I'm not robot	reCAPTCHA

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where dx = x-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = y-axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in question dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the two axes in dy = dy axis distance between the dy = dy axis distance by dy = dy axis distance between the dy = dy axis distance by dy = dy axis distance dy = d
     26 \text{ I xc} = \text{bh} \ 336 \text{ [ (Ixy rx2c} = \text{h} \ 218 \text{ Ix c} = \text{bh} \ 3/36 \text{ Ix Ixc yc} = \text{Abh} \ 36 = \text{b} \ 2 \text{ h} \ 272 \text{ ry2c} = \text{b} \ 218 \text{ Iyc} = \text{b} \ 3/36 \text{ Product of Inertia}) - \text{a} \ 2\text{b} \ 2 \sin\theta \cos\theta \ 6 \ rx2 \ ry2 = (\text{a} \sin\theta) \ 3 \ 2 = (\text{b} + \text{a} \cos\theta) \ 3 - (\text{ab} \cos\theta) \ 6 \ 2 \text{ Housner, George W., and Donald E. The RSA Public-Key Cryptosystem n=p*q where p and q are both product of Inertia and Ine
  2 6 1 xc = bh 3 36 [ (1xy rx2c = h 2 18 1 xc = bh 3 /36 | roduct of Inertia) − a 2b 2 sinθ cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 2 = (b + a cosθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosθ 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a sinθ) 3 − (a brough cosh 6 rx2 ry2 = (a brough cosh 6 rx2 
     Mn Hg Mo Ni Nb Os Pd Pt K Rh Rb Ru Ag Na Sr Ta Tl Th Sn Ti W U V Zn Zr Density \rho Atomic (kg/m3) Weight Water = 1000 26.98 121.75 74.92 137.33 9.012 208.98 112.41 132.91 40.08 140.12 52 58.93 63.54 69.72 196.97 114.82 192.22 55.85 207.2 6.94 24.31 54.94 200.59 95.94 58.69 92.91 190.2 106.4 195.08 39.09 102.91 85.47 101.07 107.87
   Volume Variable Value V
     3.79\ 3.50\ 3.29\ 3.14\ 3.01\ 2.91\ 2.83\ 2.76\ 2.71\ 2.66\ 2.61\ 2.58\ 2.54\ 2.51\ 2.49\ 2.46\ 2.44\ 2.42\ 2.40\ 2.39\ 2.31\ 2.29\ 2.28\ 2.27\ 2.18\ 2.10\ 2.02\ 1.94\ 240.5\ 19.38\ 8.81\ 6.00\ 4.77\ 4.10\ 3.68
      2.77 2.65 2.54 2.46 2.39 2.33 2.28 2.23 2.19 2.16 2.12 2.10 2.07 2.05 2.03 2.01 1.99 1.97 1.96 1.94 1.93 1.84 1.75 1.66 1.57 249.1 19.45 8.64 5.77 4.53 3.84 3.41 3.12 2.90 2.74 2.61 2.15 2.11 2.08 2.05 2.03 2.01 1.98 1.91 1.90 1.89 1.79 1.70 1.61 1.52 250.1 19.46 8.62 5.75 4.50 3.81 3.38 3.08 2.86 2.70
     2.57\ 2.47\ 2.38\ 2.31\ 2.25\ 2.19\ 2.15\ 2.11\ 2.07\ 2.04\ 2.01\ 1.98\ 1.96\ 1.94\ 1.82\ 1.81\ 1.79\ 1.65\ 1.55\ 1.46\ 251.1\ 1.947\ 8.59\ 5.72\ 4.46\ 3.77\ 3.34\ 3.04\ 2.83\ 2.66\ 2.53\ 2.43\ 2.27\ 2.20\ 2.15\ 2.10\ 2.06\ 2.03\ 1.99\ 1.85\ 1.84\ 1.81\ 1.79\ 1.69\ 1.50\ 1.39\ 252.2\ 19.48\ 8.57\ 5.69\ 4.43\ 3.74\ 3.30\ 3.01\ 2.79\ 2.62\ 2.49\ 2.38\ 2.30\ 2.22\ 2.16\ 2.11\ 2.06\ 2.02\ 1.98\ 1.95\ 1.92\ 1.89\ 1.85\ 1.84\ 1.81\ 1.79\ 1.75\ 1.75\ 1.73\ 1.71\ 1.70\ 1.68\ 1.58\ 1.47\ 1.35\ 1.22\ 254.3\ 19.50\ 8.53\ 5.63\ 4.36\ 3.67\ 3.23\ 2.93\ 2.71\ 2.54\ 2.40\ 2.30
    0.584375 1.063623 1.61031 2.20413 2.83311 3.48954 4.16816 4.86518 5.57779 6.30380 7.04150 7.78953 8.54675 9.31223 10.0852 10.8649 11.6509 12.4426 13.2396 14.0415 14.8479 15.6587 16.4734 17.2919 18.1138 18.9392 19.7677 20.5992 29.0505 37.6886 46.4589 55.3290 64.2778 73.2912 82.3581 X 2 .100 2.70554 4.60517 6.25139 7.77944 9.23635 10.6446 12.0170 13.3616 14.6837 15.9871 17.2750 18.5494 19.8119 21.0642 22.3072 23.5418 24.7690 25.9894 27.2036 28.4120 29.6151 30.8133 32.0069 33.1963 34.3816 35.5631 36.7412 37.9159 39.0875 40.2560 51.8050 63.1671 74.3970 85.5271 96.5782 107.565 118.498 Source: Thompson, C. Typical boiling curve for water at one atmosphere: surface heat flux q"s as a function of excess temperature, \DeltaTe = Ts - Tsat Free Convection Boiling - Insufficient vapor is in contact with the liquid phase to cause boiling at the saturation temperature. 159 2.3 750 ENTHALPY, Btu/lb 1.0 1650 P-h Diagram for Refrigerant HFC-134a (metric units) 350 0 0.0 90 HFC-134a (SI Units) -60 -50 0.000 0070 70 -40 0.0 -30 TEMPERATURE = -20°C 20°C -10 0 10 0. The relationship between the static and stagnation properties (T0, P0, and \rho0) at any point in the flow can be expressed as a function of the Mach number as follows: T0 1 k - 1 : Ma21 k - 1 k 1 : Ma21 k
and the standard and th
     192.168.5.0/24 can be represented by 192.168.5.0/255.255.255.0. 394 Electrical and Computer Engineering IPv4 Special Address Blocks B
     & Engineering Chemistry, "Mixing of Liquids in Chemical Processing," J. MESSAGE DATA APPLICATION TCP/UDP HEADER TCP/UDP HEADER DATA INTERNET IP HEADER DATA INTERNET IP HEADER TCP/UDP HEADER DATA INTERNET IP HEADER DATA INTERNET IP HEADER TCP/UDP HEADER DATA INTERNET IP HEADER TCP/UDP HEADER DATA INTERNET IP HEADER TCP/UDP HEADER DATA INTERNET IP HEA
     THROUGH EACH LAYER In computer networking, encapsulation is a method of designing modular communication protocols in which logically separate functions in the network are abstracted from their underlying structures by inclusion or information hiding within higher-level objects. 30 Safety Coupling Multiplier (CM) Table (Function of Coupling Multiplier)
     Mechanics, 6th ed., J.K. Vennard, 1954. The first summation represents total flow out of node i, and the second summation represents total flow into node i. Max. A multicore processor implements multiprocessing in a single physical package. Ma2 = ^ k - 1h Ma12 + 2 2k Ma12 - ^ k - 1h T2 82 + ^ k - 1h Ma12B = 2 T1 ^ k + 1h
     Ma12 P2 1 82k Ma 2 - ^ k - 1hB 1 P1 = k + 1 ^ k + 1h Ma12 t2 V1 = = t1 V2 ^ k - 1h Ma12 t2 V1 = = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h Ma12 t2 V1 = t1 V2 ^ k - 1h 
     3656/3756 S-GROUP 5AI, BF, AB/SIZE 1-1/2 X 2 - 8 METERS FEET NPSHR - FEET %EFF 50 60 A 8 1/16" DIA. Built-in potential (contact potential) of a p-n junction: NaNd V0 = kT q ln n 2 i Thermal voltage kT VT = q . d a = ^1n ah au du dx dx 14. y HEMISPHERE z c x b a y M = ab t s xc = yc = zc = 0 t s = mass/area 1 Ixx = 12 Mb2 1 r xx2 = 12 b 2
     1 Iyy = 12 Ma 2 2 = 1 a2 r yy 12 1 I zz = 12 M a 2 + b 2i 1 r zz2 = 12 a 2 + b 2i 1 r zz2 = 12 a 2 + b 2i THIN PLATE Housner, George W., and Donald E. Protocol This field defines the protocol used in the data portion of the IP datagram. The velocity ratio for a compound train is: mv = ! product of number of teeth on driver gears product of number of teeth on driver
     gears A simple planetary gearset has a sun gear, an arm that rotates about the sun gear axis, one or more gears (planets) that rotate about a point on the arm, and a ring (internal) gear that is concentric with the sun gear. Logic diagrams 4-6 5. Thermodynamic equilibrium C. When R is in Ω and T is in Kelvin, a typical thermistor might have A = 1.403
     ×10-3; B = 2.373 ×10-4; C = 9.827 ×10-8. The following gases are often present in confined spaces: 20 Safety Ammonia: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 10 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 10 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 10 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 10 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 50 ppm and deadly above 1,000 ppm; sharp, cutting odor Hydrogen sulfide: Irritating at 
     Methane: Explosive at levels above 50,000 ppm, lighter than air, odorless Carbon dioxide: Heavier than air, accumulates at lower levels and in corners where circulation is minimal, displaces air leading to asphyxiation Electrical Safety Current Level (Milliamperes) Probable Effect on Human Body 1 mA Perception level. Only the tangential component
     Wt transmits torque from one gear to another. A typical 2D stress element is shown below with all indicated components shown in their positive sense. (1) Education Requirements An individual seeking licensure as a professional engineer in engineering from an
     EAC/ABET-accredited bachelor's program (b) A degree in engineering from a non-EAC/ABET-accredited program. Homogeneous multicore systems include only identical cores; heterogeneous multicore systems have cores that are not
     identical. The k roots of r (cos \theta + j sin \theta) can be found by substituting successively n = 0, 1, 2, ..., (k - 1) in the formula i 360c w = k r 1: Y (0, b) (c, 0) X (h, k) (a, 0) ^ x - hh a2 2 - _ y - ki b2 2 = 1; Center at (h, k) is the standard form of the equation. x l = dx/dy K = - xm 81 + ^ x lh2B 3 2 The Radius of Curvature The r
     point on a curve is defined as the absolute value of the reciprocal of the curvature K at that point. Open channel (e.g., Manning, supercritical/subcritical, culverts, hydraulic elements) D. Process flow diagrams and piping and instrumentation diagrams B. Reasonable accommodations are available for examinees who meet certain eligibility criteria and
     sufficiently document their request. 2 2 th The mode of a set of data is the value that occurs with greatest frequency. Regression and curve fitting F. Rank of A is N. Thermodynamic properties (e.g., entropy, enthalpy, heat capacity) D. Options (if data offset > 5. 65536 1048576 Shared address space for communications Private network between a
     service provider and its subscribers when using a carrier-grade NAT. However, the maximum shear stress considering three dimensions is always \tau and \tau and \tau are controls (e.g., earned value, scheduling, allocation of resources, activity relationships) D. Licensees shall express a professional opinion publicly only when it is founded upon
     an adequate knowledge of the facts and a competent evaluation of the subject matter. Thus, PM = 180° + \angle G(j\omega 0dB) where \omega 0dB is the \omega that satisfies G j~i = 1. All packets after the initial SYN packet sent by the client should have this flag set. = 0.02 - 0.05 IN. d(u)/dx = nu \, du/dx \, 9. Construction estimating E. 4R: VS Pressure Sensors Pressure
     Sensors - can alternatively be called pressure transducers, pressu
     display) Temperature Sensors Resistance Temperature Detector (RTD) - a device used to relate change in temperature. dx u u 2 - 1 dx 26. 40 sta Con stan tan 50 Co EMF Output (mV) 60 0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 Temperature (°F) From Convectronics Inc., as posted on
     www.convectronics.com, July 2013. May or may not be exclusive of L1 depending on architecture ROM - nonvolatile. The expected value of Y is: E 6Y @ = # xf ^ xh dx 3 -3 while the variance is given by v 2 = V 6 X @ = E: X -
     n j D = E 7x 2A - n 2 = # ^{\circ} x - n j f ^{\circ} x h dx 3 2 2 - 3 The standard deviation is given by v = V 6X @ The coefficient of variation is defined as \sigma/\mu. Springs E. Pressure Drop for Laminar Flow The equation for Q in terms of the pressure drop \DeltaPf is the Hagen-Poiseuille equation. Virtual Condition The virtual condition is used to determine the clearance
     between mating parts. Given a, b, c, and d, and \theta2 i41, \theta2 = 2 arctan d where B ! B 2 - 4AC n 2A A = cos \theta2 - K1 - K2 cos \theta2 + K3 B = -2sin \theta2 C = K1 - (K2 + 1) cos \theta2 + K3 B = -2sin \theta2 C = K1 - (K2 + 1) cos \theta2 + K3 B = -2sin \theta2 C = K1 - (K2 + 1) cos \theta2 + K3 B = -2sin \theta2 C = K1 - (K2 + 1) cos \theta3 and \theta4 whose
     ICs are I13, I34, and I14, all of which lie on a straight line. Static friction 8-12 476 5. Stormwater (e.g., detention, routing, quality) G. • The FE exam uses both the International System (USCS). Similitude In order to use a model to simulate the conditions of the prototype, the model must be geometrically,
     kinematically, and dynamically similar to the prototype system. Water quality and modeling (e.g., erosion, channel stability, stormwater quality management, wetlands, Streeter-Phelps, eutrophication) E. Gas treatment technologies (e.g., biofiltration, scrubbers, adsorbers, incineration, catalytic reducers) F. Adiabatic Process \delta q = 0; \Delta s \geq 0 Increase
     of Entropy Principle Dstotal = Dssystem + Dssurroundings $ 0 Dsototal = Rmo outsout - Rmo in sin - R qoexternal /Texternal i $ 0 Temperature-Entropy (T-s) Diagram T 2 2 q rev = \int 1 T d s 1 AREA = HEAT s Entropy Change for Solids and Liquids ds = c (dT/T) s 2 - s 1 = \int c (dT/T) = cmeanln (T2 /T1), where c equals the heat capacity of the solid or
     liquid. They are (in order, from most significant to least significant): • bit 0: Reserved; must be zero • bit 1: Don't Fragment (DF) • bit 2: More Fragment (DF) • bit 2: More Fragment (DF) • bit 0: Reserved; must be zero • bit 1: Don't Fragment (DF) • bit 2: More Fragment (DF) • bit 0: Reserved; must be zero • bit 1: Don't Fragment (DF) • bit 2: More Fragment (DF) • bit 2: More Fragment (DF) • bit 2: More Fragment (DF) • bit 3: More Fragment (DF) • bit 4: More Fragment (DF) • bit 5: More Fragment (DF) • bit 6: More Fragment (DF) • bit 7: More Fragment (DF
     thickness of shaft wall Am = area of a solid shaft of radius equal to the mean radius of the hollow shaft Beams Shearing Force and Bending Moment Sign Conventions 1. However, its use is required to produce a consistent set of units. For IPv4, this is always equal to 4. xn), xi is the measured value, and wi is the uncertainty in that value. • Internet
     Control Message Protocol (ICMP) is a supporting protocol used to send error messages and operational information. 414 Electrical and Computer Engineering Examples nmap -v -iR 10000 -Pn -p 80 Port Scanning Generally either TCP or UDP ports are scanned. Muscular contraction
      and nerve damage begins to occur. Property and phase diagrams (e.g., T-s, P-h, P-v) H. Tertiary alcohols have the hydroxyl group united to a tertiary carbon atoms. Molecular diffusion (e.g., steady and unsteady state, physical property estimation) B. 165. It is assumed that the limits exist. Pumps,
     turbines, compressors, and vacuum systems H. Learn more about the exam scoring process. Process Capability (i.e., Centered Process) PCR = Cp = USL - LSL 6σ where μ and σ are the process mean and standard deviation, respectively, and LSL and USL are the
     lower and upper specification limits, respectively. In primary alcohols the hydroxyl group is united to a primary carbon atom united directly to only one other carbon atom united directly to only one other carbon atom. Failure to comply with any of the provisions of this Act or any of the rules or regulations of the board 5. Zone at MMC (Ø4.8) A Ø0.5 Tol. Practices any
     discipline of the profession of engineering or holds himself or herself out as able and entitled to practice any discipline of engineering b. 401 Electrical and Computer Engineering Some options may only be sent when SYN is set; they are indicated below as. H7/g6 Locational clearance fit: provides snug fit for location of stationary parts, but can be
     freely assembled and disassembled. Cost types and breakdowns (e.g., fixed, variable, direct and indirect labor, incremental, average, sunk, O&M) C. 180 Fluid Mechanics Principles of One-Dimensional Fluid Flow The Continuity Equation, as applied to one-dimensional flows, states that the
     flow passing two points (1 and 2) in a stream is equal at each point, A1v1 = A2v2. Any negligence, incompetence, or misconduct in the practice of engineering or surveying 3. The implementation of threads and processes differs between operating systems, but in most cases a thread is a component of a process. 170 0 < Pr < 7 1.10 2.50 2.00 0 0 0
     1.80\ 0\ 1.50\ 0.6\ 0\ 0.80 = vr\ 0\ 0.5\ 0.70\ 5\ 0.4\ 1.40\ 0\ 0.4\ 5\ 0.3\ 0\ 1.40\ 0\ 0.4\ 5\ 0.3\ 0\ 1.40\ 0\ 0.4\ 5\ 0.3\ 0\ 0.3\ 1.30\ 5\ 0.2\ 0.60\ vr\ 1.20\ 0.50\ T Tcr vr = v RTcr
     /Pcr Tr = 1.00 0.20 0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 REDUCED PRESSURE, Pr Definition of Compressibility Factor The compressibilit
     pressure. Engineer Intern—The term "Engineer Intern," as used in this Act, shall mean an individual who has been duly certified as an engineer intern by the board. They are typically based on measuring the strain on a thin membrane due to an applied pressure. For example, the inequality 5x1 + 3x2 + 2x3 \le 5 could be changed to 5x1 + 3x2 + 2x3 \le 1
     s1 = 5 if s1 were chosen as a slack variable. Differential Calculus The Derivative = Dx y = dy/dx = y' y l = limit s1 were chosen as a slack variable. Differential Calculus The Derivative = Dx y = dy/dx = y' y l = limit s1 when no IP address is otherwise specified, such as
     would have normally been retrieved from a DHCP server. Mass Transfer and Separation A. If Fx only depends on t, then ax ^t h = # ax ^x h dx + vxt0 t0 where ^t is the variable of integration. 201 .00006 .00004 8 107 2 4 6 8 108 Drag Coefficient for Spheres, Disks, and Cylinders CD = 24, Re
     biological) E. Expected Value: EV = (C1)(p1) + (C2)(p2) + ... Planning and scheduling (e.g., inventory, aggregate planning, MRP, theory of constraints, sequencing) E. Licensure D. Risk management (e.g., FMEA, fault trees, uncertainty) D. Traverse the left sub-tree. Predetermined time systems are useful in cases where either (1) the task does not yet
     exist or (2) changes to a task are being designed and normal times have not yet been established for all elements of the new task or changed task. Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation) B. 427 Industrial and Systems Engineering U.S. Civilian Body Dimensions, Female/Male, for Ages 20 to 60 Years
     (Centimeters) (See Anthropometric Measurements Figure) HEIGHTS Stature (height, sitting Elbow rest height, sitting Elbow rest hei
     distance Buttock-knee length, sitting Buttock-popliteal length, sitting Buttock-popliteal length, sitting HEAD DIMENSIONS Head breadth Head circumference Interpupillary distance HAND DIMENSIONS Head breadth, metacarpal Circumference, metacarpal Thickness, metacarpal III
     Digit 1 Breadth, interphalangeal Crotch-tip length Digit 2 Breadth, distal joint Crotch-tip length Digit 3 Breadth, distal joint Crotch-tip length Digit 5 Breadth, distal joint Crotch-tip length Digit 5 Breadth, distal joint Crotch-tip length Digit 5 Breadth, distal joint Crotch-tip length Digit 7 Breadth, distal joint Crotch-tip length Digit 8 Breadth, distal joint Crotch-tip length Digit 9 Breadth, distal joi
     Violating any terms of any Order imposed or agreed to by the board or using a seal or practice 10. Biochemistry, microbiology, and molecular biology (e.g., organization and function of the cell; Krebs, glycolysis, Calvin cycles; enzymes and
     protein chemistry; genetics; protein synthesis, translation, transcription) E. Pressure Relative to 0 Pa, the pressure in a vacuum Relative to local atmospheric pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 Pa, the pressure in a vacuum Relative to 1 P
     2013. A floating body displaces a weight of fluid equal to its own weight; i.e., a floating body is in equilibrium. A is row equivalent to I (identity matrix). Hazardous waste compatibility E. The easily observable IC is I14, which is located at infinity with its direction perpendicular to the interface between links 1 and 4 (the direction of sliding).
     Irreversibility, I I = wrev - wactual = TL Δstotal Heats of Reaction For a chemical reaction the associated energy can be defined in terms of heats of formation of the individual species DH %f at the standard state `ΔH %r j = Σ νi a ΔH %f k i i products reactants νi = stoichiometric coefficient for species "i" The standard state is 25°C
     and 1 bar. Motors and generators 6. A \times B = -B \times AA \times (B + C) = (A \times B) + (A \times C)(B + C) \times A = (B \times A) + (C \times A) ixi=jxj=k×k=0 i × j = k = -j × i; j × k = i = -k × j k × i = j = -i × k If A × B = 0, then either A = 0, = 0, then ei
       `dpc dp j 2 dpc = diameter of particle collected with 50% efficiency dp = diameter of particle of interest \eta = fractional particle collection efficiency e Adapted from Cooper, David C., and F.C. Alley, Air Pollution Control: A Design Approach, 2nd ed., Waveland Press, Illinois, 1986. 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/32 2001::/3
     tunneling. Vector analysis 2. In (A) and (B), \mu1 is the value assumed to be the true mean. R1 R2 VO VS R3 R4 WHEATSTONE BRIDGE R R If R1 = R2 then V0 = 0 V and the bridge is said to be balanced. Professional, ethical, and legal responsibility D. 1 dN - rA = - V dtA - dC - rA = dt A negative because A disappears i if V is constant The rate of
     reaction is frequently expressed by where -rA = kfr (CA, CB, ....) k = reaction rate constant CI = concentration of A fed. In any determinant, the minor of a given element is the determinant that remains after all of the elements are struck
     out that lie in the same row and in the same column as the given element. Heats of reaction and mixing 8-12 8. Similarly, trienes have three carbon-carbon double bonds with the general formula of CnH2n-4; hexatriene (C6H8) is such an example. + n! _ x - a i + ... Fluid Mechanics A. Black body A black body is defined as one that absorbs all energyses.
     incident upon it. Thermodynamics A. As with the source address, this may be changed in transit by a network address translation device. When the TTL field hits zero, the router discards the packet and typically sends an ICMP Time Exceeded message to the sender. Fluid properties C. All arguments of the trigonometric functions are in radians
     Street, Elementary Fluid Mechanics, 6th ed., New York: Wiley, 1982, p. 410 Electrical and Computer Engineering Data Structures Collection - a grouping of elements that are stored and accessed using algorithms. r at 7 0 0° 3.0 F 5.0 2.0 1.2 5 1.5 1.1 0 1.0 5 10 -1 ttlin 10 -2 NOTE 1. 0.65 2 3 Good: Simplest to implement, but must use a dummy
     gauge if compensating for temperature. # d f(x) = f(x) # dx = x # a f(x) dx = a # f(x
     Employers and workers use the SDS as a source of information about hazards and to obtain advice on safety precautions. # dx = ax 2 + bx + c 2ax + b + b 2 - 4ac 27c. Peak Heat Flux The maximum (or critical) heat flux (CHF) in nucleate pool boiling: qo max = Ccr h fg 8vgt 2 v tl - tv iB 1/4 Ccr is a constant
      whose value depends on the heater geometry, but generally is about 0.15. 392 Electrical and Computer Engineering The networking layer is finding appropriate routes between end hosts, and forwarding the packets along these routes.
     Perfect (plug flow) 1.0 Very high length to width ratio (pipeline flow), perforated inlet, outlet, and intra-basin baffles. Plug-Flow Reactor (PFR) τ = X dXA CA0VPFR = CA0 #0 A FA0 _ - r i A where FA0 = moles of A fed per unit time Continuous-Stirred Tank Reactor (CSTR) For a constant-volume, well-mixed CSTR τ = VCSTR = XA - rA FA0 CA0 where
     - rA is evaluated at exit stream conditions. COMPOSITE SECTION TRANSFORMED SECTION MATERIAL 2 E2, A2 E2, A2
     Theoretical effective-length factors for columns include: Pinned-pinned, K = 0.5 Fixed-fixed, K = 0.5 Fixed-fixed, K = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed, V = 0.5 Fixed-fixed, V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns: V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns and V = 0.5 Fixed-fixed buckling stress for long columns 
     Strain Energy If the strain remains within the elastic limit, the work done during deflection (extension) of a member will be transformed into potential energy and can be recovered. ^ K! 0h R= 1 K 91 + y li2C R= ym 3 2 y m! 0i 46 Mathematics L'Hôpital's Rule (L'Hôpital's Rule) If the fractional function f(x)/q(x) assumes one of the indeterminate
     forms 0/0 or \infty/\infty (where \alpha is finite or infinite), then limit f^x in f^y i
     fg T2 - T1 P lne e P2 o = : TT R 1 1 2 Gibbs Phase Rule (non-reacting systems) P+F=C+2 where P = number of phases making up a system F = degrees of freedom C = number of components in a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C = number of phases making up a system F = degrees of freedom C =
     written: molesi,out = molesi,in + viξ where ξ is the extent in moles and vi is the stoichiometric coefficient of the ith species, the sign of which is negative for reactants and positive for products. 18. U.S. Environmental Protection Agency, EPA/540/1-89/002, 1989. Corrosion mechanisms and control D. Circuit Analysis (DC and AC Steady State) A.
     Consistency of the fine with past fines for similar offenses, or justification for the fine amount C. Thus, the contact force has two components are related to the pressure angle by Wr = Wt tan(φ) Wr φ W Wt l Wt F rf t a x t l Budynas, Richard G., and J. Work,
     energy, and power G. The sample size can be obtained from the following relationships. If D 1, (wideband FM) the 98% power bandwidth B is given by Carson's rule: B \cong 2(D + 1)W Sampled Messages A low-pass message m(t) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sampling frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sample frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced samples taken at a sample frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced sample frequency of fs = 1/Ts fs > 2W where M(f) can be exactly reconstructed from uniformly spaced sample for the following frequency of fs = 1/Ts fs =
     = 0 for f > W The frequency 2W is called the Nyquist frequency. A column is considered to be intermediate if its slenderness ratio is less than or equal to (Sr)D, where ^{\circ} Sr hD = r 2SE, and y E = Young's modulus of respective member Sy = yield strength of the column material For intermediate columns, the critical load is 2 where 1 SySr Pcr = A
     >Sy - E d 2r n H Pcr A Sy E Sr = critical buckling load = cross-sectional area of the column = yield strength of the column material = Young's modulus of respective member = slenderness ratio For long columns, the critical load is 2 Pcr = r EA Sr2 where the variables are as defined above. Prepare for the FE exam by Reviewing the FE exam
     specifications, fees, and requirements Reading the reference materials Understanding scoring and reporting Viewing the most up-to-date FE exam pass rates A $175 exam fee is payable directly to NCEES. Signing, affixing, or permitting the licensee's seal or signature to be affixed to any specifications, reports, drawings, plans, plats, design
     information, construction documents or calculations, surveys, or revisions thereof which have not been prepared by the licensee or under the licensee.
     \emptyset0.1 Tol. Links 2 and 4 rotate about the fixed pivots O2 and O4, respectively. Hence T2 + V2 = T1 + V1 + U1\rightarrow2, where U1\rightarrow2 = the work done by the nonconservative forces in moving between state 1 and state 2. Integration by Parts (integral equation #6), B. If the force is constant (i.e., independent of time, displacement, and velocity) then ax = Fx
     /m vx = ax t - t0j + vxt0 x = ax t - t0j + vxt0 x = ax t - t0j + vxt0 t - t0j +
     the linked list (and sometimes back to the previous node). Network intrusion detection, network detection, 
     force (newtons) = torque on the gear (newton-mm) = pitch diameter of the gear (mm) = number of teeth on the gear (mm) = power (kW) = speed of gear (rad/s) Lewis Equation WP t v = FY where N P = d = diameter pitch (teeth/mm) F = face width (mm) Y = Lewis form factor 435 Mechanical
     Engineering Joining Methods Threaded Fasteners: The load carried by a bolt in a threaded connection is given by Fb = CP + Fi Fm < 0 while the load carried by the members is Fm = (1 - C) P - Fi where Fm < 0 C = joint coefficient = kb/(kb + km) Fb = total bolt load Fi = bolt preload Fm = total material load P = externally applied load kb = effective
      stiffness of the bolt or fastener in the grip km = effective stiffness of the members in the grip Bolt stiffness may be calculated from where A AE kb = A ld+ tA l dt td Ad At E ld lt = major-diameter area = tensile-stress area = modulus of elasticity = length of unthreaded shank = length of threaded shank contained within the grip If all members within
     the grip are of the same material, member stiffness may be obtained from where km = dEAeb(d/l) d = bolt diameter E = modulus of elasticity of retaining structures (e.g., active/passive/at-rest pressure) F. It can also be used for
     path MTU discovery, either automatically by the host IP software, or manually using diagnostic tools such as ping or traceroute. C indoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in an office complex Cindoors - COA QOA = approximate volume flow rate of outdoor air (cfm) n = number of people working in a number of people working in
     time (e.g., 4 or more hours) of human occupation (ppm) COA = concentration in return air CSA = CO2 concentration in return air CSA = CO2 concentration in supply air COA = CO2 concentration in supply air COA = CO2 concentration in return air CSA = CO2 concentration in return air CSA = CO2 concentration in supply air COA = CO2 concentration in supply air COA = CO2 concentration in supply air COA = CO2 concentration in return air CSA = CO2 concentration in supply air COA = CO2 concentra
     outdoor air Outdoor Air Changes per Hour N= where N Ci Co Ca h ln Ci - Coj - ln Ca - Coj h = air changes per hour of cot at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at start of test = outdoor concentration of CO2 at st
     Mass balance: dt = dt in + dtout! r M = CQ = CV where Continuity equation = Q = vA M = mass out r = reaction rate = volume = velocity = cross-sectional area of flow
     Stream Modeling Streeter Phelps kL D = kr d- ak 9exp '- krt j C + Daexp '- krt j C + Daex
     concentration (mg/L) = deoxygenation rate constant, base e (days-1) kd kr = reaeration rate constant, base e (days-1) La = initial ultimate BOD in mixing zone (mg/L) t = time (days) tc = time at which minimum dissolved oxygen occurs (days) Davis, MacKenzie and David Cornwell, Introduction to Environmental Engineering, 4th ed., New York:
     McGraw-Hill, 2008. 22 v 1 - e vB o t L f = Lo `1 - ho j/ xij 0 . RD x y = R + x + R D + 1 D 1 D Feed condition line slope = g/(g - 1) where heat to convert one mol of feed to saturated vapor g = molar heat of vaporization LIO U 0 < ID + g VA < 1 PO R SATURATED VAPOR g = 0 OR VAP D ATE HE 0 ER g < P SU SATURATED LIOUID g = 1 SU BC OO L g
     > ED LIQ 1 UID For a binary system, the equation of the operating line is y=x FEED COMPOSITION q-LINE SLOPES 245 Chemical Engineering Murphree plate efficiency EME = y_n - y_n + 1 where y_n = y_n + 1 and y_n = y_n + 1 where y_n = y_n + 1 and y_n = y_n + 1 where y_n = y_n + 1 and y_n = y_n + 1 are the concentration of the operating line is y_n = y_n + 1.
     concentration of vapor in equilibrium with liquid leaving equilibrium with liquid leaving equilibrium (VLE) Diagram 246 Chemical Engineering Absorption (Packed Columns) Continuous Contact Columns Z = NTUG • HTUL = NEQ • HETP where Z = column height NTUG = number of transfer units (gas phase) NTUL = number of transfer units (gas 
     transfer units (liquid phase) NEQ = number of equilibrium stages HTUG = height of transfer unit (gas phase) HTUL = L K IG a K IL a where where G L K IG K IL a = gas phase mass velocity (mass or moles/flow area • time) = liquid phase
     mass velocity (mass or moles/flow area • time) = overall liquid phase mass-transfer area • time)
     solute mole fraction x = liquid phase solute mole fractions at the lean end of column y^* = K \cdot x where K = equilibrium constant y^* = K \cdot x where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where K = equilibrium constant K \cdot x = y where 
     - y l - b y2 - y l 1 2 'y - = JK *N O KK y1 - y1 OO ln KK *O K y2 - y OO 2 L P For a chemically reacting system—absorbed solute reacts in the liquid phase—the preceding relation simplifies to: y) jLM ** y NTUG = ln d y1 n 2 247 Chemical Engineering Transport Phenomena-Momentum, Heat, and Mass-Transfer Analogy For the equations which
     apply to turbulent flow in circular tubes, the following definitions apply: hD Nu = Nusselt Number = k cp n Pr = Prandtl Number = tD m kmD Sh = Sherwood Numbe
     diameter (m) Dm = diffusion coefficient (m2/s) (dcm/dy)w = concentration gradient at the wall (M/m) (dV/dy)w = temperature gradient at the wall (W/m2•K)] k = thermal
     conductivity of fluid [W/(m•K)] km = mass-transfer flux at the wall [mol/(m2•s)] Qo Aiw = inward heat-transfer flux at the wall [mol/(m2•s)] Qo Aiw = inward heat-transfer flux at the wall flux
     fluid (mol/m3) \Delta T = temperature difference between wall and bulk fluid (K) \mu = absolute dynamic viscosity (N·s/m2) \tau w = shear stress (momentum flux) at the tube wall (N/m2) Definitions already introduced also apply. Eight successive points fall on the same side of the center line. Intellectual property (e.g., copyright, trade secrets, patents
     trademarks) D. Routing and switching B. Many decisions regarding engineering design may be based upon interpretation of disputed or incomplete information. Each day of continued violation may constitute a separate offense. The algorithm repeats for each visited node. Economic analyses (e.g., cost-benefit, breakeven, minimum cost, overhead, life
     cycle) 4-6 488 5. The weighted arithmetic mean is /w X Xw= /i i wi where Xi = the value of the population stream of the squared deviations from the population mean. Sequence Number (32 bits) Has a dual role: • If the SYN flag is set (1), then this is the initial
     sequence number. 0.30 0.40 1. User Datagram Protocol UDP Header Offsets Octet 0 Octet Bit 0 0 Source port Destination port 4 32 Length Checksum 0 1 2 3 1 4 5 6 7 8 2 3 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 The UDP header consists of four fields, each of which is 2 bytes (16 bits). The total sum of squares is equal
     to 2 m r SStotal = ! ! Yck2 - T N c = 1k = 1 where Yck is the kth observation taken for the cth experimental condition, m = 2n, T is the grand total of all observations, and N = r2n. Multiple 10-18 10-12 10-9 10-6 10-3 10-2 10-1 101 102 103 106 109 1012 1015 1018 METRIC PREFIXES Prefix atto femto pico nano micro milli centi deci deka
     hecto kilo mega giga tera peta exa Symbol a f p n µ m c d da h k M G T P E COMMONLY USED EQUIVALENTS 1 gallon of water weighs 1 cubic meter of water weighs 1 cubic foot of water weighs 1 cubic foot of water weighs 1 cubic meter of water weighs 1 cubic meter of water weighs 1 cubic meter of water weighs 1 cubic foot of water weighs 1 cubic meter of water weighs 2 cubic meters weight 1 cub
     (°C) + 32 °C = (°F - 32)/1.8 °R = °F + 459.69 K = °C + 273.15 1 Units and Conversion Factors Significant Figures of numbers in math operations will determine the accuracy of the result. A flammable liquid is defined by NFPA and USDOT as a liquid with a flash point below 100°F (38°C). The Coulomb-Mohr theory then states that
     fracture will occur for any stress situation that produces a circle that is either tangent to or crosses the envelope defined by the lines tangent to the Sut and Suc circles. Through the use of some other title, implies that he or she is a professional engineer under this Act 6. The FE Reference Handbook does not contain all the information required to
     answer every question on the exam. Gamma Function C ^ nh = #0 t n - 1e- t dt, n > 0 3 Propagation of Error Measurement E
     used. Copyrights A copyright is a form of protection provided to the authors of "original works, both published and unpublished and unpublishe
     0.0361 0.002458 centimeter (cm) atm in. Concurrent Forces A concurrent-force system is one in which the lines of action of the applied forces all meet at one point. Cameselle, and J.A.A. Adams, Sustainable Engineering: Drivers, Metrics, Tools, and Applications, 1st ed., John Wiley & Sons, 2019. Tentative upper limit of effective temperature (ET) for
     unimpaired mental performance as related to exposure time; data are based on an analysis of 15 studies. K-Maps are used to simplify switching functions by visually identifying all essential prime implicants. Press/Shrink Fits The interface pressure induced by a press/shrink fit is p= 2 r f ro + Eo ro2 - 0.5d 2 2 r r r + ri - v pi 2 + vop + Ef 2 2 i r - ri r
    2 where the subscripts i and o stand for the inner member, respectively, and p = 1 inside pressure on the outer member and outside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure on the inner member r = 1 inside pressure r = 1 ins
     Poisson's ratio of respective member The maximum torque that can be transmitted by a press fit joint is approximately T = 2\pi r^2 \mu pl, where r and p are defined above, T = torque capacity of the joint t = torque capacity t = 
     free to adopt any geometry of fit for shafts and holes that will ensure intended function. # a x dx = 1n a 10. 896. Calcium carbonate hardness removal Ca (HCO3)2 + Ca(OH)2 \rightarrow 2CaCO3(s) + 2H2O 3. • User Datagram Protocol (UDP), is a connectionless-oriented protocol that has less network overhead than TCP but provides no guarantee of delivery,
     ordering, or duplicate protection. If a datum was used with a linear dimension it would also control parallelism. 70 pp er nium Rhe dium 26% Rho n e t 13% s g m m n u tin Tu m hodiu vs. Semiconductor materials (e.g., tunneling, diffusion/drift current, energy bands, doping bands, p-n theory) B. The partial derivative with respect to x is denoted as
     follows: 2f x, y i 2z 2x = 2x 45 Mathematics The Curvature of Any Curve The curvature for the arc PQ as Q approaches P. 293 Civil Engineering Hydraulic-Elements Graph for Circular Sewers VALUE OF: f and n ff nf 1.0 1.0 1.2 1.4 1.6 2.0 2.2 2.4 2.6 2.8 3.0 3.2 3.4 3.6 n, f VARIABLE WITH DEPTH
     n, f CONSTANT INDEPENDENT OF n, f 0.9 0.8 RATIO OF DEPTH-TO-DIAMETER d D 1.8 DARCY-WEISBACH FRICTION FACTOR, f 0.7 0.6 DISCHARGE, O 0.5 MANNING'S, n HYDRAULIC RADIUS, R VELOCITY, V 0.4 0.3 AREA, A 0.2 0.1 0 0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 HYDRAULIC ELEMENTS: V , O , A , and R Rf Vf O f A f
     Design and Construction of Sanitary and Storm Sewers, Water Pollution Control Federation and American Society of Civil Engineers, 1970. Zone A uniform boundary equally disposed along the true (theoretically exact) profile within which the elements of both surfaces must lie
     simultaneously No No Profile of a Line 20±1 10 0.1 Tol. Transducer - a device used to convert a physical parameter such as temperature, pressure, flow, light intensity, etc. Compliance with codes, standards, and regulations (e.g., CWA, CAA, RCRA, CERCLA, SDWA, NEPA, OSHA) D. or 75 cm Waters, Thomas R., Ph.D., et al, Applications Manual for
     the Revised NIOSH Lifting Equation, Table 7, U.S. Department of Health and Human Services (NIOSH), January 1994. The field carries all-zeros if unused. In rectangular form, a complex number is written in terms of its real and imaginary components. Trojan, Engineering Materials & Their Applications, 4th ed., Houghton Mifflin Co., Boston, 1990.
     To locate the remaining two ICs (for a fourbar) we must make use of Kennedy's rule. 102 Materials Science/Structure of Matter Impact Test is used to find energy required to fracture and to identify ductile to brittle transition. Control Systems A. Foundation types (e.g., spread footings, deep foundations, wall footings, mats) I.
     Licensees who have knowledge or reason to believe that any person or firm has violated any rules or laws applying to the practice of engineering or surveying shall report it to appropriate legal authorities, and shall cooperate with the board and those authorities as requested. Thermodynamics and Heat Transfer A. This
     energy addition results in an increase in fluid pressure (head). Patm = PA = Pv + \gammah = PB + \gammah = 
     A1 { }A 2 Vennard, J.K., Elementary Fluid Mechanics, 6th ed., J.K. Vennard, 1954. Polymers LOG σ Polymers are classified as thermoplastics that can be melted and reformed. This value is the breakeven point. 179 Fluid Mechanics Forces on Submerged Surfaces and the Center of Pressure Patm SIDE VIEW (y-z PLANE) h = y sin θ h θy h
     LIQUID Fu P dF θ dA Patm z PLANAR VIEW FROM ABOVE (x-y PLANE) yC y y yCP x dA CENTROID (C) CENTER OF PRESSURE (CP) y SUBMERGED PLANE SURFACE Elger, Donald F., et al, Engineering Fluid Mechanics, 10th ed., 2012. Water Treatment—horizontal velocities should not exceed 0.5 fpm 2. and RfD = lifetime (i.e., chronic) dose that
     a healthy person could be exposed to daily without adverse effects NOAEL # W UF SHD = safe human dose (mg/day) NOAEL = threshold dose per kg of test animal [mg/(kg•day)] from the dose-response curve UF = total uncertainty factor, depending on nature and reliability of the animal test data =
     weight of the adult male W 24 CHEMICAL COMPATIBILITY CHART Reactivity Group No. Name 2 Acids, Minerals, Oxidizing 2 3 Acids, Organic G H 3 4 Alcohols & Glycols H H F H P 5 Aldehydes H P H F H P 6 Amides H H GT 7 Amines, Aliphatic & Aromatic H H GT H 8 Azo Compounds, Diazo Comp, Hydrazines H G H GT H G 9 Carbamates H G H G 9 Carba
     10 Caustics H H H 11 Cyanides GT GF GT GF GT GF GT GF GT GF H GF F H GF F H GF F H GF GT U 15 GT H H F H G GT GF H F H G GT GF H F H G Metal, Alkali & Alkaline Earth, Elemental 104 Oxidizing Agents, Strong
     H GT 105 Reducing Agents, Strong H GF 106 Water & Mixtures Containing Water H H F GT H G H F H F GF H GF H
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used in this Act, shall mean the jurisdiction board of licensure for professional engineers and professional surveyors, hereinafter provided by this Act. R V A DW S A B C G A T = SB E W A = = D E F SS W C FW T X Inverse []-1 The inverse B of a square n × n matrix A is B = A -1 = adj ^ Ah A where adj(A) = adjoint of A (obtained by replacing AT
 elements with their cofactors) A = determinant of A [A][A]-1 = [A]-1[A] = [I] where I is the identity matrix. Linear motion (e.g., force, mass, acceleration) C. Vibrations (e.g., natural frequency) 9-14 Strength of Materials A. It occurs over an infinitesimal distance. Flip-flops and counters F. Network topologies (e.g., mesh, ring, star) C. 448 Mechanical
Engineering Kinematics, Dynamics, and Vibrations Kinematics of Mechanisms Four-Bar Linkage shown above consists of a reference (usually grounded) link (2), a coupler link (2), a coupler link (2), a coupler link (3), and an output link (4).
 engineering attack. a(c) = +1 if there is an even number (or zero) of factors in the group set at the low level (Level 1) in experimental condition c = 1, 2, ..., m at can be proved that the interaction effect E for the factors in
the group and the corresponding sum of squares SSL can be determined as follows: E = L - 2n \ 1m \ L = / \ a^chY \ ch \ c=1 \ SSL = rL2 \ 2n \ Sum of Squares of Random Error The sum of squares due to factor Xi, SSij is the
sum of squares due to the interaction of factors Xi and Xj, and so on. The number of different combinations for C(n,r) r 3. Rate-of-Return The minimum acceptable rate-of-return (MARR) is that interest rate that one is willing to
accept, or the rate one desires to earn on investments. Perry's Chemical Engineers' Handbook, 8th ed., McGraw-Hill, 2008. Groundwater (e.g., flow, wells, drawdown) I. Perfect Form at MMC, a note such as PERFECT
FORM AT MMC NOT REQUIRED is specified. Table reprinted by permission of G.W. Housner & D.E. Hudson. Aluminum sulfate (alum) Al2 (SO4)3 • 14 H2O + 2 PO43- \rightarrow 2 AlPO4 ($\pm$) + 3 SO42- + 14 H2O Common Radicals in Water Molecular Formulas CO32- CO2 Ca(OH)2 CaCO3 Ca(HCO 3)2 CaSO4 Ca2+ H+ HCO3- Mg(HCO3)2 Mg(OH)2 MgSO4 Ca2+ H+ HCO3- Mg(HCO3)2 MgSO4 Ca2+ H+ HCO3- MgSO4 C
Mg2+ Na+ Na 2CO3 OH - SO42- Molecular Weight n # Equiv per mole Equivalent Weight 30.0 22.0 37.1 50.0 81.1 68.1 20.0 1.0 61.0 146.3 58.3 120.4 24.3 23.0 106.0 17.0 96.1 Typical Operating Ranges for Coagulation with Alum
ZERO ZETA POTENTIAL n+ With AIx(OH)3 (s) 4+ AI8(OH)20 -8 100 6 8 10 12 SWEEP COAGULATION 27 -4 2.7 -6 Fe(OH) RE-STABILIZATION ZONE (CHANGES WITH COLLOID OR SURFACE AREA) -8 -10
- 12 14 pH OF MIXED SOLUTION 0 2 ADSORPTION DESTABILIZATION 2+ 0.27 FeTOTAL Fe(OH)2+ 4 6 8 10 12 14 pH OF MIXED SOLUTION Metcalf and Eddy; AECOM, Wastewater Engineering: Treatment and Resource Recovery, 5th ed., New York: McGraw-Hill, 2014, p. These databases and software to manipulate them are
commercially available. Select the job with the shortest time, from the list of jobs, and its time at each work center. For an n-bit binary word length, transmission of a pulse-code-modulated low-pass message m(t), with M(f) = 0 for f \ge W, requires the transmission of at least 2nW binary pulses per second. Effective stress E. Force transmitted with the
required to be able to reassemble datagrams of size up to 576 bytes, but most modern hosts handle much larger packets. 4 1 34 2 1 1.0 1/2 3 1 Good: Gauges must be mounted at 45 degrees from centerline. The heat of reaction for a combustion process using oxygen is also known as the heat of combustion. Yes (Axis) Yes Not a refinement of size.
Incomplete Combustion Some carbon is burned to create carbon monoxide (CO). ICMP and ICMPv6 Header Format Offsets Octet 0 Octet Bit 0 0 Type 4 32 Rest of Header 0 1 2 3 1 4 5 6 7 8 9 10 11 2 12 13 14 15 16 Code 17 18 19 3 20 21 22 23 24 25 26 Checksum Partial List of ICMP Type and Code Values (IPv4) ICMP Type ICMP Code 0 = Echo
Reply 0 0 = net unreachable 1 = host unreachable 2 = protocol unreachable 2 = protocol unreachable 2 = protocol unreachable 3 = Redirect Datagram for the Host 2 = Redirect Datagram for the ToS and network 3 = Redirect Datagram for the ToS
and host 8 = Echo Request 0 9 = Router Advertisement 0 10 = Router Solicitation 0 0 = TTL expired in transit 11 = Time Exceeded 1 = Fragment reassembly time exceeded 403 27 28 29 30 31 Electrical and Computer Engineering Partial List of ICMPv6 Type and Code Values ICMPv6 Type ICMPv6 Code 0 = no router to destination 1 =
communication with destination administratively prohibited 2 = Beyond scope of source address failed ingress/egress policy 6 = reject route to destination 7 = Error in Source Routing Header 2 = Packet Too Big 0 0 = hop limit exceeded in transit 3
Time exceeded 1 = fragment reassembly time exceeded 0 = erroneous header field encountered 2 = unrecognized IPv6 option encountered 2 = unrecognized IPv6 option encountered 2 = unrecognized IPv6 option encountered 128 = Echo Request 0 129 = Echo Reply 0 130 = Multicast Li stener Query 0 131 = Multicast Li stener Done 0 1 3 3 = R o u t e r So l i c
t a t i o n 0 134 = Router Advertisement 0 1 3 5 = N e i g h b o r So l i c i t a t i o n 0 136 = Redirect Message 0 0 = Router Renumbering Result 255 = Sequence Number Reset 0 = The Data field contains an IPv6 address which is the Subject of this
Query 139 = ICMP Node Information Query 1 = The Data field contains a name which is the Subject of this Query, or is empty, as in the case of a NOOP. Smith; and Peter Harriott, Unit Operations of Chemical Engineering, 6 ed., New York: McGraw-Hill, 2001. Sub-Cooled Boiling - Temperature of liquid is below saturation temperature; bubbles
forming at surface may condense in the liquid. Transmissivity, T: The product of hydraulic conductivity and thickness, b, of the aquifer (L2T -1). xmax = distance along plume centerline to the point of maximum concentration (Cu/Q)max = e [a + b lnH + c (lnH) 2 + d (lnH) 3] H = effective stack height + plume rise (m) Turner, D.B.
"Workbook of Atmospheric Dispersion Estimates: An Introduction to Dispersion Modeling," 2nd ed., Lewis Publishing/CRC Press, Florida, 1994. Prime Implicant - An implicant equivalent codes for a four-bit binary value. Three-phase
power (e.g., motor efficiency, balanced loads, power equation) 14. A planetary gearset has two independent inputs and one output (or two outputs and one input, as in a differential gearset). The pressure drop P1 - P2 is given by the following: P1 - P2 is given
 one-dimensional flows. The point-slope form is y - y1 = m(x - x1) Given two points: slope, m = (y2 - y1)/(x2 - x1) The angle between lines with slopes m1 and m2 is \alpha = \arctan[(m2 - m1)/(1 + m2 \cdot m1)] Two lines are perpendicular if m1 = -1/m2 The distance between two points is d = y2 - y1i + 2 Quadratic Equation ax^2 + bx + c = 0 b! b
2 - 4 ac x = Roots = 2 a Quadric Surface (SPHERE) The standard form of the equation is (x - h)2 + (y - k)2 + (z - m)2 = r2 with center at (h, k, m). Gaining Access 4. 412, Oxford University Press. When a mechanical force is applied, the material changes dimension and an electric field is produced. UNBRACED LENGTH 2 X8 14 X73 X68 W24 W21 7 X68
X68 6 W1 X62 W24 W 10 X8 X7 8X7 4 9 W21 10 X8 8 X7 14 W X68 1 4 X6 8 12 67 6X 73 W21X 68 2 X62 W21 X7 W1 W24X 14 5 8X6 X62 W1 W24 W 55 X55 0X 77 50 8X 0X 14 8 5 0 68 W21X 5 X6 8X6 W1 12 5 62 W24X 14 16 18 UNBRACED LENGTH (0.5-ft INCREMENTS) Steel Construction Manual, 14th ed., AISC, 2011. Traffic capacity and flow
theory D. Examples: unit, integration, system, and acceptance testing. Equivalent force systems C. 222 Instrumentation, Measurement, and Control Strain Bridge Type Gauge Setup Sensitivity mV/V @ 1,000 µs 1 0.5 1/4 Axial 1 2 1/2 1.0 Better: Rejects bending strain, but not temperature. Parallel-Axis Theorem The mass moments of inertia may be
calculated about any axis through the application of the above definitions. Material/Energy Balances A. 395 Electrical and Computer Engineering IPv6 Special Address Blocks Block
of moist air/mass of dry air. ARC LENGTH The symbolic means of indicating a dimension is an arch length measured on a curved outline. (Harris, C.E., M.S. Pritchard, & M.J. Rabins, Engineering Ethics: Concepts and Cases, Wadsworth Publishing company, pages 27-28, 1995.) The expertise possessed by engineers is vitally important to societal
welfare. 231 Engineering Economics Benefit-Cost Analysis In a benefit estimated costs C. When reporting measurement results, it is necessary to provide an associated uncertainty so that those who use it may assess its reliability. Engineering Economics A. Submit five references acceptable
to the board B. The last fragment has a non-zero Fragment Offset field, differentiating it from an unfragmented packet. Thermal properties of materials E. Baffling Description Agency, 2003. Lost workday cases rate 5. It is given by A•B = axbx +
ayby + azbz = A B cos i = B : A The cross product is a vector product of magnitude B A sin \theta which is perpendicular to the plane containing A and B. Its efficiency is given by: \eta c = (TH - TL)/TH where TH and TL = absolute temperatures (Kelvin or Rankine). These substances, such as plasticizers, improve formability during processing, while others
increase strength or durability. The United States relies on public codes and standards, engineering designs, and corporate policies to ensure that a structure or place does what it should do to maintain a steady state of safety—that is, long-term stability and reliability. A1, T1, ε1 Q12 A2, T2, ε2 Q0 12 = v `T14 - T24j 1 - f2 1 - f1 1 - f 4 f1A1 + 2 2
A1F12 + =c 1 m + c 1 mG A1F1R A2F2R 219 AR, TR, ER Instrument to accepted input reference values (for example, using a different instrument with known accuracy), including an evaluation of all the associated uncertainties. Binary
Phase Diagrams Allows determination of (1) what phases are present at equilibrium at any temperature and average composition, (2) the compositions of those phases. Boiling Point Elevation - The presence of a nonvolatile solute in a solvent raises the boiling point of the resulting solution. [Source: ISO JCGM
200:2012, definition 2.26] Given a desired state or measurement y, which is a function of different measurement y, which is a function of different measurement y, and assuming that the different measurement y are uncorrelated, the Klinei McClintock equation can be used to compute the expected standard
uncertainty of y (oy) is: e vy = 2 2 2 f 2f 2f o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o 2 e o
dust, heat, electrical currents, or radiation possible? 19-3, fig. Sensors and transducers B. 1 2 Ma > 1 Ma < 1 NORMAL SHOCK 190 Fluid Mechanics The following equations relate downstream flow conditions for a normal shock wave. In particular, when dx/dt = f(x) x[(k+1)\Delta t] \cong x(k\Delta t) + \Delta t f[x(k\Delta t)] which can be
expressed as the recursive equation xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t (dxk/dt) xk + 1 = xk + \Delta t
ni X1 + X2 + f + Xni = 1 ni! Xi i= 1 X " n for sufficiently large values of n. air at 3.0 0 7 5.0 0°F 2.0 0.5 1 Se .0 ttlin q in wa te 10. Note that the force unit conversion factor gc [lbm-ft/(lbf-sec2)] should not be confused with the local acceleration of gravity q, which has different units (m/s2 or ft/sec2) and may be either its standard value (9.807 m/s2).
or 32.174 ft/sec2) or some other local value. Fluid properties (e.g., Newtonian, non-Newtonian, liquids and gases) B. The use of the checksum and source port fields is optional in IPv4 (gray background in table). • 8,10,TTTT,EEEE (80 bits)- Timestamp and echo of previous timestamp • The remaining options are historical, obsolete, experimental, not
yet standardized, or unassigned. For nucleate boiling a widely used correlation was proposed in 1952 by Rohsenow: qo nucleate = nl h fg < where 1/2 g tl - tv iF cpl Ts - Tsat i > H v Csf h fg Prln 3 qo nucleate = nucleate boiling heat flux (W/m2) μl = viscosity of the liquid [kg/(m•s)] hfg = enthalpy of vaporization (J/kg) g = gravitational
acceleration (m/s2) \rhol = density of the liquid (kg/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (N/m) cpl = specific heat of the liquid (g/m3) \sigma = surface tension of liquid-vapor interface (g/m3) \sigma = surface tension of liquid-vapor i
Prandtl number of the liquid n = x reaction with radius r = x. We will have the standard form of the equation with radius r = x. He and Mass Transfer: A Practical Approach, 3rd ed., New York: McGraw-Hill, 2007. Circle r = x. He and Mass Transfer: A Practical Approach, 3rd ed., New York: McGraw-Hill, 2007. Circle r = x.
point on a circle to a point (x',y'): t^2 = (x'-h)^2 + (y'-k)^2 - r^2 Brink, R.W., A First Year of College Mathematics, D. The radius of gyration of a column cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is, r = I A where I is the area moment of inertia and A is the cross-section is a column cross-section cross-section is a column cross-section cro
 information requested by the board as a result of a formal or informal complaint to the board that alleges a violation of this Act 7. 449 Mechanical Engineering Velocity Analysis. First-Order Linear Homogeneous Differential Equations with Constant Coefficients y' + ay = 0, where a is a real constant: Solution, y = Ce-at where C = a constant that
 satisfies the initial conditions. Solubility Product of a slightly soluble substance AB: AmBn \rightarrow mAn+ + nBm- Solubility Product Constant = KSP = [A+]m [B-]n Faraday's Equation Q M m = c F ma z k where m = mass (grams) of substance liberated at electrode Q = total electric charge passed through electrolyte (coulomb or ampere esecond) F =
96,485 coulombs/mol M = molar mass of the substance (g/mol) z = valence number A catalyst is a substance that are considered "confined" because their configurations hinder the
activities of employees who must enter, work in, and exit them. The gauge factor for metallic strain gauges is typically around 2. Frequency response evaluations to determine dynamic performance and stability. Nonferrous metallic strain gauges is typically around 2. Frequency response evaluations to determine dynamic performance and stability. Nonferrous metallic strain gauges is typically around 2. Frequency response evaluations to determine dynamic performance and stability.
plastic deformations 7. Thermodynamic properties of pure components and mixtures (e.g., specific volume, internal energy, enthalpy, entropy, free energy, ideal gas law) B. Basic hydrology (e.g., physical, chemical, thermal, biological) 7-11 15. A
 basic angle must be used from the toleranced feature to the datum referenced. Reactions are written as anode half-cells. Q = CAO\ P\ P\ 2g\ d\ c1\ + z1\ - c2\ - z2\ n where C, the coefficient of the meter (orifice coefficient), is given by C = CVCc\ 1\ - Cc2\ A0\ A1i\ 2\ 196\ Fluid Mechanics Bober, W, and W, and W, and W are W and W are W and W are W are W and W are W and W are W and W are W are W are W are W are W and W are W are W and W are W and W are W are W are W and W are W are W are W and W are W are W are W and W are W and W are W are W and W are W are W are W and W are W are W and W are W are W and W are W are W are W and W are W and W are W are W and W are W and W are W and W are W are W are W and W are W are W and W are W are W and W are W are W are W and W are W and W are W and W are W are W and W are W are W and W are W and W are W and W are W and W are W are W and W are W and W are W and W are W and W are 
be described as a sum of minterms using the notation F(ABCD) = \Sigma m(h, i, j,...) = mh + mi + mj + ... A function represented as a product of maxterms using the notation F(ABCD) = \Sigma m(h, i, j,...) = mh + mi + mj + ... A function represented as a sum of minterms only is said to be in canonical sum of products (SOP) form. Engaging in dishonorable,
unethical, or unprofessional conduct of a character likely to deceive, defraud, or harm the public 11. X X X 2X1 1 2X2 2 2Xn n Binomial Distribution P(x) is the probability that x successes will occur in n trials. Chemical properties of materials D. Block diagrams (e.g. feedforward, feedback) B. kPa psat Specific Volume m3/kg Sat. liquid sf Entropy
kJ/(kg·K) Sat. Coefficient of Performance (COP) is defined as: COP = QL/W for heat pumps, and as COP = QL/W for refrigerators and air conditioners. Fragmentation in IPv4 is handled in either the host or in routers. Some licensing boards may require you to file a separate application and pay an application fee as part of the approval process to
qualify you for a seat for an NCEES exam. The minimum value for this field is 5 which indicates a length of 5 × 32 bits = 160 bits = 20 bytes. Energy Line (Bernoulli Equation) The Bernoulli equation states that the sum of the pressure, velocity, and elevation heads is constant. Passing the NCEES Fundamentals of Engineering (FE) examination 2.
Manufacturing processes G. Licensure by Comity for a Professional Engineer The following shall be considered as minimum evidence satisfactory to the board that the applicant is qualified for licensure by comity as a professional engineer (1) An individual holding a certificate of licensure to engage in the practice of engineering issued by a proper
authority of any jurisdiction or any foreign country, based on requirements that do not conflict with the provisions of this Act and possessing credentials that are, in the judgment of the board, of a standard that provides proof of minimal competency and is comparable to the applicable licensure act in effect in this jurisdiction at the time such
certificate was issued may, upon application, be licensed without further examination except as required to examine the applicant's knowledge of statutes, rules, and other requirements unique to this jurisdiction; or (2) An individual holding an active Council Record with NCEES, whose qualifications as evidenced by the Council Record meet the
requirements of this Act, may, upon application, be licensed without further examination except as required to examine the application. 5 mA Slight shock felt; not painful but disturbing. The circle drawn with the center on the normal stress (horizontal) axis with center, C,
and radius, R, where C = vx + vy, R = 2 d 2 vx - vy R = 2 d 2 vx - vy, R = 2 d 2 vx - vy R = 2 d 2 vx R 
LD50 for Rats Amount Needed to Kill an Average Size Adult Danger—Poison Highly Toxic 50 or less Taste to a teaspoons One to 5,000 one t
principles include consideration of: • Safety • Public health • Quality of life • Resource allocation • Non-renewable resources Life-cycle analysis (cradle to grave) involves assessing the potential environmental consequences associated with a project or product from design and development through utilization and disposal. 2. Tests on Variances of
Normal Distribution with Unknown Mean Hypothesis Test Statistic H0: \sigma 2 = \sigma 02 H1: \sigma 12 = \sigma 22 H1: \sigma 12 = \sigma 22 H1: \sigma 13 = \sigma 25 H1: \sigma 12 = \sigma 26 H1: \sigma 12 = \sigma 27 H1: \sigma 12 = \sigma 12 H1: \sigma 12 = \sigma 12 H1: \sigma 13 = \sigma 12 H1: \sigma 13 = \sigma 14 H1: \sigma 15 = \sigma 15 H1: \sigma 15 = \sigma 15 H1: \sigma 16 H1: \sigma 17 H1: \sigma 17 H1: \sigma 18 H1: \sigma 18 H1: \sigma 19 H1: 
-1, n2-1 F0 < F1-\alpha2, n1-1, n2-1 H0: \sigma12 = \sigma22 H1: \sigma12 < \sigma22 F0 = s 12 s 22 F0 > F\alpha, n1-1, n2-1 Assume that the values of \alpha and \beta are given. For constant service time, \sigma2 = 0. 80 0.99 0.0100 0.0001 0.0199 0.0000 0.0003 0.0297 0.0000 0.0006 0.0394
Protocol version 6 (ICMPv6) is the implementation of ICMP for Internet Protocol version 6 (IPv6). Mechanical Engineering Geometric Dimensioning and Tolerance Types 10±0.2 Angularity Drawing Callout Example ASME Symbol 0.1 Tol. The optimal yield of D in a PFR is k at time U C D, max
k = e Do C A0 kU k U - k D j ln k U k D j 1 = \tau max = k log mean k U - k D j 1 = \tau max = k log mean k U - k D i The optimal yield of D in a CSTR is C D, max C A0 = at time 1 9 k U k D i 1 2 + 1 C \tau max = 1 2 k D k U Mass Transfer Diffusion Where p D 2p Gas: NA = PA NA + NB i - m A RT 2z 2x Liquid: NA = xA NA + NB i - CDm 2zA Ni P pi Dm = molar flux
where Ni = diffusive flux [mole/(time × area)] of component i through area A, in z direction Dm = mass diffusivity pI = partial pressure of species I C = concentration (mole/volume) (z2 - z1) = diffusion flow path length 242 Chemical Engineering Equimolar Counter-Diffusion (Gases) (NB = -NA) NA = Dm ] RT g # 8_pA1 - pA2i ^ DzhB NA = Dm
 ^{\circ}CA1 - CA2h Dz Convection Two-Film Theory (for Equimolar Counter-Diffusion) NA = k'G (pAG - pAi) = k'L (CAi - CAL) = K'G (pAG - pAi) = K'L (CA* - CAL) where NA = molar flux of component A k'G = gas phase mass-transfer coefficient K'L = overall
liquid phase mass-transfer coefficient pAG = partial pressure in component A in the bulk gas phase pAi = partial pressure at component A in the bulk liquid phase at the gas-liquid interface CAI = concentration of component A in the bulk liquid phase pA* = partial pressure of
component A in equilibrium with CAL CA* = concentration of Component A in equilibrium with the bulk gas vapor composition of A Overall Coefficients 1/K'G = 1/k'G + H/k'L 1/K'L = 1/Hk'G + H/k'L 1/K'L = 1/Hk'
 = molar overhead-product rate = molar feed rate = molar liquid downflow rate = ratio of reflux to overhead product = molar vapor upflow rate = total moles in still pot = molar feed rate = molar feed rate = molar liquid downflow rate = total moles in still pot = molar feed rate = mo
product F = feed m = any plate in stripping section of column m+1 = plate below plate in rectifying section of column m+1 = plate below plate in strill pot Flash (or equilibrium) Distillation Component material balance: <math>F = V + L Differential (Simple or Rayleigh) Distillation In the stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate in stripping section of column m+1 = plate below plate i
 c W m = \#x y dx x Wo o x When the relative volatility \alpha is constant, y = \alpha x/[1 + (\alpha - 1) x] can be substituted to give x = 1 - x of x = (y/x)a/(y/x)b = pa /by where y = a / b whe
Factorial Designs For a levels of Factor A, b levels of Factor B, and n repetitions per cell: 2/// yijk - y ••• j = bn / y i•• - y ••• j + // yijk - y i•• - y •j• + y ••• j + // yijk - y i•• - y •j• + y ·•• j = bn / y i•• - y ••• j a b a n b 2 i=1 j=1 k=1 SStotal = SSA + SSB + S
yijk i=1 j=1 k=1 2 y••2 y••• a SSA = / bn - abn i=1 2 b y•2j• y••• SSB = / an - abn j=1 2 a b y ij2• y••• - SSA - SSB SSAB = / / n - abn i=1 j=1 SSerror = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSerror = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSerror = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSerror = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSerror = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSA - SSB SSAB = / / n - abn i=1 j=1 SSError = SST - SSAB - SSAB - / / n - abn i=1 j=1 SSError = / / n - abn i=1 j=1 SSError = / / n - abn i=1 j=1 SSError = / / n - abn i=1 j=1 SSError = / 
voltage output is proportional to the difference in temperature between the measured point and the reference junction. Consistency of the fine amount Model Law, Section 160.10 General Requirements for Certificates of Authorization A. Zone 0.1 A B A 30° 30° Datum A Datum B B 0.1 Tol
Test for a Minimum y = f(x) is a minimum for x = a, if f'(a) = 0 and f''(a) > 0. Otan, et al., "Use of probabilistic methods to understand the conservatism in California's approach to assessing health risks posed by air contaminants," Journal of the Air and Waste Management Association, vol. Economic analyses (e.g., breakeven, benefit-cost, optimal
economic life) C. Water-cement (W/C) ratio is the primary factor affecting the strength of concrete. Flow measurement (e.g., orifices, Venturi meters) G. Engineers must employ concern for environmental health and public safety by addressing such things as: • Landscape aesthetics • Protection of ecosystems • Resource conservation • Air and water
pollution • Atmospheric emissions • Collection and processing of waste Adapted from: United States General Services Administration, "Sustainable Design" page, . Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation, confidence intervals) C. In a JSA, each basic step of the job is reviewed, potential hazards identified
and recommendations documented as to the safest way to do the job. Wo = Q\rho_v 1 - vi_1 - cos \alpha i v Wo = power of the turbine. • FIN (1 bit): Last packet from sender. If the quotients are equal, the series is geometric: 1. 36. d\phi/dz is the twist per unit length or the rate of twist. Examinees are not penalized for any errors in the Handbook that affect
batch reactor calculations, the time to reach a given conversion K C x 1 t = V m ln 1 - x + Vs0 max max Batch Reactor, Variable Volume of the reacting mass varies with the conversion (such as a variable-volume batch reactor) according to V = VXA = 0 1 + fAXAh (i.e., at constant pressure) where fA = VXA = 1 - VXA = 0 = VDV VXA = 0 = VDV VXA = 0 = 0
0 XA = 0 then at any time 1 - XA CA = CA0 < F 1 + fAXA and t = -CA0 #0 A dXA/8^1 + fAXAh ^- rAhB X For a first-order irreversible reaction, kt = - ln c1 - DV m f AVXA = 0 240 Chemical Engineering Flow Reactors, Steady State Space-time τ is defined as the reactor volume divided by the inlet volumetric feed rate. Complex
numbers can be added and subtracted in rectangular form. Engineer's role in society (e.g., sustainability, resiliency, long-term viability) 5-8 4. 189 v Fluid Mechanics This shows that the acoustic velocity in an ideal gas depends only on its temperature. benefit, or safety vs. This force acts in the same direction as P. Quality and reliability L. Also known
as an associative array. Control strategies (e.g., feedback, feedforward, cascade, ratio, PID controller tuning, alarms, other safety equipment) C. Fluid-energy superfine mills Perry, Robert H., and Don Green, Perry's Chemical Engineers' Handbook, 7 ed, New York: McGraw-Hill, 1997. In-Order Traversal 1. 315 Environmental Engineering Baghouse
Air-to-Cloth Rao for Baghouses Shaker/Woven Jet/Felt Dust [m3/(min • m2)] [m3/(min • m2)] [m3/(min • m2)] [m3/(min • m2)] alumina 0.8 2.4 cosmetics 0.5 3.0 enamel frit 0.8 2.7 feeds, grain 1.1 4.3 feldspar 0.7 2.7 fertilizer 0.9 2.4 flour 0.9 3.7 fly ash
0.8 1.5 graphite 0.6 1.5 gypsum 0.6 3.0 iron ore 0.9 3.4 iron oxide 0.8 2.1 iron sulfate 0.6 1.8 lead oxide 0.6 1.8 lead oxide 0.6 1.8 lead oxide 0.6 1.8 lead oxide 0.8 2.1 paper 1.1 3.0 plastics 0.8 2.1 paper 1.1 3.7 soap detergents 0.6 1.5
spices 0.8 3.0 starch 0.9 2.4 sugar 0.6 2.1 talc 0.8 3.0 tobacco 1.1 4.0 U.S. EPA OAQPS Control Cost Manual, 4th ed., EPA 450/3-90-006 (NTIS PB 90-169954), January 1990. Bayes' Theorem P`BjjP`ABjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Bj and a starch 0.9 2.4 sugar 0.6 2.1 talc 0.8 3.0 tobacco 1.1 4.0 U.S. EPA OAQPS Control Cost Manual, 4th ed., EPA 450/3-90-006 (NTIS PB 90-169954), January 1990. Bayes' Theorem P`BjjP`ABjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability of event Aj within the population of AP`Bjj = the probability o
 within the population of B Probability Functions, Distributions, and Expected Values A random variable X has a probability associated with each of its possible values. d 1n u = u1 du dx dx u i 13. Kinematics of mechanisms H. Stress and strain caused by bending loads E. Licensees shall issue no statements, criticisms, or arguments on engineering
and surveying matters that are inspired or paid for by interested parties, unless they explicitly identify the interested parties on whose behalf they are speaking and reveal any interest they have in the matters. The atomic number of protons in the atomic number of protons in the atomic number of protons in the atomic number is the number of protons in the atomic number of proto
factor for soil = 10-6 kg/mg CR = contact rate (L/hr) Dermal contact with soil CS = chemical concentration in water (mg/L) Inhalation of airborne (vapor phase) chemicals ED = exposure duration (years) CDI = (CA)(IR)(ET)(ED) (BW)(AT)
frequency (days/yr or events/year) ET = exposure time (hr/day or hr/event) Ingestion of contaminated fruits, vegetables, fish and shellfish CDI = (CF)(IR)(FI)(EF)(ED) (BW)(AT) FI = fraction ingested (unitless) IR = ingestion rate (m3/hr) PC = chemical-specific dermal permeability constant (cm/hr) SA
contendere to any crime that is a felony, whether or not related to the practice of engineering or surveying; and conviction of or entry of a plea of guilty or nolo contendere to any crime, whether or not related to the practice of engineering or surveying 4.
Mass Moment of Inertia The definitions for the mass moments of inertia are Ix = # ` y 2 + z 2 j dm Iy = # _ x 2 + z 2 j dm Iy = # _ x 2 + z 2 j dm Iy = # _ x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iy = # _ x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz = # ` x 2 + z 2 j dm Iz 
Out of Reach of Children Keep Out of Children Keep 
metals) Corrosion A table listing the standard electromotive potentials of metals is shown on the previous page. Measurements, Instrumentation, and Controls A. Strain Transducers Strain Gauge - a device whose electrical resistance varies in proportion to the amount of strain in the device. Reaction rates and order B. (N-S) Similar to cylindrical tank
classifier, except tank is conical to eliminate need for rake. Rogers, Review for the Professional Engineers' Examination in Industrial Engineering, 2012. Aluminum sulfate plus soda ash Al2 (SO4)3 + 3 NaSO4 + 3 CO2 3. When the equation is a homogeneous differential equation, f(x) = 0, the solution is yh \land xh = C1e
Strain Curve for Mild Steel Flinn, Richard A., and Paul K. Mechanical energy balance (e.g., pipes, valves, fittings, pressure losses across packed beds, pipe networks) D. 0.060 0.080 0.10 30 -10 100. ALKALINE STEEL = < 0.002 IN. • If the SYN flag is clear (0), that a packet with Congestion Experienced flag set (ECN=11) in the IP header was
received during normal transmission. Eutectic reaction (liquid \rightarrow two solid phases) Eutectoid reaction (solid \rightarrow two solid phases) Peritectic reaction (liquid \rightarrow two solid phases) Peritectoid reaction (liquid \rightarrow two solid phases) Peritectic 
weight of each phase in a two-phase system can be determined: \alpha + \beta A x\alpha 0% B 100% A x\beta x COMPOSITION, WT% (In diagram, L = liquid.) If x = the average composition at temperature T, then x -x wt % a = x b x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 100 b- a x - xa wt % b = x x # 1
Vlack, L.H., Elements of Materials Science and Engineering, 6th ed., ©1989. Mass and energy balances G. In determining mv, it is helpful to invert the mechanism by grounding the arm and releasing any gears that are grounded. Analytic geometry, logarithms, and trigonometry B. Geotechnical Engineering A. The lesser and greater sublists are then
EIG HT ,H (Cu/Q)max, m-2 NOTES: Effective stack height shown on curves numerically. The SDS is product may be used. Zone 0.1 Ø10±0.2 Concentric circles, within which each circular element of the surface must lie Circularity 0.1
Concentric cylinders, within which all surface elements must lie R 0.1 Tol. This can be used when sending packets to a host that does not have resources to handle fragmentation. For an internal feature, it is equal to the MMC minus the related geometric tolerance. The sum of n terms is S. 160 ... We will also post errata on the website. Raising
temperature causes (1) recovery (stress relief), (2) recrystallization, and (3) grain growth. It is defined when its (1) magnitude, (2) point of application, and (3) direction are known. Values of the coefficient Ccr for maximum heat flux (dimensionless parameter L* = L[g(\rho l - \rho v)/\sigma]1/2 Heater Geometry Large horizontal flat heater Small horizontal flat
heater1 Large horizontal cyclinder Small horizontal cyclinder Large sphere Small sphere 1K = \sigma/[g(\rho \ 1\ l\ Charac.\ Linear\ algebra\ (e.g.,\ matrix\ operations)\ E.\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.168.0.0/16\ 192.1
= C = 0, a straight line is defined. Primary control for features of size. If the indicated sum is greater than unity, the mixture is above the lower and upper limits of flammable limit. There is no difference between the terms flammable and explosive as applied to the lower and upper limits of flammable limit. There is no difference between the terms flammable and explosive as applied to the lower flammable limit.
0.008 813 0.006 945 0.004 925 0.003 155 Internal Energy kJ/kg Sat. Using IPv6 jumbograms, it is possible to have UDP packets of size greater than 65,535 bytes. Motors and generators (e.g., synchronous, induction, dc) 8-12 11. Work measurement (e.g., time study, predetermined time systems, work sampling, standards) C. Process design and
S3 S3 i0 S0 S2 S3 S0 i3 S3 S3 S3 S3 Another way to represent a finite state machine is to use a state diagram, which is a directed graph with labeled edges. Time value of money (e.g., equivalence, present worth, rate of return) B. Piezoresistive effect - a change in the intrinsic electrical conductivity of a material
due to a mechanical strain. In practice, the field has become a hop count—when the datagram arrives at a router, the router decrements the TTL field by one. Rule 2: Any zeros between two significant digits are significant digits are significant. Steady-state analysis using constant inputs based on the Final Value Theorem. The Option-Kind field indicates the type of option.
and is the only field that is not optional. Engineering (FE) OTHER DISCIPLINES CBT Exam Specifications effective Beginning with the July 2020 Examinations • The FE exam is a computer-based test (CBT). The program traceroute
uses these ICMP Time Exceeded messages to print the routers used by packets to go from the source to the destination. 169 ft3/lbmol — 1.20 4.08 1.50 1.49 Thermodynamics SELECTED LIQUIDS AND SOLIDS op Density Substance k]/(kg·K) Btu/(lbm-° R) kg/m3 lbm/ft3 Liquids Ammonia Mercury Water 4.80 0.139 4.18 1.146 0.033 1.000 602 13,560
continuous first derivative then the (j +1)st estimate of the root is aj + 1 = aj - f ^ xh df ^ xh dx x a j = The initial estimate of the root a0 must be near enough to the actual root to cause the algorithm to converge to the root. [Source: ISO JCGM 200:2012 definition 2.16] Sources of errors in measurements arise from imperfections and disturbances in
the measurement process, and added noise. . Kinematics of rigid bodies G. Two widely used abstract models for modern computer networks are the open systems interconnect (OSI) model and the TCP/IP model shown in the figure below. Chemical reactions (e.g., stoichiometry, equilibrium, bioconversion) 5-8 4. Columns become rows. Pi = Pyi = hxi
component i xi = mol fraction of component i in the liquid Pi* = vapor pressure of pure component i in the temperature of the mixture at equilibrium For a multicomponent i in the liquid Equilibrium For a multicomponent i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liquid Pi* = vapor pressure of pure component i in the liq
phase i Fugacities of component i in a mixture are commonly calculated in the following ways: For a liquid ftiL = xi γi f iL where xi = mole fraction of component i in the vapor t = fugacity coefficient of component i fiL = fugacity coefficient of component i in the vapor t = fugacity coefficient of component i γi = activity coefficient of component i fiL = fugacity coefficient of fugac
component i in the vapor U i P = system pressure The activity coefficient \gamma is a correction for liquid phase nonideality. Examples: code reviews and walkthroughs and compiler syntax and structure checks. For systems with time delay (dead time or transfer function is - is Y ^{\circ} sh = xKe s + 1 R ^{\circ} sh The step response for t \geq 0 to a
step of magnitude M is where y \uparrow t = 9 y0e - t - i /x + KM _1 - e - t - i /x iC u \uparrow t - i /x iC u
typically available 7-10 days after you take the exam. This material may be downloaded from nees.org for personal use only. -d tan 1 u i = 1 du dx 1 + u 2 dx -d cot 1 u i = -1 du 25. To detect and correct errors, redundant bits need to be added to the transmitted data. Torsion Torsion stress in circular solid or thick-walled (t > 0.1 r) shafts: x = -1 du 25. To detect and correct errors, redundant bits need to be added to the transmitted data.
conservation program requires: (1) testing employee hearing, (2) providing hearing protection at employee's request, and (3) monitoring noise exposure. If a2 > 4b, the solution is of the form (critically damped) y = C1er1x + C2er2 x If a2 < 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 < 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 < 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the form (overdamped) y = C1er1x + C2er2 x If a2 > 4b, the solution is of the fo
 (underdamped) y = e\alpha x (C1 cos \beta x + C2 \sin \beta x), where \alpha = -a/2 b= 4b - a 2 2 Fourier Transform The Fourier transform pair, one form of which is 3 F \simh e j\simt d\sim can be used to characterize a broad class of signal models in terms of their frequency or spectral content. 287 1.0 0.0 Civil
                                                                                                                                                             ression Members Fv = 50 ksi \omega c = 0.90 KL r 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 \omegaFcr ksi 45.0 45.0 44.9 44.8 44.8 44.7 44.7 44.6 44.5 44.4 44.3 44.2 44.1 43.9 43.8 43.7 43.6 43.4 43.3
43.1\ 43.0\ 42.8\ 42.7\ 42.5\ 42.3\ 42.1\ 41.9\ 41.8\ 41.6\ 41.4\ 41.2\ 40.9\ 40.7\ 40.5\ 40.3\ 40.0\ KL r 41\ 42\ 43\ 44\ 45\ 46\ 47\ 48\ 49\ 50\ 51\ 52\ 53\ 54\ 55\ 56\ 57\ 58\ 59\ 60\ 61\ 62\ 63\ 64\ 65\ 66\ 67\ 68\ 69\ 70\ 71\ 72\ 73\ 74\ 75\ 76\ 77\ 78\ 79\ 80
32.7 32.4 32.1 31.8 31.4 31.1 30.8 30.5 30.2 29.8 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 29.5 
20.7 20.4 20.1 19.8 19.5 19.2 18.9 18.6 18.3 18.0 17.7 17.4 17.1 16.8 16.5 16.2 16.0 15.7 KL r 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 Adapted from Steel Construction Manual, 15th ed., AISC 2017. Cylindricity is a
composite control of form which includes circularity, straightness and taper of a cylindrical feature. The minimum size header is 5 words and the maximum of 60 bytes and maximum of 60 bytes and maximum of 60 bytes and maximum is 15 words thus giving the minimum size of 20 bytes and maximum of 60 bytes and maximum is 15 words thus giving the minimum size of 20 bytes and maximum of 60 bytes and maximum of 60 bytes and maximum is 15 words thus giving the minimum size of 20 bytes and maximum of 60 bytes and maximum is 15 words thus giving the minimum size of 20 bytes and maximum of 60 bytes and maximum is 15 words thus giving the minimum size of 20 bytes and maximum of 60 bytes and maximum of 60 bytes and maximum is 15 words and the maximum of 60 bytes and maximum of 
Physical Property Tables (at room temperature) GASES Substance Mol wt cp kJ/(kg·K) cv ° R k kJ/(kg·K) ct. 167 0.2870 0.2870 0.2870 0.2881 0.1430 0.1889 0.2968 53.34 38.68 26.58 35.10 55.16 0.361 0.753 2.44 0.403 0.148 1.18 1.67 1.40 1.30 1.67 0.2765 2.0769 4.1240 0.5182 0.4119 51.38 386.0 766.4 96.35 76.55 0.177 0.392
0.157 0.362 0.335 1.40 1.04 1.40 1.12 1.33 0.2968 0.0729 0.2598 0.1885 0.4615 55.15 13.53 48.28 35.04 85.76 Btu/(lbm- R) kJ/(kg·K) Btu/(lbm- R) 0.240 0.125 0.415 0.203 0.246 1.49 3.12 10.2 1.74 0.618 0.248 0.409 0.219 0.407 0.445 0.743 1.64 0.658 1.49
1.41 Gases Air Argon Butane Carbon dioxide Carbon monoxide 29 40 58 44 28 Ethane Helium Hydrogen Methane Neon 30 4 2 16 20 Nitrogen Octane vapor Oxygen Propane Steam Substance 28 114 32 44 18 1.00 0.520 1.72 0.846 1.04 1.77 5.19 14.3 2.25 1.03 1.04 1.71 0.918 1.68 1.87 Critical Temperature, Tcr GASES Critical Pressure, Pcr Critical
Volume, Vcr Air Argon Butane Carbon dioxide Carbon monoxide K 132.5 150.8 425.0 304.1 132.9 °R 238.5 271.4 765.4 547.4 239.2 MPa 3.77 4.87 3.80 7.38 3.50 atm 37.2 48.1 37.5 72.8 34.5 m3/kmol — 0.0749 0.255 0.0939 0.09325 Ethane Helium Hydrogen 305.4 5.19 33.2 549.7 9.34 59.8 4.88 0.227 1.30 48.2 2.24 12.8 0.1483 0.0574 0.0651 2.376
0.9195 1.043 Methane Neon 190.4 44.4 342.7 79.9 4.60 2.76 45.4 27.2 0.0992 0.0416 1.59 0.666 Nitrogen Octane vapor Oxygen Propane Steam 126.2 568.8 154.6 369.8 647.1 227.2 1024.0 278.3 665.6 1165.0 3.39 2.49 5.04 4.25 22.06 33.5 24.6 49.7 41.9 217.7 0.0898 0.492 0.0734 0.203 0.0560 1.44 7.88 1.18 3.25 0.8971 Howell, John R., and
Richard O. Frames and trusses E. Thermosets cannot be melted and reformed. The shearing force is positive if the right portion of the beam tends to shear downward with respect to the left. The services may include, but not be limited to, providing planning, studies, designs, design coordination, drawings, specifications, and other technical
submissions; teaching engineering design courses; performing surveying that is incidental to the practice of engineering; and reviewing construction or other design products for the purposes of monitoring compliance with drawings and specifications related to engineering design courses; performing surveying that is incidental to the practice of engineering; and reviewing construction or other design products for the purposes of monitoring compliance with drawings and specifications related to engineering design courses; performing surveying that is incidental to the purposes of monitoring compliance with drawings and specifications related to engineering design courses; performing surveying that is incidental to the purposes of monitoring compliance with drawings and specifications.
columns are, for: rounded-rounded or pinned-pinned ends, leff = 1; fixed-free, left = 1; fixed-free, leff = 1; fixed-free, leff = 1; fixed-free, leff = 1; fixed-free, left = 1; fixed-fr
forces acting on the control volume \Sigma Q1\rho1v1 = rate of momentum of the fluid flow entering the control volume in the same direction of the force \Sigma Q2\rho2v2 = rate of momentum of the fluid flow entering the control volume in the same direction of the force \Sigma Q2\rho2v2 = rate of momentum of the fluid flow entering the control volume in the same direction of the force \Sigma Q2\rho2v2 = rate of momentum of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid flow entering the control volume in the same direction of the fluid f
enlargement, or contraction in a pipeline may be computed using the impulsement may be computed using the i
Steady-State Error ess Type T=0 T=1 T=2 1/(KB + 1) 0 0 Ramp \infty 1/KB 0 Acceleration \infty \infty 1/KB Unit Step 2. Security (e.g., port scanning, network vulnerability testing, web vulnerability testing, web vulnerability testing, security (e.g., port scanning, network vulnerability testing).
next header. Pointers A pointer is a reference to an object. CMRR = A Acm CMRR is usually expressed in decibels as: CMRR = 20 log10 = A G Acm Solid-State Electron mobility \equiv hole mobility \equiv hole concentration \equiv hole concentration \equiv hole concentration \equiv
charge on an electron (1.6 \times 10-19C) Doped material; ptype 
following graphs (with \omega 0 = 2\pi/T). Test for a Point of Inflection at x = a, if f''(x) changes sign as x increases through x = a. Dx! f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 k = 0 Trapezoidal Rule for n = 1 #a f^{a} + kDxh b n- 1 f^{a
equation is a vector equation. 30 Iron Chr ome l vs. If not required, it must state 'SEPARATE REQUIREMENT.' Median points to axis control. Dimensional changes are usually very small and can be predominantly in one dimension. Newton's second law for particles D. Power transmission I. It can be proved that L E = n-1 2 m L = / a chY ch c=1
SSL = rL2 \ 2n \ 421 \ Industrial \ and \ Systems \ Engineering \ where \ ma(c) \ a(c) \ r = number \ of \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 2) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ set \ at \ its \ low \ level \ (Level 1) \ in \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ experimental \ condition \ c = +1 \ if \ the \ factor \ is \ experimental \ condition \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ the \ factor \ c = +1 \ if \ th
= average response value for experimental condition c SSL = sum of squares associated with the factor Interaction Effects Consider any group of two or more factors. i1 S0 i3 i2 S1 S3 i 2, i 3 i0, i 1, i 2, i 3 Mathematics The characteristic of how a function maps one set (X) to another set (Y) may be described in terms of
being either injective, surjective, surjective, surjective, or bijective, or bijective, and standards commonly used in the United States are
shown in the table. The RQ depends on substrates and organisms involved. Laminar and turbulent flow F. Internet Control Message Protocol (ICMP) is a supporting protocol in the Internet Control Message Protocol (ICMP) is a supporting protocol in the Internet Control Message Protocol (ICMP) is a supporting protocol in the Internet Control Message Protocol (ICMP) is a supporting protocol in the Internet Control Message Protocol (ICMP) is a supporting protocol (ICMP) is a supporting protocol in the Internet Control Message Protocol (ICMP) is a supporting protocol (ICMP) i
scalar value function h(x) = h(x1, x2, ..., xn) find a vector x^* \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x^*) \le h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all h(x) = h(x) for all x \in Rn such that h(x) = h(x) for all x 
2 S q q Sq S 2 2 2h S 2h g 2x2 2xn S2x1 2xn T, where x = xk V 2 2h W 2x1 2xn W W q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q Q W W q q W W q Q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W W q q W w q q W W q q W w q q W W q q W w q q W W q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w q q w w
required for the solution of a particular exam question will be included in the question itself. Dynamic friction H. Combinations of Random Variables Y = a1 \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + ... + an \times 1 + a2 \times 2 + 
the alkyl groups and adds the word ketone. Licensees shall not partner, practice, or offer to practice with any person or firm that they know is engaged in fraudulent or dishonest business or professional practices. Fluid statics C. The minimum length is 8 bytes, the length of the header. Can be used as refinement of size. Dynamics, Kinematics, and
Vibrations A. Transmission and distribution (e.g., real and reactive losses, efficiency, voltage drop, delta and wye connections) C. The pass rates below represent FE exam within 12 months of graduation ExamVolumePass rateFormat
AvailabilityLast updated FE Chemical33173%CBTYear roundJan 2022 FE Environmental47070%CBTYear roundJan 2022 FE Environmental47070%CBTYear roundJan 2022 FE Industrial and Computer81573%CBTYear roundJan 2022 FE Environmental47070%CBTYear roundJan 2022 FE Other
Disciplines 45565% CBTYear round an 2022 Other Disciplines exam breakdown by examinee degree* ProgramVolumePass rateFormatAvailabilityLast updated Architectural 6458% CBTYear round an 2022 General Engineering 4163% CBTYear round an 2022 Mechanical 5078% CBTYear round an 2022 General Engineering 4163% CBTYear round and a contract of the contract of 
2022 Naval Architecture & Marine 2983% CBTYear roundJan 2022 Petroleum 3435% CBTYear roundJan 2022 *Conly EAC/ABET degrees with more than 25 first-time examinees are reported. Free-body diagrams I. 144. Buckius, Fundamentals of Engineering Thermodynamics, 2nd ed., 1992, McGraw Hill, adapted from Table C.4 Critical Constants, pp.
Additional rules of conduct are also included in the Model Rules. Two separate flowrates mo 1 and mo 2: mo 1 h1i - h1e j = mo 2 h 2e - h2i j Mixers, Separators, Open or Closed Feedwater Heaters: \Sigmamo ihi = \Sigmamo end Basic Cycles Heat engines take in heat QH at a high temperature TH, produce a net amount of work W, and
reject heat QL at a low temperature TL. Air Quality and Control A. Probability distributions (e.g., normal, binomial, empirical, discrete, continuous) B. Now by integrating and summing over a system of any number of particles, this may be expanded to t2 \Sigma H0i it2 = \Sigma H0i it1 + \Sigma # M0idt t1 The term on the left side of the equation is the angular
momentum of a system of particles at time t2. Applies to each circular element independently, 1 ton refrigeration cycles are plotted on T-s diagrams in this section: reversed rankine, two-stage refrigeration, air refrigeration Psychrometrics Properties of an air-water vapor mixture at a fixed
pressure are given in graphical form on a psychrometric chart as provided in this section. 92 Chemistry and Biology PERIPLASMIC SPACE OUTER MEMBRANE 3 µm 1 µm SEX PILUS RIBOSOMES PEPTIDOGLYCAN CYTOPLASMIC CHROMOSOME FLAGELLA INNER OR CYTOPLASMIC MEMBRANE COMMON PILUS 10 µm 20 µm
MITOCHONDRIA CELL WALL STARCH GRANULES PLASMA MEMBRANE NUCLEUS ENDOPLASMIC RETICULUM ANIMAL PLANT Shuler, Michael L., & Fikret Kargi, Bioprocess Engineering Basic Concepts, Prentice Hall PTR,
perpendicular distance d from the centroidal axis to the axis in question. dx 1 + u 2 dx 24. Big O equations are written as: O(n) = f(n) When comparing the efficiency of two algorithms, compare two O(n) values as n approaches infinity. Optionally, it may provide other services, such as reliability, in-order delivery, flow control, and congestion control.
397 Electrical and Computer Engineering Fragment Offset The fragment offset field is measured in units of eight-byte blocks. Design of experiments (e.g., ANOVA, factorial designs) 485 9-14 10-15 6. This is called the torsional stiffness and is often denoted by the symbol k or c. If the values do not match, the router discards the packet. Confined
spaces include, but are not limited to, underground vaults, tanks, storage bins, manholes, pits, silos, process vessels, and pipelines. If a purchase cost is available for an item of equipment in year M id Current Index in Index
Estimation Lang factors Type of plant Fixed capital investment Total ca
information on a map or in a digital database matches true or accepted values that are relative to the earth's surface or other reference datum Surveying deliverables—Any map, database, report, or other similar
electronic or printed deliverable that shows the authoritative location of features or coordinate systems. For n independent components connected in parallel, n R P1, P2, fPni = 1 - 9 1 - Pi i = 1 422 Industrial and Systems Engineering Learning Curves The time to do
the repetition N of a task is given by where TN = KN s K = constant s = \ln (learning rate, as a decimal)/\ln 2; or, learning rate = 2s If N units are to be produced, the average time per unit is given by Tayg = K8 N + 0.5 h^1 + sh Inventory Models For instantaneous replenishment (with constant demand rate, known holding
and ordering costs, and an infinite stockout cost), the economic order quantity is given by EOQ = where 2AD h A = cost to place one order D = number of units used per year h = holding cost per unit per year Under the same conditions as above with a finite replenishment rate, the economic manufacturing quantity is given by EMQ = 2AD h 1 - D R is
where R = the replenishment rate Facility Planning Equipment Requirements n PijTij Mj = / C ij i=1 where Mj Pij Tij Cij n = number of machine j, measured in pieces per production period = production period 
piece = number of hours in the production period available for the product i on machine j = number of crews required for assembly operation j = desired product i and assembly operation j (pieces per day) = standard time to
perform operation j on product i (minutes per piece) = number of minutes available per day for assembly operation j on product i = number of product i = n
Measurement The Pitot Tube From the stagnation pressure equation for an incompressible fluid, v = 2 \rho i P0 - Ps j = where 2g P0 - Ps 
Vennard, 1954. Brown Purple -454 to 1,832°F -270 to 1,000°C Oxidizing or Inert. Jurisdiction," as used in this Act, shall mean a state, the District of Columbia, or any territory, commonwealth, or possession of the United States that issues licenses to practice and regulates the practice of engineering and/or surveying within
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its legal boundaries. Postorder Traversal 1. Trojan, Engineering Materials and Their Applications, 4th ed., Houghton Mifflin Company, 1990. Kinematics of particles B. 291 Civil Engineering Well Drawdown Unconfined aquifer Q ORIGINAL GROUNDWATER LEVEL r2 r1 PERMEABLE SOIL h2 h1 BOTTOM OF AQUIFER IMPERMEABLE Dupuit's
 Formula Q= where rK h 22 - h12 j r ln d r2 n 1 Q = flowrate of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from well (cfs) K = coefficient of water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface above bottom of aquifer at distance r2 from water surface r2 from water surface r2 from water surfa
 surface at perimeter of well, i.e., radius of well (ft) r2 = radius to water surface whose height is h2 above bottom of aquifer (ft) ln = natural logarithm Q/Dw = specific capacity Dw = well drawdown (ft) Confined aquifer ORIGINAL PIEZOMETRIC SURFACE H AQUITARD TOP OF AQUIFER PERMEABLE SOIL r1 h2 h1 r2 BOTTOM OF AQUIFER
 IMPERMEABLE 292 b Civil Engineering Theim Equation Q= T = Kb = transmissivity (ft2/sec) b = thickness of confined aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of aquifer (ft) h1, h2 = heights of piezometric surface above bottom of 
 Minimum or of Peak-to-Average Daily Sewage Flow where 2r T `h 2 - h1 j r ln d r2 n 1 P 0.2 Curve A 2: 5 14 + Curve B: 1 4+ P 18 + P Curve
 activity coefficient, Raoult's law) G. If the final load is P and the corresponding elongation of a tension member is δ, then the total energy U stored is equal to the work W done during loading. Note that the value in the IHL field must include enough extra 32-bit words to hold all the options (plus any padding needed to ensure that the header contains
an integer number of 32-bit words). The averages of n observations tend to become normally distributed as n increases. Impersonating any licensee 6. Statically indeterminate systems 5-8 9-14 10-15 489 9-14 9. The integer following the slash indicates the number of leftmost bits that are common to all addresses on the network. Gain margin (GM),
 which is the additional gain required to produce instability in the unity gain feedback control system. Hypothesis testing and design of experiments (e.g., t-test, outlier testing, analysis of the variance) D. 221 Instrumentation, Measurement, and Control Alloy Combination and Color ANSI Code + Lead - Lead J IRON Fe (magnetic) White
 CONSTANTAN COPPER-NICKEL Cu-Ni Red K NICKELCHROMIUM Ni-Cr Yellow T COPPER Cu Blue E NICKELCHROMIUM Ni-Cr Purple NICKEL Cu-Ni Red CONSTANTAN COPPER-NICKEL Cu-Ni Red CONSTANTAN CU-NI RED CU-NI 
 Temperature Range Leads Cable Environment Reducing, Vacuum, Inert. The Engineering Probability and Statistics section provides a high-level overview of measurement uncertainty. For an external feature, the virtual condition is equal to the MMC plus the related geometric tolerance. 115 Dynamics Plane Circular Motion A special case of radial
 and transverse components is for constant radius rotation about the origin, or plane circular motion. Abbreviation ACK Acknowledge ARQ Automatic request BW Bandwidth CRC Cyclic redundancy code DHCP Dynamic host configuration protocol IP Internet protocol LAN Local area network NAK Negative acknowledgement OSI Open systems
 interconnect TCP Transmission control protocol P
4.952 5.414 5.875 6.337 6.799 7.260 Sat. McCabe's Cyclomatic Complexity c=e-n+2 where for a single program graph, n is the number of nodes, e is the number of students and graduates from their programs, comparing results on
 specific content areas to national averages. Heat-transfer equipment, operation, and design (e.g., double pipe, shell and tube, fouling, number of transfer units, log-mean temperature difference, flow configuration) 8-12 10. No (Surface) Straightness Ø10±0.2 Ø0.1 Tol. The number of different permutations of n objects taken n at a time, given that ni
 are of type i, where i = 1, 2, ..., k and \sumni = n, is n! P n; n1, n2, f, nk i = n1!n2!fnk! Sets De Morgan's Law A,B= A+B A+B= A,B Associative Law A, ^{\circ}B + Ch = ]A + Bg + ^{\circ}A, Ch A + ^{\circ}B + Ch = ]A + Bg + ^{\circ}A, Ch A + ^{\circ}B + Ch = ]A + Bg + ^{\circ}Ch = ]A + Bg + ^{\circ}A, Ch A + ^{\circ}B + Ch = ]A + Bg + ^{\circ}Ch = ^{\circ}
be empty. 9. Pressure vessels and piping F. Cyclone 50% Collection Efficiency (m) = dynamic viscosity of gas (kg/m•s) = inlet width of cyclone (m) = number of effective turns gas makes in cyclone = inlet
 velocity into cyclone (m/s) = density of particle (kg/m3) = density of gas (kg/m3) Cyclone Collection Efficiency (%) where Particle Size Ratio dp d pc Adapted from Cooper, David C., and F.C. Alley, Air Pollution Control: A Design Approach, 2nd ed., Waveland Press, Illinois, 1986. The network interface layer of the TCP/IP model
 corresponds to the bottom two layers (data link and physical) of the OSI model. Predicting Lower Flammable Limits of Mixtures of 
 Symmetry Datum A A Ø5±0.2 0.1 A Ø10±0.2 Runout Circular Runout Datum A A Ø5±0.2 0.1 A Ø10±0.2 Runout Circular Runout Datum A A Ø5±0.2 0.1 A Ø10±0.2 Runout Circular Runout Datum A A Ø5±0.2 0.1 A Ø10±0.2 Runout Circular Runout Datum A A Ø5±0.2 0.1 A Ø10±0.2 Runout Circular Runout Datum A Datum A
 multiprocessing, the operating system may use hardware threads that exist as a hardware-supported method for better utilization of a particular CPU. The secretary of state of this jurisdiction shall not accept organizational papers nor issue a certificate of incorporation, organization, licensure, or authorization to any firm which includes among the
 objectives for which it is established or within its name, any of the words "engineer," "engineering," "surveyor," "surveying," or any modification or derivation thereof unless the board has issued for said applicant a certificate of authorization or derivation or a letter indicating the eligibility of such applicant to receive such a certificate. Flow measurement B. 44
Mathematics Conic Section Equation The general form of the conic section equation is Ax2 + Bxy + Cy2 + Dx + Ey + F = 0 where not both A and C are zero. 232 Engineering Economics Interest Rate Tables Factor Table - i = 0.50% n 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 30 40 50 60 100 n 1 2 3 4 5 6 7 8 9 10 11 12 13 14
15\ 16\ 17\ 18\ 19\ 20\ 21\ 22\ 23\ 24\ 25\ 30\ 40\ 50\ 60\ 100\ P/F\ 0.9950\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851\ 0.9851
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9.3342\ 9.8172\ 10.2993\ 10.7806\ 11.2611\ 11.7407\ 14.1265\ 18.8359\ 23.4624\ 28.0064\ 45.3613\ Factor\ Table - i=1.00\%\ P/G\ F/P\ F/A\ A/P\ A/F\ A/G\ 0.0000\ 0.9901\ 2.9604\ 5.9011\ 9.8026\ 14.6552\ 20.4493\ 27.1755\ 34.8244\ 43.3865\ 52.8526\ 63.2136\ 74.4602\ 86.5835\ 99.5743\ 113.4238\ 128.1231\ 143.6634\ 160.0360\ 177.2322\ 195.2434\ 214.0611\ 233.6768
254.0820\ 275.2686\ 392.6324\ 681.3347\ 1,035.6966\ 1,448.6458\ 3,562.7934\ 0.0000\ 0.9803\ 2.9215\ 5.8044\ 9.6103\ 14.3205\ 19.9168\ 26.3812\ 33.6959\ 41.8435\ 50.8067\ 60.5687\ 71.1126\ 82.4221\ 94.4810\ 107.2734\ 120.7834\ 134.9957\ 149.8950\ 165.4664\ 181.6950\ 198.5663\ 216.0660\ 234.1800\ 252.8945\ 355.0021\ 596.8561\ 879.4176\ 1,192.8061
2,605.7758 F/P 1.0050 1.0100 1.0151 1.0202 1.0253 1.0304 1.0355 1.0407 1.0459 1.046 1.1157 1.1268 1.1381 1.1495 1.1616 1.1272 1.1328 1.1614 1.2208 1.2832 1.3489 1.0406 1.0510 1.0201 1.0303 1.0406 1.0510 1.0615 1.0721 1.0829 1.0937 1.1046 1.1157 1.1268 1.1381 1.1495 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1272 1.1328 1.1616 1.1050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0050 1.0
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24.0158\ 29.9158\ 34.9997\ 39.3803\ 51.6247\ P/A\ 0.9804\ 1.9416\ 2.8839\ 3.8077\ 4.7135\ 5.6014\ 6.4720\ 7.3255\ 8.1622\ 8.9826\ 9.7868\ 10.5753\ 11.3484\ 12.1062\ 12.8493\ 13.5777\ 14.2919\ 14.9920\ 15.6785\ 10.3514\ 17.0112\ 17.6580\ 18.2922\ 18.9139\ 19.5235\ 22.3965\ 27.3555\ 31.4236\ 34.7609\ 43.0984\ P/G\ 0.0000\ 0.9707\ 2.8833\ 5.7098\ 9.4229\ 13.9956
 1.2690\ 1.2880\ 1.3073\ 1.3270\ 1.3469\ 1.3671\ 1.3876\ 1.4084\ 1.4295\ 1.4509\ 1.5631\ 1.8140\ 2.1052\ 2.4432\ 4.4320\ F/A\ 1.0000\ 2.0150\ 3.0452\ 4.0909\ 5.1523\ 6.2296\ 7.3230\ 8.4328\ 9.5593\ 10.7027\ 11.8633\ 13.0412\ 14.2368\ 15.4504\ 16.6821\ 17.9324\ 19.2014\ 20.4894\ 21.7967\ 23.1237\ 24.4705\ 25.8376\ 27.2251\ 28.6335\ 30.0630\ 37.5387\ 54.2679\ 73.6828
 96.2147\ 228.8030\ Factor\ Table\ -\ i = 2.00\%\ P/G\ F/P\ F/A\ 0.0000\ 0.9612\ 2.8458\ 5.6173\ 9.2403\ 13.6801\ 18.9035\ 24.8779\ 31.5720\ 38.9551\ 46.9977\ 55.6712\ 64.9475\ 74.7999\ 85.2021\ 96.1288\ 107.5554\ 119.4581\ 131.8139\ 144.6003\ 157.7959\ 171.3795\ 185.3309\ 199.6305\ 214.2592\ 291.7164\ 461.9931\ 642.3606\ 823.6975\ 1,464.7527\ 1.0200\ 1.0404
7.9681\ 8.4073\ 8.8433\ 9.2760\ 9.7055\ 10.1317\ 10.5547\ 10.9745\ 13.0251\ 16.8885\ 20.4420\ 23.6961\ 33.9863\ Engineering Economics Interest Rate Tables Factor Table - i = 4.00\%\ n\ P/F\ P/A\ P/G\ 1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\ 11\ 12\ 13\ 14\ 15\ 16\ 17\ 18\ 19\ 20\ 21\ 22\ 23\ 24\ 25\ 30\ 40\ 50\ 60\ 100\ 0.9615\ 0.9246\ 0.8890\ 0.8548\ 0.8219\ 0.7599\ 0.7307\ 0.7026\ 0.6756
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 competence B. 408, Oxford University Press. Multiplication of Two Matrices R V SA BW A = SC DW A3,2 is a 3-row, 2 - column matrix S W SE F W T X H I G B2,2 is a 2-row, 2 - column matrix B == J K In order for multiplication to be possible, the number of columns in A must equal the number of rows in B. Tolerance value must be less than the size
 empty vessel) fluid velocity (m/s) \rho = \text{fluid density} (kg/m3) \mu = \text{fluid viscosity} [kg/(m•s)] 185 Fluid Mechanics Submerged Orifice Operating under Steady-Flow Conditions: Vennard, 1.K., Elementary Fluid Mechanics Submerged Orifice Operating under Steady-Flow Conditions: Vennard, 1954. The transport layer adds a transport header normally containing TCP and UDP protocol information
Tolerance zone can be bilateral or unilateral or unilatera
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 centroid to the center of a particular fastener. Both UDP and TCP have checksum fields. Component scalar equations may be obtained by considering the momentum and force in a set of orthogonal directions. Component scalar equations may be obtained by considering the momentum and force in a set of orthogonal directions.
to 2,193°F -210 to 1,200°C Brown Yellow -454 to 2,501°F -270 to 1,372°C Clean Oxidizing and Inert. For instance, in writing Newton's second law, the equation would be written as F = ma/gc, where F is in lbf, m in lbm, and a is in ft/ sec2. Elastic Potential Energy For a linear elastic spring with modulus, stiffness, or spring constant, k, the force in
the spring is Fs = k s where s = the change in length of the spring from the undeformed length of the spring. Case 4. 22 v 1 -ev B o t, i, j 0 . AIT, autoignition temperature, is the lowest temperature above which no external ignition source is required to initiate combustion. Generally, the term of a new patent is 20 years from the date on which the
application for the patent was filed in the United States or, in special cases, from the date an earlier related application was filed, subject to the payment of maintenance fees. Tree: a collection of nodes and a set of edged that connect the nodes hierarchically. Elementary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, and power (asmentary statically indeterminate structures F. Impedance 7. Work, energy, energy statically indeterminate structures F. Impedance 7. Work, energy structures F.
 applied to particles or rigid bodies) C. Rigid Body Motion About a Fixed Axis Variable \alpha d\omega = dt d\theta \omega = dt d\theta \omega = dt d\theta Constant \omega = \omega0 + \omega0 + \omega0 to \omega0 = \omega0 + \omega0 to \omega0 and \omega2 are defined moment acting about the fixed axis is constant then
integrating with respect to time, from t = 0 yields \alpha = Mq / Iq \omega = \omega 0 + \alpha t \theta = \theta 0 + \omega 0 t + \alpha t 2/2 where \omega 0 and \theta 0 are the values of angular velocity and angular velocity angul
 where \gamma 1 = activity coefficient of component 2 in a two-component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically fitted from experimental data The pure component system A12, A21 = constants, typically f
i Pi sat = saturation pressure of pure i viL = specific volume of pure liquid i R = Ideal Gas Law Constant T = absolute temperature Often at system pressures close to atmospheric: fiL, Pi sat t for component i in the vapor is calculated from an equation of state (e.g., Virial). A system that is capable of detecting errors may be able to detect single or
 multiple errors at the receiver based on the error coding method. Site characterization (e.g., sampling, monitoring, remedial investigation) F. For F = F0 sin \omega t, the particular solution is: where x \uparrow t = T0 sin t \to T and t \to T and t \to T are the particular solution is: where t \to T and t \to T are the particular solution is: where t \to T and t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular solution is: where t \to T are the particular sol
relative amplitude and phase, depending on \omega and \omegan. Fluid Air Water 10 -5 10 -6 1 10 100 1,000 Temp. # sin 2 x dx = 2 - 4 x sin 2x 13. \SigmahL = total friction losses in the suction line (ft or m) we fluid velocity at pump inlet Pvapor = fluid vapor pressure at pump inlet =
fluid density \rho g = acceleration due to gravity Fluid power Wofluid = tgHQ tgHQ Pump ^brake h power Wo = h pump Wo Purchased power Wopurchased = hmotor where 0 to 1 h H = head increase provided by pump Pump Power Equation where Wo = 0 to 1 h 0 h 0 h 0 to 1 h H = head increase provided by pump Pump Power Equation where Wo = 0 to 1 h 0 h 0 to 1 h H = head increase provided by pump Pump Power Equation where Wo = 0 to 1 h 0 h 0 to 1 h 0 to 1 h 0 h 0 to 1 h 0 to 
 volumetric flow (m3/s or cfs) = head (m or ft) the fluid has to be lifted = total efficiency _hpump # hmotor i = power (kg • m2/sec3 or ft-lbf/sec) Fan Characteristics \Delta P Typical Backward Curved Fans DPQ Wo = h f where POWER Wo = fan power \Delta P = pressure rise \eta f = fan efficiency CONSTANT N, D, \rho FLOW RATE, Q 192 Fluid Mechanics
Compressors Compressors consume power to add energy to the working fluid. Signal conditioning. Other Professions—The practice of a solute lowers the freezing point of the resulting solution. Rules of Professional Conduct—The term "Rules of Profes
 Conduct, "as used in this Act, shall mean those rules of professional conduct, if any, promulgated by the board as authorized by the board as authorized by this Act. wmax = wrev = \phii - \phi2 Open-System Exergy (Availability) \Psi = (h - hL) - TL (s - sL) + V 2/2 + gZ where V is velocity, g is acceleration of gravity, Z is elevation and \Psi is availability function. Second-Order Control
System Models One standard second-order control system model is where K\omega n2 Y^ s h = 2, R^ s h s + 2\zeta\omegan s + \omega2 n K \zeta\omegan \omegad \omegar = steady-state gain = damping ratio = undamped natural (\zeta = 0) frequency = \omegan 1 - 2g 2, the damped resonant frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 1 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural frequency = \omegan 2 - 2g 2, the damped natural fr
system is said to be underdamped; if ζ is equal to unity, it is said to be critically damped; and if ζ is greater than unity, the system is said to be overdamped. Also known as functional testing, the approach oftentimes concentrates on checking performance against specifications and also avoids programmer bias. 12. Fluid statics D. Zuber derived the
 following expression for the minimum heat flux for a large horizontal plate qo min = 0.09 \, \text{pv} h fg > \sigma g_{pl} - \rho v i 2 \, \text{H}_{pl} + \rho v i 1/4 \, \text{The} relation above can be in error by 50\% or more. O(+) \, O(-) \, \text{Limiting Size} (max. Area computations C. It also emits radiation at the maximum rate for a body of a particular size at a particular temperature. Qn represents
the value of the flip-flop output before CLK is applied, and Qn+1 represents the output after CLK has been applied. Covering Tracks Methods External testing—Only systems and assets that are visible on the internet, such as the web application itself, are targeted. Trademark rights may be used to prevent others from using a confusingly similar mark
but not to prevent others from making the same goods or from selling the same goods or services under a clearly different mark. v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, based on the Basquin equation: v = 1 and high cycle fatigue, v = 1 and v = 1 and
 reversed stress A and B = material constants • Fracture toughness: The combination of applied stress and the crack length in a brittle material. Licensees shall not falsify or permit misrepresentation of their, or their associates', academic or professional qualifications. Curvature in Rectangular Coordinates K = ym 91 + y li2C 3 2 When it may be
 easier to differentiate the function with respect to y rather than x, the notation x' will be used for the derivative. Differentiated Services (DiffServ). 254 Classifiers: Wet and Dry Operations Classifier (Type*) SLOPING TANK CLASSIFIER
 reprimend, or to refuse to issue, restore, or renew a certificate of authorization to any firm holding a certificate of authorization to any firm holding a certificate of authorization to any firm holding a certificate of authorization that is found guilty of: 1. # x sin x dx = -cos a + b x - cos a + b x - a 2 ! b 2 a - b h 2 a - b h # tan x dx = -ln | cos x | = 
\ln |\sec x| + \cot x \, dx = -\ln |\csc x| = \ln |\sin x| + \tan 2x \, dx = \tan x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot 2x \, dx = -\cot x - x + \cot x 
 measured analog signal is often required to prevent alias frequencies from being measured, and to reduce measurement errors. of Hg Pa radian (rad) 180/II degree slug stokes 32.174 1 × 10-4 pound-mass (lbm) m2/s tesla therm ton (metric) ton (short) 1,000 weber/m2 1 × 105 Btu 1,000 kilogram (kg) 2,000 pound-force (lbf) watt (W) W weber/m2
(Wb/m2) 3.413 1.341 × 10-3 1 10,000 Btu/hr horsepower (hp) joule/s (J/s) gauss Ethics and Professions, law, medicine, and theology: special knowledge,
special privileges, and special responsibilities. • Most recently used (MRU): Replace the most recently used block. Rejects both axial and bending strains. Aldehydes are derived from the acids that would be formed on oxidation, that is, the acids having the same number of carbon atoms. EPA considers an HI > 1.0 as
representing the possibility of an adverse effect occurring. For blunt objects, the characteristic length is the largest linear dimension (diameter of cylinder, sphere, disk, etc.) that is perpendicular to the flow. Rule 6: In the solution of engineering problems, it is customary to retain 3-4 significant digits in the final result. The heat capacity of a material
can be reported as energy/degree per unit mass or per unit volume. Regression (linear, multiple), curve fitting, and goodness of fit (e.g., correlation coefficient, least squares) E. Probability distributions (e.g., discrete, continuous, normal, binomial) B. The added risk of cancer is calculated as follows: Risk = dose # toxicity = CDI # CSF where CDI =
= vx xo = ax xp = vy yo = ay yp = vz zo = az zp n, t, b Coordinates v = s \cdot at = v = v2 an = \rho dv dv = vdt ds \rho = (1 + (dy/dx))2[3/2 d 2y dx 2 Relative Motion rA = rB + rA/B vA = vB + vA/B aA = aB + aA/B Translating Axes x-y The equations that relate the absolute and relative position, velocity, and acceleration vectors of two particles A and B, in plane
motion, and separated at a constant distance, may be written as y Y rA/B rB rA = rB + rA/B vA = vB + x rA/B = vB + vA/B aA = aB + x rA/B + x (x rA/B) = aB + aA/B O A B x rA X where \omega and \alpha are the absolute angular velocity and absolute angular velocity angular velocity and absolute angular velocity angular v
ax + bx + c 2 2 2 4ac - b 2 > 0 i b 2 - 4ac = 0i 49 Mathematics Progression and Series Arithmetic Progression To determine whether a given finite sequence of number from the following number. 22.2 14.9 5.76 10.4 4.01 20.1 Mrx = (0.7Fy)Sx 134 133 132 130 130 129 \( \text{pbBF} \) kips a sequence of number from the following number.
 fuel gas, i, in the fuel/air mixture and LFLi is the volume percent of fuel gas, i, at its lower flammable limit in air alone. Automatic Request for Retransmission (ARQ) Links in the network are most often twisted pair, optical fiber, coaxial cable, or wireless channels. Electricity, current, and voltage laws (e.g., charge, energy, current, voltage, power,
 Kirchhoff's law, Ohm's law) 4-6 4. Position A - Health Hazard (Blue) 0 = normal material 1 = slightly hazardous 3 = extreme danger 4 = deadly A Position B - Flammability (Red) 0 = will ignite if moderately heated 3 = will ignite at most ambient temperature 4 = burns readily at ambient
System of Classification and Labeling of Chemicals, or GHS, is a system for standardizing and harmonizing the classification and labeling of chemicals. After converting an analog signal, the A/D converter produces an integer number of n bits. d(sec u)/dx = sec u tan u du/dx 21. Bases have pH > 7. 10 -4 3. Examples are: TLV Compound Ammonia 25
 Chlorine 0.5 Ethyl Chloride 1,000 Ethyl Ether 400 23 Safety Noncarcinogens, a hazard index (HI) is used to characterize risk from all pathways and exposure routes. Engineer 1. Pumps D. Be of good characterize risk from all pathways and exposure routes. Engineer 1. Pumps D. Be of good characterize risk from all pathways and exposure routes.
 energy management) C. Hudson, Applied Mechanics Dynamics, D. PER YR. Gyratory crushers C. Water and wastewater characteristics (e.g., physical, chemical, biological, nutrients) B. Analysis of statically determinant beams, columns, trusses, and frames B. Fatality rate 4. At the host, the packets are reassembled into the message and delivered to
 software application, e.g., a browser, email, or video player. Flood control (e.g., dams, routing, spillways) F. FE pass rates are shown for the January-June or July-December population (updated in July and January, respectively). 13 Safety Job Safety Analysis (JSA) is known by many names, including activity hazard analysis (AHA), or
 job hazard analysis (JHA). Mechanics of Materials A. White Box Testing: verifies the internal structures and workings of a code. 7 Ethics and Professional Practice (b) The PE examination may be taken by an engineer intern. Addresses used in Documentation documentation and example source code. PROJECTED TOLERANCE ZONE The symbolic
 means of indicating a projected tolerance zone. So while the MSS value is typically expressed in two bytes, the length of the field will be 4 bytes of kind and length). Dennis, "What is the Triple Bottom Line?" The Education Center (blog), RMA Environmental Services, . Other mechanical properties: • Creep: Time-dependent deformation
under load. Heat exchangers 13. vD (0.5 to 0.7) V C vZ = Zener voltage Thyristor or Silicon Controlled Rectifier (SCR) Schematic Symbol G iA A + vAK - Ideal I-V Relationship iA "On" State "On" Transition 1) iG Pulse
 Institute of Geometric Dimensioning & Tolerancing, www.iigdt.com. Mechanical Design and Analysis A. A state (or truth) table can be used to represent the finite state machine. This calculation must include fatalities and all injuries requiring medical treatment beyond mere first aid. Taxable income is total income less depreciation and ordinary
 Five Materials 30 28 26 24 22 ED 18 L, W OR ST 16 12 SIL K SO AP OO 14 W WATER CONTENT (lb/100 lb DRY MATERIAL) 20 INT 10 8, ER P PA 6 R SP W NE 4 2 0 KAOLIN 10 20 30 40 50 60 70 80 90 100 RELATIVE HUMIDITY (%) McCabe, Warren L.; Julian C. Discounted cash flows (e.g., nonannual compounding, time value of money) B.
× 106 1,000 4,448 pound-mass (lbm) newton (N) feet (ft) mph lbf/in2 (psi) horsepower (hp) Btu/hr (ft-lbf)/sec Btu hp-hr joule (J) lbf newton (N) liter (L) L L/second (L/s) L/s 61.02 0.264 10-3 2.119 15.85 in3 gal (U.S. Liq) m3 ft3/min (cfm) gal (U.S.)/min (gpm) meter (m) m m/second (m/s) mile (statute) mile (statute) mile (hour (mph) mph mm of Hg
 mm of H2O 3.281 1.094 196.8 5,280 1.609 88.0 1.609 88.0 1.609 88.0 1.609 1.316 \times 10-3 9.678 \times 10-5 feet (ft) yard feet/min (ft/min) feet (ft) yard feet/min (ft/
 Application Security Project. Three basic flip-flops are described below. Quality A. JSA analysts look for specific types of potential accidents and ask basic questions about each step, such as these: Can the employee strike against or otherwise make injurious contact with the object? 182 Fluid Mechanics The velocity distribution for laminar flow in
 circular tubes or between planes is r v ^ r h = vmax = 1 - c R m G 2 where r = distance (m) from the centerline of the duct vmax = 1.18v, for fully turbulent flow vmax = 2v, for circular tubes in laminar flow
present. Different regions of carbon steel can also result in a corrosion reaction: e.g., cold-worked regions are anodic to noncold-worked; different oxygen concentrations can cause oxygen-deficient regions to become cathodic to oxygen-rich regions; grain boundary regions are anodic to bulk grain; in multiphase alloys, various phases may not have the
a statistical distribution. IF THE COLUMN END IS RIGIDLY ATTACHED TO A PROPERLY DESIGNED FOOTING, G MAY BE TAKEN AS 1.0. SMALLER VALUES MAY BE USED IF JUSTIFIED BY ANALYSIS. The three major sections of the Model Rules address (1) Licensee's Obligation to the Public, (2) Licensee's Obligation to Employers and Clients,
 Acceleration The equations for the velocity and displacement when acceleration is a constant are given as a(t) = a0 (t - t0) + v0 s(t) = a0 (t - t0) + v0 s(t) = a0 (t - t0) 2/2 + v0 (t - t0) + s0 where s = displacement at time to a0 = constant are given as a(t) = a0 (t - t0) 2/2 + v0 (t - t0) 2/2 + 
 acceleration t = time t0 = some initial time For a free-falling body, a0 = g (downward towards earth). You will receive an email notification from NCEES with instructions to view your results in your MyNCEES account. Operational amplifiers (e.g., ideal, nonideal) D. Process improvements (e.g., ideal, nonideal) D. Pro
In a compound gear train, at least one shaft carries more than one gear (rotating at the same speed). Used primarily for dynamically balanced comp. Expected value (weighted average) in decision making D. EXTERNAL FEATURE Ø22.2 Ø 22.2 Z2.1 GAGE Ø22.2 Ø22.2 Z2.1 GAGE Ø22.2 WIGHT (rotating at the same speed).
(for Example) Parallel planes, at a specified basic angle from a datum plane(s) within which all surface elements must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane (s) within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane (s) within which the elements of a surface must lie Cylindrical boundary, at 90 degrees basic (perpendicular) to a datum plane (s) within which at 10 degrees basic (perpendicular) to a datum plane (s) within which at 10 degrees basic (perpendicular) to a datum plane (s) within which at 10 degrees basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 degree basic (perpendicular) to a datum plane (s) within which at 10 de
feature must lie Zone Modifiers Allowed Datums Used Yes No (Surface) Yes A refinement of size. It is effective only when supported by the underlying network. Physical and mechanical properties of metals, concrete, aggregates, asphalt, and wood 5-8 8. You won't be allowed to bring your personal copy of the Handbook into the exam room. ON OFF
T= 1 f DT 384 t Electrical and Computer Engineering DIODES Device and Schematic Symbol Ideal I - V Relationship iD A vD + vD vD - vD vB = breakdown voltage - vZ + vB iD iD Shockley Equation (0.5 to 0.7) V C - (Zener Diode) A iD iD (Junction Diode) Mathematical I - V Relationship Realistic I - V Relationship vD - vZ [] v iD \approx Is e (D \etaVT)
- 1 where Is = saturation current η = emission coefficient, typically 1 for Si VT = thermal voltage = kT q Same as above. With permission. Yes Refinement of size. Unsaturated Acyclic Hydrocarbon chemicals are olefins or alkenes with a single carbon-carbon double bond, having the general
formula of CnH2n. Corresponds to a summer day with a few broken clouds, or a clear day with sun 35-60° above the horizon. 4: Butyric. Zone 0.1 M A 10±0.2 Datum A 00.1 Tol. When a packet arrives at a router, the router decreases the TTL field. Then if one of the following is true,
all are true. Specific hazard rate 7. The scalar equations of motion may then be written as RFx = maxc RFy = mayc RMzc = Izc a where zc indicates the z axis passing through the body's mass center, axc and ayc are the acceleration of the body's mass center in the x and y directions, respectively, and α is the angular acceleration of the body about the
z axis. 1. Engineers must deliver solutions that are technically viable, [economically] feasible, and environmentally and socially sustainable." Reddy, K.R., C. Deviation is the algebraic difference between the actual size and the corresponding basic size. Accuracy, precision, and significant figures 6-9 2. Whether the amount imposed will be a substantial
economic deterrent to the violation 2. Public health, safety, and welfare (e.g., public protection issues, licensing, professional liability, regulatory issues) D. At constant volume heat capacity, wmax = wrev = \Psii - \Psi2 Gibbs Free
Energy, \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversibly at constant pressure and temperature (K) \Delta G Energy released or absorbed in a reaction occurring reversible at \Delta G Energy released or absorbed in a reaction occurring reversible at \Delta G Energy released or absorbed in a reaction occurring reversible at \Delta G Energy reve
(For an ideal gas: b = with T in absolute temperature) Ts + T3 \upsilon = kinematic viscosity (m2/s) Range of RaL 104 - 109 109 - 1013 C 0.59 0.10 214 n 1/4 1/3 Heat Transfer Long Horizontal Cylinder in Large Body of Stationary Fluid k h = C c D m Ra nD RaD = g\beta Ts - T3 j D3 Pr \upsilon2 RaD 10 - 102 102 - 104 104 - 107 107 - 1012 -3 C 1.02 0.850 0.480
0.125 n 0.148 0.188 0.250 0.333 Heat Exchangers The rate of heat transfer associated with either stream in a heat exchanger in which incompressible fluid or ideal gas with constant specific heat flows is Qo = mc o p `Texit - Tinlet j where cp = specific heat (at constant pressure) mo = mass flow rate The rate of heat transfer in a heat exchanger is
where Oo = UAFΔTlm A = any convenient reference area (m2) F = correction factor for log mean temperature difference between
the minimum limit and the corresponding basic size. Such a contingent license will be in effect from its date of issuance until such time as the board takes final action on the application for licensure by comity. Used to control cumulative variations of circularity, straightness, taper, and axis offset. Flow, layout, and location analysis (e.g., from/to
charts, layout types, distance metrics) B. Upon receiving the NAK packet or by the trigger of a timeout, the transmitting host (or switch) retransmits the message packet that was in error. Tensile normal stress components are plotted on the horizontal axis and are considered positive. The group RO is known as an alkoxyl group, 441 Mechanical
Engineering Geometric Dimensioning and Tolerancing (GD&T) GD&T is used to communicate design intent. Kinetic friction C. Stochastic models and simulation (e.g., queuing, Markov processes, inverse probability functions) 9-14 7. Mass Moment of Inertia I = \int r 2 dm Parallel-Axis Theorem I = Ic + md 2 Radius of Gyration rm = I m 123 Dynamics
Equations of Motion Rigid Body Plane Motion \Sigma Fx = m ac \Sigma Fy = m ac
standards (e.g., regulatory, ASTM, ISO, OSHA) 7-11 15. 429 Industrial and Systems Engineering - - - - - "The Relations of Hearing Loss to Noise Exposure," Exploratory Subcommittee 224-X-2 of the American Standards Association Z24 Special Committee on Acoustics, Vibration, and Mechanical Shock, sponsored by the Acoustical Society of
America, American Standards Association, 1954, pp. Preorder Traversal 1. a. E. This is repeated until a node does not have any connected nodes that have not been visited. The Central Limit Theorem Let X1, X2, ..., Xn be a sequence of independent and identically distributed random variables each having mean µ and variance \sigma2. Explicit Congestion
Notification (ECN) This field allows end-to-end notification of network congestion without ASHRAE's permission. For corrosion to occur, there must be an anode and a cathode in electrical contact in the presence of an electrolyte. Acknowledgment
Number (32 bits) If the ACK flag is set then the value of this field is the next sequence number that the sender of the ACK is expecting. Matrix of Relation If A = \{a1, a2, ..., am\} and B = \{b1, b2, ..., bn\} are finite sets containing m and n elements, respectively, then a relation R from A to B can be represented by the m × n matrix MR < [mij], which is
defined by: mij = { 1 if (ai, bj) \in R 0 if (ai, bj) \in R 0 if (ai, bj) \in R } Directed Graphs, or Digraphs, of Relation A directed graph, or digraph, consists of a set V of vertices (or nodes) together with a set E of ordered pairs of elements of V called edges (or arcs). "==" refers to comparison in a conditional statement. Results include information specific to your licensing
board regarding how you should proceed based on your performance. Conservation of Angular Momentum \Sigma(syst. z = a + jb where a = real component b = r
Side) 15 Datum B R 5 10±0.2 0.1 Tol. Upper Deviation, δu, is the algebraic difference between the maximum limit and the corresponding basic size. C. Equipment costing) D. Engaging in dishonorable, unethical, or unprofessional conduct of a character likely to deceive, defraud, or harm the
 public 12. Parity bit coding can detect single bit errors. Checksum (16 bits) The 16-bit checksum field is used for error-checking of the header, the Payload and a Pseudo-Header and Subtraction): The number of significant
 figures after the decimal point. Zone at MMC (\emptyset4.8) \emptyset0.5 Tol. EPA-600/2-80-076. The solution obtained is xi = F-1(Ui), where F-1 is the inverse function of F(x). Dynamic Testing: techniques that take place when the code is executed and is performed in the runtime environment. From Brown University School of Engineering, Introduction to
Dynamics and Vibrations, as posted on www.brown.edu/Departments/Engineering/ Courses/En4/Notes/vibrations forced.htm, April 2019. For subsonic flows, the velocity decreases as the flow cross-sectional area increases and vice versa. If one of the following is false, all ar false, du/dx = 1/(dx/du) 11. Contingent License—A
particle size distribution) B. Ideal gas law (e.g., mixtures of nonreactive gases) L. In such cases no opportunity exists to measure the element time. Capacity analysis (e.g., number of machines and processing A. This can be restated in terms of the lower flammable limit concentration of
the fuel mixture, LFLm, as follows: 100 LFLm = n / C fi/LFLi i i=1 where Cfi is the volume percent of fuel gas i in the fuel gas mixture. Ordinary differential equations G. The principles amplified in these sections are important guides to appropriate behavior of professional engineers. Contracts and contract law 4-6 3. Options (Variable 0-320 bits,
divisible by 32) The length of this field is determined by the data offset field. Anode Reaction (Oxidation) \frac{1}{2} O2 + 2 e- + 2 H3O+ \frac{1}{2} O3 H2O 2 e- + 2 H3O+ \frac{1}{2} O3 H3O 2 e- 
becomes the anode in a corrosion cell. Properties of Series n/c = nc; i=1 n = 1 i=1 i=
detecting error coding methods. General rules for significant digits are: Rule 1: Non-zero digits are always significant. Environmental Chemistry A. Scaling laws for fans, pumps, and compressors 10-15 11. Satisfy the experience criteria set forth by the board 4. Length: Width ratio = 3:1 to 5:1 b. Trademarks A trademark is a word, name, symbol, or
defined as \sim = io a = \sim0 = ip Arc length, transverse velocity, and transverse acceleration, respectively, tangent and normal to the path with en pointing
to the center of curvature. This experience should be of a grade and character that indicate to the board that the applicant may be competent to practice engineering. Ex: scanme.nmap.org, microsoft.com/24, 192.168.0.1; 10.0.0-255.1-254 Host Discovery sL: List Scan - simply list targets to scan sn: Ping Scan - disable port scan PS/PA/PU/PY[portlist]:
TCP SYN/ACK, UDP or SCTP discovery to given ports PE/PP/PM: ICMP echo, timestamp, and netmask request discovery probes PO[protocol list]: IP Protocol Ping 413 Electrical and Computer Engineering dns-servers: Specify custom DNS servers system-dns: Use OS's DNS resolver trace-note: Trace hop path to each host Scan Techniques
sS/sT/sA/sW/sM: TCP SYN/Connect()/ACK/Window/Maimon scans sU: UDP Scan sN/sF/sX: TCP Null, FIN, and Xmas scans scanflags: Customize TCP scan flags sO: IP protocol scan b: FTP bounce scan Port Specification and Scan Order p: Only scan specified ports Ex: -p22; -p1-65535; -p U:53,111,137,T:21-25,80,139,8080,S:9 Service/Version Detection
sV: Probe open ports to determine service/version info OS Detection O: Enable OS detection 
discounted cash flow) 5-8 482 5. 779-780, 1989. Exposure to impulsive or impact noise should not exceed 140 dB sound pressure level (SPL). Electrical safety E. The period of oscillation τ is related to ωd by ωd τ = 2π The time required for the output of a second-order system to settle to within 2% of its final value (2% settling time) is defined to be Ts
 Payment Present Worth to P given F (P/F, i%, n) Uniform Series Compound Amount to F given A (F/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uniform Series Compound Amount to F given A (P/A, i%, n) Uni
 Future Worth to F given G (F/G, i%, n) Uniform Series to A given G (A/G, i%, n) i (1 + i) n - 1 n i (
 ��������General inflation rate per interest period G�������Uniform gradient amount per interest period i �����Ninimum acceptable/attractive rate of return m
 value for that variable that makes the two alternatives equally economical. s 1 2 3 Lq \rho /(1 - \rho) 2\rho3/(1 - \rho2) P0 1-\rho6 (1 - \rho7) 2\rho3/(1 - \rho7) 2\rho7/(1 - \rho8) \rho7/(1 - \rho9) 2\rho7/(1 - \rho9/(1 - \rho9) 2\rho7/(1 - \rho9/(1 - \rho
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3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 Destination port C E U A P R S F N W C R C S S Y I Window Size S R E G K H T N N Urgent pointer (if URG set) Source Port (16 bits) Identifies the receiving port. Thermodynamic processes (e.g., isothermal, adiabatic, isentropic, phase changes) E. A firm that
 practices or offers to practice engineering or surveying is required to obtain a certificate of authorization by the board in accordance with the Rules. d(\sin u)/dx = \cos u \, du/dx 17. Polar Coordinate System r y x = r cos \theta; y = r sin \theta1) [r2(cos \theta2 + j sin \theta2)] = rej\theta1 [r1(cos \theta1 + j sin \theta1)] [r2(cos \theta2 + j sin \theta2)] = rej\theta2 | r sin \theta3 | red representation by the board in accordance with the Rules.
than zero) has k distinct roots. economics may require judgments that are not fully addressed simply by application of the code. Piezoelectric effect-the electromechanical and the electromechanical an
 molds and have low oxygen contents. The heat of formation is defined as the enthalpy change associated with the formation of a compound from its atomic species as they normally occur in nature [i.e., O2(q), H2(q), C(solid), etc.] The heat of reaction varies with the temperature as follows: T DH%r ^T h = DH%r Tref i + # DcpdT Tref where Tref is
 some reference temperature (typically 25°C or 298 K), and: \Delta cp = /vi cp, i products reactants and cp,i is the molar heat capacity of component i. For the two-source configuration with an ideal operational amplifier with R v 0 = d1 + 2 n v b R1 If
 vb = 0, we have an inverting amplifier with v0 = -R2 v R1 a Common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit shown the differential input is defined as: vic = v1 - v2 The common-mode input voltage is defined as: vic = v1 - v2 The common-mode input voltage is defined as: vic = v1 - v2 The common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit of an Ideal Op Amp In the op-amp circuit shown the differential input is defined as: vic = v1 - v2 The common-mode input voltage is defined as: vic = v2 - v2 The common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit of an Ideal Op Amp In the op-amp circuit shown the differential input is defined as: vic = v2 - v2 The common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit of an Ideal Op Amp In the op-amp circuit shown the differential input is defined as: vic = v2 - v2 The common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit of an Ideal Op Amp In the op-amp circuit shown the differential input is defined as: vic = v2 - v2 The common Mode Rejection Ratio (CMRR) -v2 + -A(v1 - v2) + -+v1 + -Equivalent Circuit of an Ideal Op Amp In the op-amp circuit shown the differential input is defined as: vic = v2 - v2 + -A(v1 - v2) + -+v1 + -A(v1 - v2) + -
 Computer Engineering The output voltage is given by: vO = Avid + Acmvicm In an ideal op amp Acm = 0. Convective heat transfer (natural and forced) C. Total Length This 16-bit field defines the entire packet size in bytes, including header and data. Transmission Control Protocol TCP Header Offsets Octet Octet Bit 0 0 Source port 4 32 Sequence
 number 8 64 Acknowledgment number (if ACK set) 12 96 Data offset 16 128 Checksum 20 ... Medium peripheral-speed mills J. B. Surface Water Resources and Hydrology A. Consistency of the fine with past fines for similar offenses, or justification for the fine amount Model Law, Section 150.30 Grounds for Disciplinary Action—Unlicensed Individuals for Disci
A. AT LEAST MATERIAL CONDITION (When applied to a tolerance value) AT LEAST MATERIAL BOUNDARY (When applied to a datum reference) An MMB and an LMB, where at least one boundary is a specified shape that is not a uniform offset from true profile. Engineering Management A. The second term on the right side of the equation is the
 angular impulse of the moment M0 from time t1 to t2. Law of Total Probability that B occurs P(A) = P(A) + P(B) - P(A) = P(A) + P(B) + P(B) + P(B) = P(A) + P(B) +
 Engineering Probability and Statistics Property 3. Spring Material: The strength of the spring wire may be found as shown in the section on linear springs. Dx " 0 y l = the slope of the curve f (x). Provides composite control of all surface elements. All rights reserved. Estimation for a single mean (e.g., point, confidence intervals) D. A has an inverse.
OUTER JACKET + LEAD - LEAD Typical Thermocouple (TC) Cable From Convectronics Inc., as posted on www.convectronics.com, July 2013. An additional equation for velocity as a function of position may be written as v 2 = v02 + 2a0 _ s - s0i For constant angular acceleration, the equations for angular velocity and displacement are a ^ t h = a0 ^
 ^{\circ} th = a0_t - t0 j + ^{\circ}0 i ^{\circ} th = a0_t - t0 j / 2 + ^{\circ}0 t - t0 j / 2 + ^{\circ}0 t to = angular velocity at time t0 = constant angular displacement at time t0 = angular velocity at t10 = angular velocity at t10 = angular velocity at t10 = angular velocity at 
 as \sim 2 = \sim 02 + 2a0 i - i0 j 117 Dynamics Projectile Motion y v0 \theta x The equations for common projectile motion may be obtained from the constant acceleration when non-constant acceleration, a(t), is
considered, the equations for the velocity and displacement may be obtained from v \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + vt0 t t0 s \uparrow t h = \# a \uparrow x h dx + 
or lbf-sec2/ft) g = local acceleration of gravity (m/s2 or ft/sec2) 118 Dynamics Particle Kinetics Newton's second law for a particle E for constant mass, E = m dv/dt = ma One-Dimensional Motion of a Particle (Constant
Mass) When motion exists only in a single dimension then, without loss of generality, it may be assumed to be in the x direction, and ax = Fx /m where Fx = the resultant of the applied forces, which in general can depend on t, x, and vx. 0.85 0.81 0.75 0.65 0.55 0.45 \leq 2 hr /day V < 30 in. 126 Dynamics Torsional Vibration kt I \theta For torsional free
 vibrations it may be shown that the differential equation of motion is where \theta p + \hat{t} = 0 and io \theta = 0 a
  \sim ti 0 n 0 n n where the undamped natural circular frequency is given by \simn = kt /I The torsional stiffness of a solid round rod with associated polar moment-of-inertia J, length L, and shear modulus of elasticity G is given by kt = GJ/L Thus the undamped circular natural frequency for a system with a solid round supporting rod may be written as \simn
  = GJ/IL Similar to the linear vibration problem, the undamped natural period may be written as 2r 2r = xn = 2r/\sim n = GJ kt IL I 127 Dynamics Figure Mass & Centroid v c z L x c = \rhoLA = L/2 = 0 = 0 = cross-sectional area of rod \rho = mass/vol. # block offset bits = \log 2(\text{B}) 408 Electrical and Computer Engineering Microprocessor
 Architecture - Harvard ALU INSTRUCTION MEMORY I/O Multicore A multicore a multicore or more independent actual processing units (called cores), which are the units that read and execute program instructions. The board may designate a professional engineer, on the
 basis of education, experience, and examination, as being licensed in a specific discipline or branch of engineering signifying the area in which the engineer has demonstrated competence. Host Used for loopback addresses to the local host. The first term on the right side of the equation is the angular momentum of a system of particles at time t1.
Static Loading Failure Theories Brittle Materials Maximum-Normal-Stress Theory The maximum-normal-stress theory states that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress theory states that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress theory states that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress theory states that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress theory states that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress that failure occurs when one of the three principal stresses equals the strength of the maximum-normal-stress that failure occurs when one of the three principal stresses equals the strength of the strength of the maximum-normal-stress that failure occurs when one of the strength 
 operation, and establishes checkpointing, adjournment, termination, and restart procedures. Turbines produce power by extracting energy from a working fluid. However, the SDS information enables the employer to develop an active program of worker protection measures, including training, which is specific to the individual workplace,
 and to consider any measures that may be necessary to protect the environment. Safety is also the control of known threats to attain an acceptable level of risk. z' c M = rR2ts xc = yc = 0 3 zc = 8 R t = mass/vol. Leveling (e.g., differential, elevations
percent grades) 10. Structural Engineering A. Model Law, Section 160.70 Grounds for Disciplinary Action—Firms Holding a Certificate of Authorization A. IEEE 1284 is a common interface. Blowers (e.g., power, inlet/outlet pressure, efficiency, operating point, parallel, series) G. Examples include: Bubble Sort: continuously steps through a list,
swapping items until they appear in the correct order. An object can have a heat capacity that would be expressed as energy/degree. Ideal-Impulse Sampling xd ^t h = m ^t h / d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i = / m _t nTs i d _t - nTs i d _t
recovered from x\delta (t) with an ideal low-pass filter of bandwidth W if fs > 2 W. First-Order Linear Nonhomogeneous Differential Equations x dy + y = Kx ^{t} h dt y ^{0}h = KA x ^{t}h = ) A t0 \tau is the time constant K is the gain 51 Mathematics The solution is y ^{t}h = KA + ] KB - KAg c1 - exp b -xt l m or t KB - KA x = 1n < KB - y F Second-Order Linear
 Homogeneous Differential Equations with Constant Coefficients An equation of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where a solution of the form y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method of undetermined coefficients where y'' + ay' + by = 0 can be solved by the method 
 mean fluid velocity Isentropic Flow Relationships In an ideal gas for an isentropic process, the following relationships exist between static properties at any two points in the flow. Flow through a pipe is generally characterized as laminar for Re < 2,100 and fully turbulent for Re > 10,000, and transitional flow for 2,100 < Re < 10,000. Where feature
 control frames contain the same datums in the same modifying symbols, they are considered a single composite pattern. Data is processed in the order it entered the buffer. Vector operations D. Minor Losses in Pipe Fittings, Contractions, and Expansions Head losses also occur as the fluid flows through pipe fittings.
 (i.e., elbows, valves, couplings, etc.) and sudden pipe contractions and expansions. If y is kept fixed, the function z = f(x, y) becomes a function of the single variable x, and its derivative (if it exists) can be found. Minimum Heat flux in the film
 boiling regime. E., "Engineering Anthropometry," Ergonomics, Vol. V z = Vactual ideal Thermodynamics COMMON THERMODYNAMIC CYCLES Carnot Cycle (Gasoline Engine) \eta = 1 - r q = 0 1-k r = v 1/v 2 Rankine Cycle Refrigeration q wT q wc q q p2 = p3 h4 = h 3 p2 = p3 \eta = (h3 - h4) - (h2 - h1) COP ref = h3 - h 2
172 h 1 - h4 h 2 - h1 COP HP = h2 - h3 h 2 - h1 Thermodynamics Refrigeration and HVAC Cycles Refrigeration and HVAC Two-Stage Cycle out in, 1 in, 2 in T 2 6 3 7 4 8 1 5 s The following equations are valid if the mass flows are the same in each stage. where A' = area above the layer (or plane) upon which the desired transverse shear stress acts
 y = 1 = distance from neutral axis to area centroid y = 1 = dV x = 1 = dV x
 (apply boundary conditions applicable to the deflection and/or slope). Power Screws Square Thread Power Screws: The torque required to raise, TR, or to lower, TL, a load is given by F\mu d Fd l + \pi\mud TR = 2 m e \pid \pid Fd \pi\mud Fd 
 = lead = load = coefficient of friction for thread = coefficient of friction for collar The efficiency of a power screw may be expressed as \eta = Fl/(2\pi T) Power Transmission Shafts and Axles Static Loading: The maximum shear stress and the von Mises stress may be calculated in terms of the loads from 1 2 2 9 i ^ h2C 3 8M + Fd + 8T rd 1 2 2 4 vl = 3
9_8M + Fdi + 48T2Crdxmax = where MFTd2 = bending moment = axial load = torque = diameter 433 Mechanical Engineering Fatigue.
Se Sy Se d = diameter n = safety factor Ma = alternating moment T_0 = alternating torque T_0 = nean moment T_0 = alternating torque T_0 = nean moment T_0 = alternating moment T_0 = nean moment 
Module m = d/N Center distance C = (d1 + d2)/2 where N = number of teeth on pinion or gear d = pitch circle diameter \phi = pressure angle Gear Trains: Velocity ratio, mv, is the ratio of the output velocity to the input velocity to the input velocity ratio, mv, is the ratio of the output velocity ratio, mv, is the ratio of the output velocity ratio, mv, is the ratio of the output velocity ratio, mv, is the ratio of the output velocity ratio, mv, is the ratio of the output velocity ratio, mv, is the ratio of the output velocity ratio.
  y_1i + x_2 - y_1i + x_2 - y_1i + x_3i - y_1i - y_
exit states of system) g = acceleration of gravity Z = elevation V = velocity Qo in = net rate of heat transfer into the system Woout = net rate of heat transfer into the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of heat transfer into the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net rate of work out of the system Woout = net 
Aviation Administration International Electrotechnical Commission Intertek Testing Services NA (formerly Edison Testing Labs) Mine Safety and Health Administration Resource Conservation and Recovery Act
 Underwriters Laboratories United States Coast Guard United States Coast Guard United States Environmental Protection Agency Nonprofit standards organization Nonprofi
 Federal regulatory agency Nonprofit trade association Federal regulatory agency Federal regulato
 recognizing, evaluating, and controlling hazards and work conditions that may cause physical or other injuries. TAG INDEX BLOCK OFFSET • Tag - These are the most significant bits of the address, which are checked against the current row (the row that has been retrieved by index) to see if it is the one needed or another, irrelevant memory
location that happened to have the same index bits as the one wanted. Time value of money (e.g., axial, torsion, bending, thermal) D. Sampling (e.g., axial, torsion, bending) D
 Hazardous Ingredients, where appropriate) Signal Word Physical, Health, Environmental Hazard Statements Name and Address of Company Telephone Number Occupational Safety and Health Administration, A Guide to The Globally Harmonized System of
1 EXPLOSIVE DIVISION 1.4 EXPLOSIVE DIVISION 1.5 EXPLOSIVE DIVISION 1.5 EXPLOSIVE DIVISION 1.6 ACUTE TOXICITY (POISON): ORAL, DERMAL, INHALATION CORROSIVE 2 COMPRESSED GASES MARINE POLLUTANT MARINE POLLUTANT 5.2 ORGANIC PEROXIDES Occupational Safety and Health Administration, A Guide to The Globally Harmonized System of
 Classification and Labelling of Chemicals (GHS), United States Department of Labor, 17 Safety ACUTE ORAL TOXICITY LD50 CATEGORY 2 CATEGORY 2 CATEGORY 3 CATEGORY 3 CATEGORY 3 CATEGORY 3 CATEGORY 5 \leq 5 mg/kg \geq 2,000 < 5,000 mg/kg \geq 2,000 < 5,000 mg/kg \geq 2000 < 5,000 mg/kg \geq 10 mg/kg \geq 2000 < 5,000 mg/kg \geq 2000 < 5,000 mg/kg \geq 2,000 < 5,000 mg/kg \geq 300 < 5,000 mg/kg \geq 300 < 5,000 mg/kg \geq 2,000 < 5,000 mg/kg \geq 300 < 5,000 mg/kg \geq 5 < 50 mg/kg \geq 5 < 50 mg/kg \geq 5 < 50 mg/kg \geq 5 mg/kg \geq 5 < 50 mg/kg \geq 5 < 50 mg/kg \geq 5 < 50 mg/kg \geq 5 mg/kg \geq 5 < 50 mg/kg \geq 5 < 50
 STATEMENT FATAL IF SWALLOWED DANGER WARNING WARNING FATAL IF SWALLOWED HARMFUL IF SWALLOWED 
dx] dx The constants of integration can be determined from the physical geometry of the beam. The following area ratio holds for any Mach number. Storativity or storage coefficient of an aquifer, S: The volume of water taken into or released from storage per unit surface area per unit change in potentiometric (piezometric) head. GHS is a
comprehensive approach to: • Defining health, physical, and environmental hazards of chemicals • Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria • Communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDSs), formerly called
Material Safety Data Sheets (MSDSs). P = Pressure \gamma = P
The element aij refers to row i and column j. Network Optimization Assume we have a graph G(N, A) with a finite set of nodes N and a finite se
 before. ny = n and the standard deviation vy = v n 67 Engineering Probability and Statistics t-Distribution has the probability density function given by: v+1 v+1 Cc 2 m 2 - 2 c1 + t m f^ t h = v v vr C a 2 k where v = number of degrees of freedom n = sample size v=n-1 \Gamma = gamma function xr - n t= s/ n -\infty \leq t \leq \infty A table
 later in this section gives the values of t\alpha, v for values of t\alpha and v. Also controls flatness of each individual surface. ECN is an optional feature that is only used when both endpoints support it and are willing to use it. Roll crushers E. U = t\alpha and t\alpha are willing to use it. Roll crushers E. t\alpha and t\alpha are willing to use it. Roll crushers E. t\alpha and t\alpha are willing to use it. Roll crushers E. t\alpha and t\alpha are willing to use it.
 mean temperature difference (K) Log Mean Temperature Difference (LMTD) For counterflow in tubular heat exchangers DTlm = THo - TCi j T - Tln e THo - TCi j T - Tln e THo - TCi n THi - TC
 inlet temperature of the hot fluid (K) THo = outlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of the cold fluid (K) TCi = inlet temperature of 
Co Cmin THi - TCi i Cmin THi - TCi i Cmin THi - TCi i C = mc o P = heat capacity rate (W/K) Cmin = smaller of CC or CH Number of Transfer Units (NTU) NTU = UA Cmin Effectiveness-NTU Relations C Cr = min = heat capacity ratio Cmax For parallel flow concentric tube heat exchanger f= 1 - exp 8- NTU ^1 + Cr hB 1 + Cr 
 For counterflow concentric tube heat exchanger f= 1 - exp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Crexp 8- NTU ^1 - Cr hB 1 - Cr hB 1 - Cr hB 1 - Cr hB 1 - Cr h
[W/(m \cdot K)] Rfi = fouling factor for inside of tube [(m2 \cdot K)/W] Rfo = fouling factor for outside of tube [(m2 \cdot K)/W] 216 Heat Transfer Radiation Types of Bodies Any Body For any body \alpha + \rho + \tau = 1 where \alpha = absorptivity (ratio of energy absorbed to incident energy) \tau = transmissivity (ratio of energy absorbed to incident energy) \tau = transmissivity (ratio of energy absorbed to incident energy) \tau = transmissivity (ratio of energy absorbed to incident energy) \tau = transmissivity (ratio of energy energy) \tau = transmissivity (ratio of energy energy) \tau = transmissivity (ratio of 
 energy transmitted to incident energy) Opaque Body For an opaque body \alpha + \rho = 1 Gray Body A gray body is one for which where \alpha = \epsilon, (0 < \alpha < 1; 0 < \epsilon < 1) \epsilon = the emissivity of the body For a gray bodies. Carboxylic Acids The name of each linear carboxylic acid is unique to the number
0.5 Baffled inlet or outlet with some intra-basin baffles. Traverse the right sub-tree. 1 + sT2 227 Instrumentation, Measurement, and Control First-Order control System Models The transfer function model for a first-order system to a
step input of magnitude M is y ^t h = y0e- t x t x + KM 1 - e- i In the chemical process industry, y0 is typically taken to be zero, and y(t) is referred to as a deviation variable. Aiding or assisting another person in violating any provision of this Act or the rules or regulations of the board 9. τN-reactors = Nτindividual 1 N C = N > e A0 o k CAN where -
1H N = number of CSTRs (equal volume) in series CAN = concentration of A leaving the Nth CSTR Two Irreversible Reactions in Parallel kD A " D ^desired h kU A " U ^undesired h x y - rA = - dcA/dt = kD C A x r D = dcD/dt = kD C A y r U = dcU/dt = kU C A Y D = instantaneous fractional yield of D = d C D / - d C A i Y D = overall
 fractional yield of D = N D f / N A0 - N A f j where NAf and NDf are measured at the outlet of the flow reactor. The statements usually insert, select, delete or update stored data in the SQL database. The values are shared with those used for the IPv4 protocol field, as both fields have the same function. When the system pressure is 1 atm, an ideal-
 gas mixture is assumed. Engineering 1. Both version 4 (IPv4) and version 6 (IPv4) are used and can co-exist on the same network. Linear algebra H. Transmission lines (high frequency) 480 4-6 11-17 4-6 12. a= where f DT \alpha = thermal expansion coefficient \epsilon = engineering strain \Delta T = change in temperature 104 Materials Science/Structure of Matter
 Specific heat (also called heat capacity) is the amount of heat required to raise the temperature of something by 1 degree. Source Address This field is the IPv4 address of the sender of the packet. The economic benefits gained by the violator as a result of noncompliance 5. Diffusion Diffusion
 where D = diffusion coefficient Do = proportionality constant Q = activation energy R = gas constant [8.314 ]/(mol • K)] T = absolute temperature Thermal and Mechanical Processing Cold working (plastically deforming) a metal increases strength and lowers ductility. Hardenability: The "ease" with which hardness can be obtained. Providing false
 testimony or information to the board 13. 5 Ethics and Professional Practice Model Law, Section 110.20 Definitions A. Instrumentation, Measurement, and Control Wheatstone Bridge - an electrical circuit used to measure changes in resistance. P0 = 1 - \rho Lq = (\lambda 2\sigma^2 + \rho^2)/[2(1 - \rho)] L = \rho + Lq Wq = Lq / \lambda W = Wq + 1/\mu Poisson Input—Erlang
1, 2, and 3 servers. \Sigma FH = 0 and \Sigma FV = 0 where FH = horizontal forces and member components FV = vertical forces and member components FV = vertica
process machinery such as pumps and compressors) Purchased-equipment installed) 10-18 Piping (installed) 40-70 Land (if purchase is required) 6 Total direct plant
 investment) Total capital investment 68-86 455-569 257 Chemical Engineering Scaling of Equipment Costs The cost of Unit A at one capacity related to the cost of Unit B with X times the cost of unit A is approximately Xn times the cost of Unit A at one capacity related to the cost of Unit B. Bridging may occur at the top surface due to condensation and resulting spoilage creating
 a crust. If the shortest job time is the time at the first work center, schedule it first, otherwise sc
 where 2.28 L/D SN t = mean residence time (min) L/D = internal length-to-diameter ratio S = kiln rake slope (in./ft of length) N = rotational speed (rev/min) Energy Content of Waste Typical Waste Values Food Waste Paper Cardboard Plastics Wood Glass Bi-metallic Cans Moisture, % 70 6 5 2 20 2 3 317 Energy, Btu/lb 2,000 7,200 7,000 14,000 8,000
60 300 Environmental Engineering Indoor Air Quality Material Balance where dC V dt i = QCo + S - QCi - kCiV V = volume of the room (m3) ng o m3 ng Co = concentration of the pollutant in the outside air e 3 o m 3 m d n Q = ventilation rate hr ng S = source emission rate inside the room d n hr k = removal reaction rate constant (assumed here to
 Closed Layout of Room No windows or exterior doors on one wall Windows or exterior doors on three walls Air Exchange Rate (air changes per hour, ach) 0.5 1.0 1.5 2.0 Approximate Volume Flow Rate of Outdoor Air where 13, 000 n QOA. If a Fourier series representing a periodic
 function is truncated after term n = N the mean square value FN2 of the truncated series is given by Parseval's relation. Limited Use in Oxidizing at High Temperatures. Addition of Two Matrix The matrix I = (aij) is a square n × n matrix with 1's on the diagonal
temperature. The instructions are ordinary CPU instructions such as Add, Move Data, and Branch, but the multiple cores can run multiple instructions at the same time, increasing overall speed for programs amenable to parallel computing. Flow measurement (e.g., pitot tube, venturi meter, weir) J. Zone R 0.1 Tol. C iB iC iB B Same as for NPN with
current directions and voltage polarities reversed. Entropy ds = 1 \text{ T i dgrev } 2 \text{ s2} - \text{s1} = \#1 \text{ 1 T i dgrev } \#1 \text{ T i dgrev } \#1 \text{ 2 1 T i
 or lifting? Dual Linear Program Associated with the above linear programming problem is another problem. Construction Engineering A. Adapted from ASME Y14.5-2018, American Society of Mechanical Engineers, 2018. If M is an N-digit value of base-r, the radix complement R(M) is defined by R(M) = r
N - M The 2's complement of an N-bit binary integer can be written 2's Complement (M) = 2N - M This operation is equivalent to taking the 1's complement (inverting each bit of M) and adding one. 542. However, an increase in water without a corresponding increase in cement reduces the concrete strength. Power Systems A. Occupational health
 (e.g., PPE, noise pollution, safety screening) 8. Pumps (e.g., power, operating point, parallel, series) E. Water quality (e.g., ground and surface, basic water chemistry) J. D UI VOLUME LIQ SS GLA L STA CRY Tg Tm TEMPERATURE The volume temperature curve as shown above is often used to show the difference between amorphous and crystalline
 solids. Expected value and expected error in decision making C. The payback period of time required for the profit or other benefits of an investment to equal the cost of the investment to equal the cost of the investment to equal the cost of the investment. In the absence of known effects, use ke = 1. Radiation D. No licensee granted inactive status may practice or offer to practice engineering in this
jurisdiction unless otherwise exempted in this Act. Human factors (e.g., displays, controls, usability, cognitive engineering) B. The Impulse-Momentum of the fluid equals the rate of change of momentum of the fluid. hfg Sat. DeWitt, Fundamentals of Heat and Mass Transfer, 3rd ed., Wiley, 1990
 2 = The Data field contains an IPv4 address which is the Subject of this Query 0 = A successful reply. Ethers are generally designated by naming the alkyl groups and adding the word ether. The vector form of a force is F = Fx i + Fy j Resultant (Two Dimensions) The resultant, F, of n forces with components Fx,i and Fy,i has the magnitude of 2
212F = e/Fx, i o + e/Fy, i o + e/Fy, i o + e/Fy, i o + e/Fy, i o H n i=1 The resultant direction with respect to the x-axis is i = arctan e! Fy, i n i= 1! Fx, i o n i= 1 Resolution of a Force Fx = F cos \thetax Fy = F cos 
(y/R)F x2 + y2 + z2 Fz = (z/R)F Moments (Couples) A system of two forces that are equal in magnitude, opposite in direction, and parallel to each other is called a couple. Any further increase in applied forces will cause motion. Linear programming and optimization (e.g., formulation, solution, interpretation) C. There are significant work terms and a
 single-mass stream. If \sigma 1 \ge \sigma 2 \ge \sigma 3, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2, then the theory predicts that yielding will occur whenever \tau = 1 + \delta 2.
 amorphous. Xn is approximately normal. Case 2: Allowances are based on workday. # dx = + ax bx + c 2 2ax + b - tan 1 2 4ac - b 2 27b. SODIUM HYDROXIDE 0 CONCENTRATION, % METHANOL 0 ACID, NITRIC 100 AMMONIA, AQUEOUS 200 ACID, HYDROCHLORIC 300 ACID, ACETIC TEMPERATURE, °F KEY TO CHARTS HYDROGEN
GD&T helps the designer provide information about the size, geometry, and location of features for mechanical parts. Manufacturing processes (e.g., machining, casting, welding, forming, dimensioning, new technologies) B. Calculus (e.g., single-variable, integral, differential) C. Therefore, one must distinguish the pound-force (lbf) from the pound
mass (lbm). Stresses and strains (e.g., diagrams, axial, torsion, bending, shear, thermal) C. The length is set to zero when a Hop-by-Hop extension header carries a Jumbo Payload option. This value is decremented by one at each forwarding node and packet discarded if it becomes 0. A confined space has limited or restricted means for entry or exit
0 0 1 2 3 1 4 Version 5 6 7 8 9 IHL 10 11 2 12 DSCP 13 14 15 17 18 ECN 19 3 20 21 22 23 24 25 26 Options (if IHL > 5) Version The first header field in an
IP packet is the four-bit version field. The cofactor of this element (if i + j is odd). If, in addition, the density is constant, then Q is constant. Errata To report errata in this book, send your correction using our chat feature or your
the HCS requires new SDSs to be in a uniform format, and include the section number; recommended use; restrictions on use Section 1, Identification: Includes product identifier; manufacturer or distributor name, address, phone number; recommended use; restrictions on use Section 2
 Hazard(s) identification: Includes all hazards regarding the chemical; required label elements Section 3, Composition/information on ingredients; trade secret claims Section 4, First-aid measures: Includes important symptoms/effects, acute, and delayed; required treatment Section 5, Fire-fighting
 measures: Lists suitable extinguishing techniques, equipment; chemical hazards from fire Section 6, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup Section 8, Accidental release measures; protective equipment and cleanup Section 8, Accidental release measures; protective equipment and cleanup Section 8, Accidental release measures; protective equipment and cleanup Section 8, Accidental release measures; protective equipment equipment
 Exposure controls/personal protection: Lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE) Section 9, Physical and chemical stability and possibility of
 hazardous reactions Section 11, Toxicological information* Section 12, Ecological information* Section 13, Disposal considerations* Section 14, Transport information* Section 15, Regulatory information* Section 16, Other information* Section 17, Toxicological information informatio
 function f that assigns to each state and input pair a new state. An organization may develop its own database of normal element durations, and normal times are already in the database. DIMENSION ORIGIN The symbolic means of indicating a
 toleranced dimension between two features originates from one of these features and not the other. Scanning 3. Care must be exercised during computations to correctly compute the algebraic sign of the work term. Bernoulli equation (hydrostatic pressure, velocity head) E. 224.0.0.0/4 224.0.0.0-239.255.255.255 268435456 Internet In use for IP
 multicast. The change in kinetic energy is the work done in accelerating the rigid body from \omega 0 to \omega i Iq \sim 2/2 = Iq \sim 02/2 + E m Vivx + vcy j/2 + Ic \sim 2/2 For motion about an instant
center, T = IIC\omega 2/2 Principle of Angular Impulse and Momentum Rigid Body (Plane Motion) (Hc)1 + \Sigma M0 dt = (Hc)2 where Hc = Ic\omega (H0)1 + \Sigma M0 dt = (H0)2 where Hc = Ic\omega (H0)1 + \Sigma M1 keq = i ki Springs in parallel: k2 ki k1 k2 keq = / ki i ki
 Spring Material: The minimum tensile strength of common spring steels may be determined from Sut = A/d m where Sut is the tensile strength in MPa, d is the wire diameter in millimeters, and A and m are listed in the following table: Material Music wire Oil-tempered wire Hard-drawn wire Chrome vanadium Chrome silicon ASTM m A A228 A229
 A227 A232 A401 0.163 0.193 0.201 0.155 0.091 2060 1610 1510 1790 1960 Maximum allowable torsional stress for static applications may be approximated as Ssy = \tau = 0.45Sut cold-drawn carbon and low-alloy steels (A232, A401) 431 Mechanical Engineering Compression
 Spring Dimensions Type of Spring Ends Term End coils, Nt Free length, Lo Solid length, Ls Pitch, p Plain 0 N pN + d d (Nt + 1) (L0 - d)/N Term End coils, Nt Free length, Lo Solid length, Ls Pitch, p Squared and
 Name O(log n) Logarithmic O(n log(n)) = O(log n!) Loglinear Merge sort, Heap sort, Fast Fourier Transform O(n) Quadratic Insertion sort, Bubble sort, Quick sort 2 Example (Worst Case) Binary tree traversal, Hash table search Software Syntax Guidelines • Code is pseudocode, no specific language • No end-of-line punctuation (e.g., semicolon) is
Time To Live (TTL) An eight-bit time to live field helps prevent datagrams from persisting (e.g., going in circles) on an internet. Licensees shall make a reasonable effort to inform another licensee whose work is believed to contain a material discrepancy, error, or omission that may impact the health, safety, or welfare of the public, unless such
 reporting is legally prohibited. If f(x) has ern x terms, then resonance is manifested. It is an inherent quality of a material or a condition. Stoichiometry and chemical reactions (e.g., equilibrium, acid-base, oxidation-reduction, precipitation, pC-pH) B. 0.95 0.92 0.88 0.84 0.79 0.72 0.35 0.27 0.22 0.18 0.60 0.50 0.42 0.35 0.30 0.26 0.15 0.13 0.23 0.21 \leq
 renew a license and who applies to and is approved by the board to be granted the use of the title "Professional Engineer, Retired." 4. In that case, the equation becomes: Risk = Hazard × Exposure Organizations evaluate hazards using multiple techniques and data sources. 192.0.2.0/24 192.0.2.0- 192.0.2.255 256 Documentation Assigned as TEST-
NET-1, documentation and examples. l = arn - 1 S = a (1 - rn)/(1 - r); r \ne 1 l = arn - 1 l
 of the determinant, arranged in n rows and n columns and enclosed by two vertical lines. Some useful Laplace transform Pairs f(t) d(t), Impulse at t = 0.1 s t
\beta 2C sn F^ sh - / sn - m - 1 d dtf ^m0 h n-1 m m=0 #0 t f^x hdx c 1 mF^ sh s #0 t x t - xih^x hdx H^ shX^ sh f t - xiu t - xie - xs F^ sh limit f(t) limit sF(s) t"3 s"0 t"0 s"3 The last two transforms represent the Final Value Theorem (F.V.T.) and Initial Value Theorem (I.V.T.), respectively. Parity - For parity bit
 coding, a parity bit value is added to the transmitted frame to make the total number of ones odd (odd parity) or even (even parity). Q = volumetric flow A0 = cross-sectional area of flow g = acceleration of gravity h = height of fluid above orifice Time required to drain a tank 2 At /A0 i 1 2 1 2 `h1 - h 2 j Dt = 2g where rD 2 At = cross-sectional area
of tank = 4 \text{ t } 186 \text{ Fluid Mechanics Multipath Pipeline Problems P P L v v v L Vennard, } J.K., Elementary Fluid Mechanics, 6 \text{th ed.}, J.K. Vennard, 1954. e * d = 1 \text{ (mod t)} where t = least common multiple (p - 1, q - 1) • The encrypted cyphertext c of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The signature s of a message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The decrypted message m is c = me (mod n) • The decrypted message is m = cd (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (mod n) • The decrypted message m is c = me (
m is s = md (mod n) Diffie-Hellman Key-Exchange Protocol A sender and receiver separately select private keys x and y. Sat. The following equations govern the operation of the circuit given that neither transistor is operating in the saturation region. Hazardous properties of materials, including SDS (e.g., corrosivity, flammability, toxicity, reactivity,
 Momentum Transfer ftV 2 xw = 8 Heat Transfer od Q n = hDT A w Mass Transfer b N l = km Dcm A w Use of Friction Factor (f) to Predict Heat-Transfer and Mass-Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mass Transfer fjH = b Nu l Pr 2 3 = RePr 8 Mas
 Range Guide for the Applicaon of Various Solid-Solid Operaons Sorters Size alone Screens Liquid cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables Wet tables, spirals Centrifuges Sizers Density alone (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables (heavy media) Cyclones Cones Drums Size and density (ores) (coal) Dry tables (heavy media) Cyclones Cones Drums Size and density (heavy media) Cyclones Cyclone
 Kind byte of 0x01 indicates that this is a No-Op option used only for padding, and does not have an Option-Length or Option-Data byte following it. Unsteady-state mass balance C. LD50 Median lethal single dose, based on laboratory tests, expected to kill 50% of a group of test animals, usually by oral or skin exposure. The Mach number (Ma) is the
ratio of the fluid velocity to the speed of sound. Molality of Solutions - The number of gram moles of a substance per 1,000 grams of solvent. The formal definition of calibration in Chemical Engineering and Mining Review, June 10,
 into Partial Fractions. Data acquisition (e.g., logging, sampling rate, sampling rate, sampling range, filtering, amplification, signal interface, signal processing, analog/digital [A/D], digital/analog [D/A], digital/an
 example in this category is ethylene, C2H4. Number systems B. Many engineering departments use these reports to assess program outcomes. If the cross-sectional area and the elevation of the pipe are the same at both sections, onescions, onescions (1 and 2), then z1 = z2 and v1 = v2. A single point falls outside the (three sigma) control limits. For forced vibrations, onescions (1 and 2), then z1 = z2 and v1 = v2. A single point falls outside the (three sigma) control limits.
 indicating a dimension or other dimensional data as reference shall be to enclose the dimensional data) within parentheses. Licensees shall comply with the licensing laws and rules governing that require real-time data
 streaming and therefore make use of the DSCP field. Consider an element which lies in the jth column and the ith row. 160 180 1 200 Thermodynamics 161 PRESSURE, psia 1.5 80 60 200 2.0 100 800 600 80 140 R-134a 1,1,1,2
 Tetrafluoroethane REFERENCE STATE: h = 0.0 Btu/lb, s = 0.00 Btu/lb, hi = he Boilers, Condensers, Evaporators, One Side in a Heat Exchanger: Heat transfer terms are significant. Water content affects workability. This assumption is valid for steady operation of turbines, pumps, compressors, throttling valves, nozzles, and heat exchangers,
 including boilers and condensers. The output is typically a very small signal. d(tan u)/dx = sec2 u du/dx 19. FE Reference Handbook 10.0.1 Copyright ©2020 by NCEES®. Flinn, Richard A., and Paul K. 252 Chemical Engineering Solids Processing Mean Particle Sizes Calculated from Particle Size Distributions (PSDs) Representative particle density
 functions are shown in the figure below: Particle Size Distribution Functions density function (f) cumulative density function describes the distribution of number of particles (fN) or volume of particles (fV) with respect to particle size. Book
 Value BV = initial cost - Σ Dj Taxation Income taxes are paid at a specific rate on taxable income. The FE exam includes 110-questions. S. Software implementation (e.g., iteration, conditionals, recursion, control flow, scripting, testing) 4-6 481 8-12 Fundamentals of Engineering (FE) ENVIRONMENTAL CBT Exam Specifications Effective Beginning
 with the July 2020 Examinations • The FE exam is a computer-based test (CBT). A number of options are available to individuals who wish to protect their intellectual property from being claimed or misused by others. Material types and compatibilities (e.g., engineered materials, ferrous and nonferrous metals) C. • RST (1 bit): Reset the connection
SYN (1 bit): Synchronize sequence numbers. (Red Team vs Blue Team) Security Triad AIC—Availability, Integrity, Confidentiality (also referred to as CIA Triad) Availability, and accurate Confidentiality—set of rules that limits access to
 information Authentication Three factors for authentication, Accounting you know (password, PIN, etc) Something you are (biometrics, etc) AAA protocols (Authentication, Accounting) TACACS+—Terminal Access Controller Access Contr
 Authentication Dial In User Service DIAMETER—Enhancement for RADIUS. Note that the range of N is [0, 2n - 1]. Dimensionless number, Froude number, Enhancement for RADIUS. Note that the range of N is [0, 2n - 1].
 winding one winding (b) solenoid (n) hydraulic motor, variable capacity (one direction of flow) (z) shut-off valve M (c) adjustable symbol (o) actuating cylinder (double acting) (bb) internal combustion engine (e) directional arrow (air or gas) (g) two-way, two-positional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor, variable capacity (one directional arrow (oil) (p) actuating cylinder (double acting) (ab) internal combustion engine (e) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (p) actuating cylinder (double acting) (ab) electric motor M (d) directional arrow (oil) (d) electric motor M (d) directional arrow (oil) (d) electric motor M (d) directional arrow (oil) (d) electric motor M (d) directional arrow (d) electric motor M (d) 
control valve (normally closed) (cc) coupling (f) fluid line flow (r) two-position control valve (normally open) (ee) cooler (h) reservoir (open) (t) four-way, two-position control valve (ff) heater (i) reservoir (closed) (u) check (nonreturn) valve (gg)
pressure gage (j) filter or strainer (v) shuttle valve (hh) temperature gage (k) pump, fixed capacity (two directions of flow) (x) pressure relief valve Source: MIL-TD-17B-1: Military Standard Mechanical Symbols, Washington, DC: U.S. Department of Defense
 1963. PPP protocols PAP—Password Authentication Protocol CHAP—Challenge Handshake Authentication Protocol EAP—Extensible Authentication Protocol EAP—Extensible Authentication Protocol CHAP—Challenge Handshake Authentication Protocol EAP—Extensible Authentication Protocol CHAP—Challenge Handshake Authentication Protocol EAP—Extensible Authentication Protocol EAPE—Extensible Authentication Proto
MMC (\emptyset10.2) \emptyset 0.1 M \emptyset0.5 Tol. These density functions can be measured by a variety of means. 288 \varphiFcr ksi 15.4 13.2 13.0 12.8 12.6 12.4 12.2 12.0 11.9 11.7 11.5 11.4 11.2 11.0 10.9 10.7 10.6 10.5 10.3 10.2 10.0 9.91 9.78 9.65 9.53 9.40 9.28 9.17 9.05 8.94 8.82 KL r 161 162 163 164 165 166 167 168
169\ 170\ 171\ 172\ 173\ 174\ 175\ 176\ 177\ 178\ 179\ 180\ 181\ 182\ 183\ 184\ 185\ 186\ 187\ 188\ 189\ 190\ 191\ 192\ 193\ 194\ 195\ 196\ 197\ 198\ 199\ 200\ \varphi Fcr\ ksi\ 8.72\ 8.61\ 8.50\ 8.40\ 8.30\ 8.20\ 8.10\ 8.00\ 7.89\ 7.82\ 7.73\ 7.64\ 7.38\ 7.29\ 7.21\ 7.13\ 7.05\ 6.97\ 6.90\ 6.82\ 6.75\ 6.67\ 6.60\ 6.53\ 6.46\ 6.39\ 6.32\ 6.26\ 6.19\ 6.13\ 6.06\ 6.00\ 5.94\ 5.88\ 5.82\ 5.76\ 5.70\ 5.65\ 7.46\ 7.38\ 7.29\ 7.21\ 7.13\ 7.05\ 6.97\ 6.90\ 6.82\ 6.75\ 6.67\ 6.60\ 6.53\ 6.46\ 6.39\ 6.32\ 6.26\ 6.19\ 6.13\ 6.06\ 6.00\ 5.94\ 5.88\ 5.82\ 5.76\ 5.70\ 5.65\ 7.46\ 7.38\ 7.29\ 7.21\ 7.13\ 7.05\ 6.97\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 6.90\ 
AISC Table 4-1 Available Strength in Axial Compression, kips—W shapes LRFD: φPn Selected W14, W12, W10 W14 W12 W10 74 68 61 53 48 58 53 50 45 40 60 54 49 45 39 0 980 899 806 702 636 767 701 657 590 526 794 712 649 597 516 6 922 844 757 633 573 722 659 595 534 475 750 672 612 543 469 7 901 826 740 610 552 707 644 574 516
565 513 410 351 13 734 670 599 433 391 578 525 413 370 328 606 543 493 384 328 14 701 639 572 401 361 553 501 384 343 304 581 520 471 358 305 15 667 608 543 391 578 525 413 370 328 606 543 493 384 328 14 701 639 572 401 361 553 501 448 405
26 311 281 250 133 120 249 222 130 116 102 270 241 216 124 104 28 268 242 215 115 103 215 192 112 99.8 88.0 233 208 186 107 90.0 30 234 211 187 100 89.9 187 167 97.7 87.0 76.6 203 181 162 93.4 78.4 32 205 185 165 88.1 165 147 82.9 76.4 67.3 179 159 143 82.1 68.9 34 182 164 146 146 130 158 141 126 36 162 146 130 130 116 141 126
113 38 146 131 117 117 104 127 113 101 40 131 119 105 105 93.9 114 102 91.3 Civil Engineering 289 Effective length KL (ft) with respect to least radius of gyration ry Shape wt/ft Fy = 50 ksi \varphic = 0.90 Civil Engineering Hydrology/Water Resources NRCS (SCS) Rainfall-Runoff ^{\circ} h Q = P - 0.2S P + 0.8S 1, 000 10 S = CN 1, 000 CN = S + 10 2 where
P = precipitation (inches) S = maximum basin retention (inches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = CIA where A C I Q = watershed area (acres) = runoff (onches) CN = curve number Rational Formula Q = curve number Rational Formula
I = \Delta Ss P = precipitation Qin = surface water flow into the system Qout = surface water flow into the system Qs = groundwater flow into the sys
expression: EL = Pc Ep where Pc = pan coefficient (Pc ranges from 0.3 to 0.85; common Pc = 0.7) 290 Civil Engineering Evapotranspiration Rates for Grasses Grass-Reference Evapotra France France France France France France France France France F
before specifying concentricity. Currently, all standard DS fields end with a '0' bit. Definitions used in ASME Y14.5 Regardless of Feature Size (RFS) This is the default condition for geometric tolerances. • 0 (8 bits): End of options list • 1 (8 bits): No operation (NOP, Padding) This may be used to align option fields on 32-bit boundaries for better
performance. 350 400 Enthalpy (k]/kg) 450 500 550 600 4. For example, relative stability can be quantified in terms of a. Closed conduits (e.g., Darcy-Weisbach, Hazen-Williams, Moody) C. The six most-significant bits hold the Differentiated Services (DS) field, which is used to classify packets. Van Nostrand Company, Inc., Princeton, NJ, 1959. 1.00
 0.97 0.94 0.91 0.88 0.84 0.80 0.75 0.70 0.60 0.52 0.45 0.41 0.37 0.34 0.31 0.28 0.00 Waters, Thomas R., Ph.D., et al, Applications Manual for the Revised NIOSH, January 1994. Adapted from Hibbeler, R.C., Engineering Mechanics, 10th ed., Prentice Hall, 2003.
Contains system instructions or constant data for the system Replacement Policy - For set associative caches, if there is a miss and the set or cache (respectively) is full, then a block must be selected for replacement N.C.
Dahl, An Introduction to Mechanics of Solids, McGraw-Hill, New York, 1959. Pavement system design (e.g., thickness, subgrade, drainage, rehabilitation) C. An Option-Kind byte of 0x02 indicates that this is the Maximum Segment Size option, and will be followed by a byte specifying the length of the MSS field (should be 0x04). In the second system,
the higher alcohols are considered as derivatives of the first member of the series, which is called carbinol. * A = Very unstable E = Slightly unstable E
Some materials that are not inherently hazardous can become hazardous during storage or processing. COROLLARY to Kelvin-Planck: No heat engine can have a higher efficiency than a Carnot Cycle operating between the same reservoirs. Uncertainty (e.g., expected value and risk) 5-8 4. Unsteady-state energy balance E. Feature Control Frame
From the ASME Y14.5:2009 standard: "A feature control frame is a rectangle divided into compartments containing the geometry with respect to which the
tolerance is specified. For a second-order determinant: a1 a2 b1 b2 = a1b2 - a2b1 For a third-order determinant: a1 a2 b1 b2 = a1b2c3 + a2b3c1 + a2b1c3 - a1b3c2 c1 c2 c3 58 Mathematics Vectors A = axi + ayj + azk Addition and subtraction: A + B = (ax + bx)i + (ay + by)j + (az + bz)k A - B = (ax - bx)i + (ay - by)j + (az + bz)k A - B = (ax - bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ay - by)j + (az + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax + bx)i + (ax + bz)k A - B = (ax
bz)k The dot product is a scalar product and represents the projection of B onto A times A. Rotating rake feeds sands to central underflow. Pipe and duct flow and friction losses (e.g., pipes, valves, fittings, laminar, transitional and turbulent flow) G. - Equivalent sound-level contours used in determining the A-weighted sound level on the basis of an
octave-band analysis. Mechanical properties of materials C. Biomechanics of the Human Body Basic Equations Hx + Fx = 0 Hy + Fy = 0 Hy + 
testing—This is similar to a blind test, but the security team is not made aware of the simulation. This sum is called the expansion of the determinant [according to the elements of the security team is not made aware of the simulation. This sum is called the expansion of the determinant [according to the elements of the security team is not made aware of the simulation. This sum is called the expansion of the determinant [according to the elements of the security team is not made aware of the simulation. This sum is called the expansion of the determinant [according to the elements of the security team is not made aware of the simulation. This sum is called the expansion of the determinant [according to the elements of the security team is not made aware of the simulation. This sum is called the expansion of the elements of the security team is not made aware of the simulation.
required for transmission of the pulse modulated message is inversely proportional to the pulse length τ. Combustion and combustion products (e.g., CO, CO2, NOX, ash, particulates) I. 2001:db8::/32 2001:db8::/32
and risk (e.g., uncertainty, utility, decision trees, financial risk) 8-12 8. © 1996-2014, Amazon.com, Inc. Engineer—The term "Engineering by reason of engineering education, training, and experience in the application of engineering principles and the
interpretation of engineering data. Time value of money (e.g., equivalence, present worth, future worth, rate of return, annuities) B. The thermistor resistance is: -RT = R0e\beta d T T0 n 1 1 where \beta is a material dependent value and T is in Kelvin. Complex numbers C. Facilities and Supply Chain A. Professions are based on a
large knowledge base requiring extensive training, 2 O 1 `H i Cmax = ruy v exp f - 2 2 p v z vz where variables are as above except Cmax = maximum ground-level concentration vz = H for neutral atmospheric conditions 2 310 Environmental Engineering Selected Properties of Air Nitrogen (N2) by volume 78.09% Oxygen (O2) by volume 20.94%
Argon (Ar) by volume 0.93% Molecular weight of air 28.966 g/mol Absolute viscosity, μ at 80°F 0.045 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) Density at 80°F 0.0734 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.045 lbm/(hr-ft) at 100°F 0.0734 lbm/(hr-ft) 
circuits C. Probability distributions (e.g., discrete, continuous, normal, binomial) C. AM signals can be demodulator. Ergonomics (e.g., biomechanics, cumulative trauma disorders, anthropometry, workplace design, macroergonomics) 8-12 11. This derivative is called the partial derivative of z
with respect to x. Calculus (e.g., derivatives, integrals, progressions, series) C. This process continues with larger lists until at last, two lists are merged into the final sorted list. The theory predicts that yielding will occur whenever > v1 - v2 i + v2 - v3 j + v1 - v3 j H 2 2 2 1 2 2 $ Sy The term on the left side of the inequality is known as the
effective or Von Mises stress. The circumstances leading to the Violation 3. 2 = The Qtype of the Query is unknown to the Responder. The Hazard Communicate the hazards of hazardous chemical products. Zvar = tvar = where X - no v n X
no s n Zvar = standard normal Z score tvar = sample distribution test statistic σ = standard deviation up = population mean x = hypothesized mean or sample mean n = sample distribution test statistic σ = standard deviation test statistic σ = standard deviation test statistic σ = standard deviation up = population mean x = hypothesized mean or sample mean n = sample distribution test statistic σ = standard deviation up = population mean x = hypothesized mean or sample mean n = sample distribution up = population mean x = hypothesized mean or sample mean n = sample distribution up = hypothesized mean n = sample mean
ed., McGraw-Hill, 1992, p. 442 Mechanical Engineering Modifying Symbols Term Symbol AT MAXIMUM MATERIAL CONDITION (When applied to a datum reference) Definitions The condition in which a feature of size contains the maximum amount of material within the
stated limits of size, e.g., minimum hole diameter or maximum shaft diameter or maximum shaft diameter. Given a, b, c, and d, \theta2, \theta3, \theta4, and \theta2, \theta3, \theta4, and \theta50 and \theta50. The stated limits of size, e.g., minimum hole diameter or maximum shaft diameter. Given a, b, c, and d, \theta61, \theta7, \theta8, \theta9, 
Mechanical Engineering Symbols commonly used to represent hydraulic pneumatic and electromechanical components. If the forces, such as friction, serve to dissipate energy, U1\rightarrow 2 is negative. Options The options field is not often used. + v 2n vseries = v n v vmean = n vproduct = A 2 v 2b + B 2 va2 2 The sample variance is s 2 = 81/_{-} n - 1 iB /
Xi - X j n 2 i=1 The sample standard deviation is s= 71/ n - 1hA! Xi - X j n 2 i= 1 The sample coefficient of variation = CV = s/X The sample root-mean-square value = ^1/nh! Xi2 When the discrete data are rearranged in increasing order and n is odd, the median is the value of the b n + 1 l item 2 th
th n n When n is even, the median is the average of the b l and b + 1l items. The overall order is n=x+y Batch Reactor, Constant Volume For a well-mixed, constant-volume batch reactor, Constant Volume For a well-mixed, constant-volume batch reactor, Constant Volume For a well-mixed, constant Volume For a well-mixed, constant-volume batch reactor, Constant Volume For a well-mixed, constant-volume For a well-mixed, constant-volume For a well-mixed, constant-volume batch reactor, Constant Volume For a well-mixed, constant-volume For a well-mixed For a well-mixe
CAO CAOXA = kt or or First-Order Irreversible Reaction - rA - dCA dt = kCA = kCA dXA dt = k ^1 - XAh ln CA CAOi = - kt ln ^1 - XAh = - kt or or Second-Order Irreversible Reaction - rA = kCA2 - dCA dt = kCA dXA dt = k ^1 - XAh = - kt or or Second-Order Irreversible Reaction - rA = kCA2 - dCA dt = kCA dXA dt = k ^1 - XAh = - kt or or Second-Order Irreversible Reaction - rA = kCA2 - dCA dt = kCA2 1 CA - 1 CAO = kt dXA dt or = kCAO ^1 - XAh = - kt or or First-Order Reversible Reactions k1 AER k2 dC A = k1 CA - k1 CAO = kt dXA dt or = kCAO ^1 - XAh = - kt or or First-Order Reversible Reactions k1 AER k2 dC A = k1 CA - k1 CAO = kt dXA dt or = kCAO ^1 - XAh = - kt or or First-Order Reversible Reactions k1 AER k2 dC A = k1 CA - k1 CAO = kt dXA dt or = kCAO ^1 - XAh = - kt or or First-Order Reversible Reactions k1 AER k2 dC A = k1 CA - k1 CAO = k
2 C R dt K C = k1 k2 = Ct R Ct A M = CR0 C A0 - rA = - dX A k1 ^ M + 1 h t = X A - X Ai dt M + Xt A X C - Ct - ln f1 - t A p = - ln A tA XA C A0 - CA = ^ M + 1 h k1 t M + Xt A i Xt A is the equilibrium conversion. The following educational criteria may apply as a substitute to the length of experience set forth above: (a) An individual with a
master's degree in engineering acceptable to the board: three years of experience after the qualifying bachelor's degree is conferred as described in a(1)(a) or a(1)(c) above (b) An individual with an earned doctoral degree in engineering acceptable to the board and who has passed the FE exam: two years of experience (c) An individual with an
earned doctoral degree in engineering acceptable to the board and who has elected not to take the FE exam: four years of experience A graduate degree that is used to satisfy education requirements, productivity analysis,
temporary erosion control) C. V ≥ 30 in. Dienes are acyclic hydrocarbons with two carbon-carbon double bonds, having the general formula of CnH2n-2; butadiene (C4H6) is an example of such. Below the glass transition temperature (Tg) the amorphous material will be a brittle solid. In an exothermic process, heat is evolved (enthalpy change is
negative). f. The OSI session layer provides the mechanism for opening, closing, and managing a session between end-user application processes. Poor 0.3 Single or multiple unbaffled inlets and outlets, no intra-basin baffles. Sludge treatment and handling (e.g., land application, digestion, sludge dewatering, composting) G. Asks to push the buffered
data to the receiving application. It is the same for both components. Replaces PSK with Simultaneous Exchange of Equals Penetration Testing - Authorized Vulnerability Testing Phases 1. This relation says that the mean-square value is the sum of the mean-square value of the Fourier components, or 2 FN2 = a 0 + 12i! and a 12i! an
 the RMS value is then defined to be the square root of this quantity or FN. 7. Thermodynamic laws (e.g., first law, second law) B. West, Plant Design and Economics for Chemical Engineers, 5th ed., McGraw-Hill, 2004. 2: Acetic. The firm applying shall supply such certificate or letter from the board with its application for incorporation, organization,
licensure, or authorization. Open-channel flow (e.g., Manning's equation, drag) H. Ambient and indoor air quality (e.g., criteria, toxic and hazardous air pollutants) B. The ethical principles governing the engineering profession are embodied in codes of ethics. d[f (u)]/du = {d[f (u)]/du} du/dx 10. Process Design A. CPM Precedence Relationships
ACTIVITY-ON-NODE A A B B START-TO-START: START OF B DEPENDS ON THE FINISH OF A ACTIVITY-ON-ARROW ANNOTATION EARLY START (A FINISH-TO-START: START OF B DEPENDS ON THE FINISH OF A ACTIVITY-ON-NODE ANNOTATION EARLY START (A FINISH-TO-START).
FINISH/LATE FINISH ACTIVITY DURATION j EARLY START Nomenclature ES = Early start = Late start = LF - duration LF = LATE start = LAT
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ACWP = Actual \ cost \ of \ work \ performed \ (Actual) \ BCWP = Budgeted \ cost \ of \ work \ performed \ (Earned) \ Variance = Earned - Planned) \ Indices \ BCWP \ CPI = ACWP \ (Cost \ variance = Earned - Actual) \ SV = BCWP \ cost \ Performance \ Index = Earned - Actual) \ SV = BCWP \ cost \ Performance \ Index = Earned \ results \ (Earned) \ Variance = Earn
 Earned m Actual Planned BAC = Original project estimate (Budget at completion) ETC = BAC - BCWP CPI EAC = ACWP + ETC i Estimate to complete i Estimate to complete i Estimate at completion Nomenclature where
 P_MW i ng = ppb # RT m3 ppb = parts per billion P = pressure (atm) R = ideal gas law constant = 0.0821 L•atm/(mole•K) T = absolute temperature (K) = 273.15 + °C MW = molecular weight (g/mole) Atmospheric Dispersion Modeling (Gaussian) σy and σz as a function of downwind distance and stability class, see following figures. OSI MODEL
 TCP/IP MODEL APPLICATION PRESENTATION APPLICATION SESSION TRANSPORT TRANSPOR
  aquifer properties, soil characteristics, subsurface) B. Societal Considerations "Creating a sustainable world that provides a safe, secure, healthy life for all peoples is a priority of the US engineering community. International tolerance (IT) grade numbers designate groups of tolerances such that the tolerance for a particular IT number will have the
same relative accuracy for a basic size. Internet Protocol version 4 Header The IPv4 packet header consists of 14 fields, of which 13 are required. Materials Science A. Certification or Enrollment as an Engineer Intern The following shall be considered as minimum evidence that the applicant is qualified for certification or Enrollment as an Engineer Intern The following shall be considered as minimum evidence that the applicant is qualified for certification or Enrollment as an Engineer Intern The following shall be considered as minimum evidence that the applicant is qualified for certification as an engineer intern.
 needed to solve exam questions—such as the cover, introductory material, index, and exam specifications—will not be included in the PDF version. Biological processes (e.g., distributions, mean, mode, standard deviation, confidence interval,
 regression and curve fitting) 8-12 2. Merge Sort: divides the list into the smallest unit (e.g., 1 element), then compares each element with the adjacent list to sort and merge the two adjacent lists. Discipline (including voluntary surrender of an engineering or surveying license in order to avoid disciplinary action) by another jurisdiction, foreign
 country, or the United States government, if at least one of the grounds for discipline is the same or substantially equivalent to those contained in this Act 6. Single-variable calculus C. Statistical control (e.g., control limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits) 4-6 3. In the sliding window protocol, each outbound frame contains a sequence number. P ten n5 num ngs gste Plati . AC circuit limits a sequence number a sequence number of the sliding window protocol is not a sequence number and the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a sequence number of the sliding window protocol is not a s
 analysis (e.g., resistors, capacitors, inductors) D. Risk always involves both probability and severity elements. As a 4-bit field, the maximum value is 15 words (15 × 32 bits, or 480 bits = 60 bytes). Maxterm, Mi - A sum term which contains an occurrence of every variable in the function. Unfortunately, there is no scientific basis for predicting elements.
times without breaking them down into motion-level parts. d(uvw)/dx = uv dw/dx + uw dv/dx + uw dv/d
-100 2000 Refrigerant 410A [R-32/125 (50/50)] Properties of Liquid Vapor Enthalpy, Btu/lb-°F Liquid Vapor Entropy, Btu/lb-°F L
  17.96\ 106.18\ -0.04574\ 0.29455\ 0.3226\ 0.1733\ 1.230\ 0.0954\ 0.00469\ 5\ 6\ -89.63\ -89.63\ -89.63\ -89.63\ -89.63\ -89.53\ -16.24\ 106.89\ -0.04107\ 0.29162\ 0.3231\ 0.1760\ 1.232\ 0.0945\ 0.3236\ 0.1785\ 1.233\ 0.0931\ 0.00482\ 7\ 8\ -80.85\ -80.71\ 86.44\ 6.7935\ -13.40\ 108.05\ -0.03349\ 0.28705\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.3241\ 0.
0.1807 1.234 0.0922 0.00488 8 10 -73.70 -73.56 85.67 5.5105 -11.08 108.97 -0.02743 0.28356 0.3251 0.1848 1.237 0.0905 0.00498 10 12 -67.62 -67.48 85.02 4.6434 -9.10 109.75 -0.02743 0.28356 0.3251 0.1848 1.237 0.0905 0.00498 10 12 -67.62 -67.48 85.02 4.6434 -9.10 109.75 -0.02743 0.28356 0.3251 0.1848 1.240 0.0891 0.00507 12 14 -62.31 -62.16 84.44 4.0168 -7.36 110.42 -0.01795 0.27840 0.3270 0.1917 1.243 0.0879 0.00515 14 14.70^{\circ}
  -60.60 -60.46 84.26 3.8375 -6.80 110.63 -0.01655 0.27766 0.3274 0.1928 1.244 0.0875 0.00517 14.70b 16 -57.56 -57.42 83.93 3.5423 -580 111.01 -0.01407 0.27638 0.3279 0.1947 1.245 0.0868 0.00528 18 20 -49.34 -49.19 83.02 2.8698 -3.09
 1.7343 3.97 114.47 0.0093 0.26530 0.3352 0.2154 1.269 0.0801 0.00570 34 36 -25.69 -25.54 80.33 1.6422 4.79 114.74 0.0112 0.26448 0.3360 0.2173 1.272 0.0795 0.00574 36 Thermodynamics 166 1 Refrigerant 410A [R-32/125 (50/50)] Properties of Liquid on Bubble Line and Vapor on Dew Line (con't) Pressure, psia Temp.,* °F Bubble Dew Density
 115.24\ 0.0147\ 0.26297\ 0.3374\ 0.2208\ 1.277\ 0.0785\ 0.00589\ 44\ 46\ -14.88\ -14.73\ 79.05\ 1.2982\ 8.45\ 115.90\ 0.0194\ 0.26098\ 0.3396\ 0.2259\ 1.284
0.0771\ 0.00593\ 46\ -12.94\ -12.79\ 78.82\ 1.2460\ 9.11\ 116.10\ 0.0209\ 0.26038\ 0.3403\ 0.2275\ 1.287\ 0.0766\ 0.00597\ 48\ -11.07\ -10.91\ 78.59\ 1.1979\ 9.75\ 116.30\ 0.0223\ 0.25980\ 0.3410\ 0.2290\ 1.289\ 0.0762\ 0.00600\ 50\ 55\ -6.62\ -6.45\ 78.05\ 1.0925\ 11.27\ 116.75\ 0.0257\ 0.25845\ 0.3427\ 0.2328\ 1.295\ 0.0752\ 0.00610\ 55\ 60\ -2.46\ -2.30\ 77.54\ 1.0040\ 12.70
 119.26\ 0.0461\ 0.25072\ 0.3561\ 0.25072\ 0.3561\ 0.25072\ 0.3561\ 0.2592\ 1.345\ 0.0692\ 0.00677\ 95\ 100\ 23.71\ 23.89\ 74.17\ 0.6070\ 21.90\ 119.48\ 0.0482\ 0.24999\ 0.3578\ 0.2622\ 1.352\ 0.0685\ 0.0674\ 0.00700\ 110\ 120\ 33.86\ 34.05\ 72.78\ 0.5051\ 25.57\ 120.24\ 0.0556\ 0.24736\ 0.3644\ 0.2738\ 1.37861\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.3578\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 0.24999\ 
 Properties of Liquid on Bubble Line and Vapor on Dew Line (con't) Pressure, psia Temp., *°F Bubble Dew Density, lb/ft3 Liquid Vapor Entropy, Btu/lb-°F Liquid 
0.1115\ 0.22629\ 0.4820\ 0.4747\ 1.977\ 0.0507\ 0.01214\ 380\ 400\ 113.68\ 113.89\ 58.70\ 0.1310\ 57.83\ 121.13\ 0.1145\ 0.22488\ 0.4971\ 0.5016\ 2.063\ 0.0499\ 0.01271\ 400\ 450\ 122.82\ 123.01\ 56.39\ 0.1114\ 62.23\ 120.14\ 0.1218\ 0.22124\ 0.5443\ 0.5857\ 2.333\ 0.0481\ 0.01433\ 450\ 500\ 131.19\ 131.38\ 53.97\ 0.0952\ 66.54\ 118.80\ 0.1289\ 0.21732\ 0.6143\ 0.7083\ 2.7281300\ 0.0481\ 0.01433\ 450\ 500\ 131.19\ 131.38\ 53.97\ 0.0952\ 66.54\ 118.80\ 0.1289\ 0.21732\ 0.6143\ 0.7083\ 2.7281300\ 0.0481\ 0.01433\ 450\ 500\ 131.19\ 131.38\ 53.97\ 0.0952\ 66.54\ 118.80\ 0.1289\ 0.21732\ 0.6143\ 0.7083\ 2.7281300\ 0.0481\ 0.01433\ 450\ 500\ 131.19\ 131.38\ 53.97\ 0.0952\ 66.54\ 118.80\ 0.1289\ 0.21732\ 0.6143\ 0.7083\ 2.7281300\ 0.0481\ 0.01433\ 450\ 500\ 131.19\ 131.38\ 53.97\ 0.0952\ 66.54\ 118.80\ 0.1289\ 0.21732\ 0.6143\ 0.7083\ 2.7281300\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.04810\ 0.048
 Bubble and dew point at one standard atmosphere c Critical point Reprinted with permission from 2013 ASHRAE Handbook — Fundamentals, ASHRAE: 2013. Angular Momentum or Ho = I0 ~ Taking the time
derivative of the above, the equation of motion may be written as Ho 0 = d_1 0 \sim i/dt = M0 where M0 is the moment applied to the particle. The expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression 32.174 lbm-ft/(lbf-sec2) is designated as gc and is used to resolve expression as gc and is used to re
 based on job time. Source Port Number This field identifies the sender's port, when used. The tightest fit usable on cast iron. • Transmission Control Protocol (TCP) is a connection-oriented protocol that detects lost packets, duplicated packets, duplicated packets, or packets that are received out of order and has mechanisms to correct these problems. Newton's second
law for rigid bodies I. Model Law, Section 130.10 General Requirements for Licensure Education, experience, and examinations are required for licensure as a professional engineer or professional surveyor as set forth by the jurisdiction. Radius of gyration rp, rx, ry is the distance from a reference axis at which all of the area
 length of member = final temperature = initial temperature Cylindrical Pressure versal For internal pressure only, the stresses at the inside wall are: vt = Pi ro2 + ri2 and or = -Po r o2 + ri2 and or = -Po r o2 - ri2 131 Mechanics of Materials where ot or Pi Po ri ro =
 tangential (hoop) stress = radial stress = internal pressure = external pressure = inside radius = outside r
  access prior to your exam, you may either purchase a hard copy or download a free electronic copy. The negative sign indicates that the output gear rotates in the opposite sense with respect to the input gear rotates in the opposite sense with respect to the input gear. The point at which the Mach number is sonic is called the throat and its area is represented by the variable, A*. Black Box Testing: examines
 functionality without knowledge of the internal code. Deformation and stiffness D. Mass moment of inertia E. \sigma - \sigma tmax = 1 2 3. Bottom slope is set at 1% 2. Equilibrium stages numbered from top. Groundwater flow (e.g., Darcy's law, specific capacity, velocity, gradient, transport mechanisms) C. Henry's Law is valid for low concentrations; i.e., x \approx 1.00
 0. Datum with a basic dimension would control the tolerance around the true profile. Revoke, suspend, or refuse to issue, restore, or renew the certificate of authorization 10 Ethics and Professional Practice Model Law, Section 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe to issue, restore, or renew the certificate of authorization 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe to issue, restore, or renew the certificate of authorization 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe the certificate of authorization 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe the certificate of authorization 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe the certificate of authorization 170.30 Exemption Clause This Act shall not be construed to prevent the following: A. Breakeven analysis is used to describe the certificate of authorization 170.30 Exemption Clause This Act shall not be constructed to the certificate of authorization 170.30 Exemption Clause This Act shall not be constructed to the certificate of authorization 170.30 Exemption 170
 the percentage of capacity of operation for a manufacturing plant at which income will just cover expenses. Magnesium carbonate hardness removal Mg(HCO3)2 + 2Ca(OH)2 \rightarrow 2CaCO3(s) + Mg(OH)2(s) + 2H2O 5. Stress transformations and Mohr's circle C. These types of questions are called conceptual issues, in which definitions of terms may be in
dispute. Also known as Big-endian. 19 Safety LOC, limiting oxygen concentration (vol % O2), is the concentration of oxygen below which combustion is not possible. Some error detecting and correcting algorithms include block code, Hamming code, and Reed Solomon. Heat Transfer A. Insertion Sort: takes elements from a list one by one and inserts
them in their correct position into a new sorted list. Quenching is rapid cooling from elevated temperature, preventing the formation of equilibrium phases. 198.18.0.0-198.18.0.0-198.18.0.0-198.18.0.0-198.18.0.0-198.19.255.255
The 1976 Copyright Act generally gives the owner of copyrighted work, to prepare derivative works, to distribute copies or phonorecords of the copyrighted work, to prepare derivative works, to distribute copies or phonorecords of the copyrighted work, to prepare derivative works, to distribute copies or phonorecords of the copyrighted work, to prepare derivative works, to distribute copyrighted work publicly. No No Refinement of size. Area moments of inertia G.
 Urgent Pointer (16 bits) If the URG flag is set, then this 16-bit field is an offset from the sequence number indicating the last urgent data byte. The endurance limit is the stress below which fatigue failure is unlikely. Rotary cutters and dicers H. The modifier defines the tolerance or acceptability where the part has the least amount of material or
  weighs the least. () I xc yc = a 3b sin 2 \theta cos \theta 12 Statics 111 y (Radius of Gyration)2 Area Moment of Inertia Figure y Area & Centroid I xc = I y c = \pi a 4 4 rx2 = ry2 = 5a 2 4 yc = a I x = I y c = \pi a 4 4 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 4 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 4 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 4 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 5 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 4 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 5 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 6 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 7 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 7 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 7 rx2c = ry2c = a 2 4 xc = a I x = I y c = \pi a 4 7 rx2c = ry2c = \pi a 4 7 rx2c = ry2c = \pi a 4 7 rx2c = \pi a 5 rx2c = \pi a 4 7 rx2c = \pi a 4 7 rx2c = \pi a 5 rx2c = \pi a 5 rx2c = \pi a 7 rx
Product of Inertia I xc y c = 0 I xy = Aa 2 2 = a 2 x y C a (4 5πa πb Ix = Iy = - πa 2b 2 - 4 4 J = π a 4 - b 4 2 xc = a b) (yc = a 4 rx2) = A = α 2 θ - a C x xc = sin 2θ 2 I xy = Aa 2 (= πa 2 a 2 - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = 4 θ rx2 = Ix = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 (I xc y c = 0 I xy = 2a 4 3 a 2 (θ - sinθ cosθ) a ry2 = Aa 2 σ - b 2 σ - b 2 σ - b 2 σ - b 2 σ - b 2 σ - b 2 σ - b 2 σ - b 2 σ -
\cos\theta a2 1 - 4 30 - 3sin\theta cos\theta ry2 = 2sin 30 cos\theta a2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta cos\theta cos\theta a 2 1 + 4 \theta - sin\theta cos\theta cos\theta
 packet back to the originating element (or stays silent, allowing the transmitter to timeout). You will be provided with an electronic reference handbook during the exam. Only the first packet sent from each end should have this flag set. Centroid of area F. Satisfy the education criteria set forth by the board 3. Then for large n, the Central Limit
  Theorem asserts that the sum Y = X1 + X2 + ... If a = 0, the Taylor's series equation becomes a Maclaurin's series. Mass and energy balances (e.g., STP basis, loading rates, heating values) C. Film Boiling - Surface completely covered by vapor blanket; includes significant radiation through vapor film. If B2 - 4AC < 0, an ellipse is defined.
 Turbomachinery (e.g., pumps, turbines, fans, compressors) K. Responds equally to axial strain. For a measured analog signal over the nominal high end of the voltage range, the voltage range and VH is the nominal range [VL,VH], where VL is the nominal range [VL,VH], where VL is the nominal high end of the voltage range and VH is the nominal range [VL,VH], where VL is the nominal range [VL,VH], where VL is the nominal range [VL,VH] is the nominal range [VL,VH].
 the A/D converter with typical values of 4, 8, 10, 12, or 16. 1/2 1 Details Best: Rejects axial strain and is temperature compensated. Cyclical Redundancy Code (CRC) - CRC can detect multiple errors. vapor hg Sat. 20 00080 30 40 4. For supersonic flows, the velocity increases as the flow cross-sectional area increases and decreases as the flow cross-sectional area increases are the flow cross-section area increases as the flow cross-section area increases as the flow cross-section area increases as the flow cross-section area increases are the flow cross-section area increases area increases are the flow cross-section area increases.
cross-sectional area decreases. Stress and strain caused by axial loads, bending loads, torsion, or transverse shear forces D. At this point the algorithm backtracks to the last visited node and repeats the algorithm. Rows of A are linearly independent. A*X = 0 has a unique solution. D = 50% equivalent to TWA of 85 dBA. volume (veh/15 min) 299 Civil
 Engineering Vertical Curves L y = ax 2 A = g2 - g1 g - g a = 22L 1 L 2 E = ac 2 m g - g r = 2L 1 L K = A g g1L xm = -2a1 = g - 1 g2 x y A E PVT PVC g 1 CK NT BA NGE TA YPVC VERTICAL CURVE FORMULAS NOT TO SCALE Compiled from AASHTO, A Policy on Geometric Design of Highways and Streets, 6th ed., 2011. Firm—The term "Firm,"
 as used in this Act, shall mean any form of business or entity other than an individual operating as a sole proprietorship under his or her own name. Instrumentation (e.g., measurements, data acquisition, transducers) E. • Static IP addressing implies each station joining a network is manually configured with its own IP address. 0.90 OUTLET SQUARE
OUTLET SQUARE AND AND SHARP PROJECTING INTO BARREL COEF. 258 Civil Engineering Geotechnical Phase Relationships WEIGHTS (OR MASSES) 0 Ww W was Volumes of voids VV = VA + VW Total unit weight W \gamma = V Saturated unit weight Gs + e i cw \gamma sat = 1+e \gammaW =
62.4 lb/ft3 or 9.81 kN/m3 Effective (submerged) unit weight \gamma' = \gamma sat - \gamma W Unit weight of solids W \gamma S = VS S Dry unit weight V e n = VV = 1 + e 259 Vv V Vs Civil Engineering Degree of saturation (%) V S = VW # 100 V
 \simGS S= e Relative density Dr = [(emax - e)/(emax - emin)] × 100 = [(\gammaD field - \gammaD min)/(\gammaD max - \gammaD min)][\gammaD max/\gammaD field] × 100 Relative compaction (%) RC = (\gammaD field/\gammaD max) × 100 Plasticity index PI = LL - PL LL = liquid limit PL = plastic limit Coefficient of uniformity CU = D60/D10 Coefficient of concavity (or curvature) CC = (D30)2/(D10 × D10) COEfficient of uniformity CU = D60/D10 Coefficient of uniformity CU = D60/D1
D60) Hydraulic conductivity (also coefficient of permeability) From constant head test: k = Q/(iAte) i = dh/dL Q = total quantity of water From falling head test: k = 2.303[(aL)/(Ate)]\log 10(h1/h2) where A = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpendicular to flow a = cross-sectional area of test specimen perpe
 = head at time t = te L = length of soil column Discharge velocity v = ki Factor of safety against seepage liquefaction FSs = ic/ie ic = (\gamma \text{SAL} - \gamma \text{W})/\gamma \text{W} ie = seepage exit gradient 260 Civil Engineering RANGE OF RECOMPRESSION CR VOID RATIO, e e0 RANGE OF VIRGIN COMPRESSION CC p0 pC p0 + \Delta p PRESSURE (LOG10 SCALE) SOIL
CONSOLIDATION CURVE OVER CONSOLIDATED CLAY where where e0 = initial void ratio (prior to consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = induced change in void ratio p0 = initial effective consolidation stress o'c \Delta p = in
 center of consolidating stratum qs = applied surface stress causing consolidation p + Dp H If po 1 pc and po + Dp H If po 1 pc and po + Dp H If po 1 pc and po + Dp H If po 1 pc and Available Strengths Yielding: Rupture: Block shear: \phi y = 0.90 \text{ Pn} = Fy \text{ Ag } \Omega = 1.67 \text{ } \phi f = 0.75 \text{ } Pn = Fu \text{ Ae } \Omega = 2.00 \text{ } \phi = 0.75 \text{ } \Omega = 2.00 \text{ } U
 = 1.0 (flat bars and angles) Agv = gross area for shear Anv = net area for shear Ant = net area for tension F [0.6Anv + UbsAnt] * u Rn = [0.6Fy Agv + Ubs Fu Ant] Smaller 283 Civil Engineering Y tf X tw X d Table 1-1: W Shapes Dimensions and Properties bf Area Depth Web Shape A 2 d tw bf In. Axis X-X tf I S 4 3 r Z I 3 r 4 In. In. In. 20.1 23.7 0.415
 W18X71\ 20.8\ 18.5\ 0.495\ 7.64\ 0.810\ 1170\ 127\ 7.50\ 146\ 60.3\ 1.70\ W18X65\ 19.1\ 18.4\ 0.450\ 7.59\ 0.750\ 1070\ 117\ 7.49\ 133\ 54.8\ 1.69\ W18X55\ 16.2\ 18.1\ 0.390\ 7.53\ 0.630\ 890\ 98.3\ 7.41\ 112\ 44.9\ 1.67\ W18X50\ 14.7\ 18.0\ 0.355\ 7.50\ 0.570\ 800\ 88.9\ 7.38\ 101\ 40.1\ 1.65\ W18X46\ 13.5\ 18.1\ 0.360\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\ 17.0\
 6.06\ 0.605\ 712\ 78.8\ 7.25\ 90.7\ 22.5\ 1.29\ W18X40\ 11.8\ 17.9\ 0.315\ 6.02\ 0.525\ 612\ 68.4\ 7.21\ 78.4\ 19.1\ 1.27\ W16X67\ 19.7\ 16.3\ 0.395\ 10.2\ 0.67\ 954\ 117\ 6.96\ 130\ 119\ 2.46\ W16X57\ 16.8\ 16.4\ 0.430\ 7.12\ 0.715\ 758\ 92.2\ 6.72\ 10.59\ W16X45\ 13.3\ 16.1\ 0.345\ 7.04\ 0.565\ 586\ 72.7\ 6.65\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 10.59\ 
 AISC, 2011. However, the actual limit for the data length, which is imposed by the underlying IPv4 protocol, is 65,507 bytes (65,535 - 8 byte UDP header - 20 byte IP header). Analysis of Variance for 2n Factorial Designs Main Effects Let E be the estimate of the effect of a given factor, let L be the orthogonal contrast belonging to this effect. Fluid
 Mechanics/Dynamics A. Cost types and breakdowns (e.g., fixed, variable, incremental, average, sunk) C. Option number assignments are maintained by the IANA. Darcy's Law where where dh Q = - KA dx = discharge rate (ft3/sec or m/s) = hydraulic conductivity (ft/sec or m/s) = hydraulic head (ft or m) = cross-sectional area of flow (ft2 or
 m2) dh q = -K dx Q K h A q = specific discharge (also called Darcy velocity) <math>q - K dh v = n = n dx v = average seepage velocity or superficial velo
COOLING RATES FOR BARS QUENCHED IN AGITATED WATER COOLING RATES FOR BARS QUENCHED WATER COOLING RATES FOR BARS QUENC
 of a cylinder or slot in relationship to a datum(s). Internal forces in rigid bodies (e.g., trusses, frames, machines) F. Arrows are reversed for cathode half-cells. Fluid dynamics (e.g., trusses, frames, machines) F. Arrows are reversed for cathode half-cells. Fluid dynamics (e.g., trusses, frames, machines) F. Arrows are reversed for cathode half-cells.
 Kind byte of 0 is the End Of Options option, and is also only one byte. Examples are: Gas/Compound Acetone Acetylene Ammonia n-butane Cyclohexane Cycl
 flowing fluid. Basic modulation/demodulation concepts (e.g., AM, FM, PCM) B. Examples of common additives are: Plasticizers: vegetable oils, low molecular weight polymers or monomers Fillers: talc, chopped glass fibers Flame retardants: halogenated paraffins, zinc borate, chlorinated phosphates Ultraviolet or visible light resistance: carbon black
Oxidation resistance: phenols, aldehydes Thermal Properties The thermal expansion coefficient is the ratio of engineering strain to the change in temperature. °F -100 4 0.015 2 0.010 1 -40 0 40 80 120 160 ENTHALPY, Btu/lb PRESSURE-ENTHALPY DIAGRAM FOR 410A 2013. Q = CAO 2gh in which h is measured from the liquid surface to the
 centroid of the orifice opening. MacCullough, Elements of Strengths of Materials, K. Also responds to bending strain. Probability distributions (e.g., discrete, continuous, normal, binomial, conditional probability distributions (e.g., discrete, continuous, normal, binomial, conditional probability) C. Reprinted with permission from ASCE. Solids buildup can be a problem. Thus, 1 fx = E 8vx - v_v + vz iB + a_Tf - Ti i and similarly for
sy and \epsilon z, where \alpha = coefficient of thermal expansion (CTE). Carbon dioxide removal CO2 + Ca(OH)2 \rightarrow CaCO3(s) + H2O 2. Bioprocessing (e.g., fermentation, biological treatment systems, aerobic, anaerobic process, nutrient removal) 7-11 6. If \mu is the arithmetic mean of a discrete population of size N, the population variance is defined by 2 2 2 v 2
 = ^1/N h 9^ X1 - nh + ^ X2 - nh + f + _ XN - ni C 2 = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation = ^1/N h ! _ Xi - ni N i= 1 Standard deviation formulas (assuming statistical independence) are vpopulation formulas (assuming statistical independence) are vpopulation formulas (assuming statistical independence) are vpopulation formulas (assuming statistical indep
  determine the amount of energy required to cause failure in standardized test samples. C D = 100\% #! i Ti where Ci = time spent at specified sound pressure level, SPL (hours) 110 115 120 125 130 Permissible Time (hr) 32 16 8 4 2 1 0.5 0.25 0.125 0.063
0.031 If D > 100\%, noise abatement required. 150 200 250 300 350 400 500 600 700 800 900 1000 1100 1200 1300 0.4625 0.4708 0.5342 0.5951 0.6548 0.7137 0.7726 0.8893 1.0055 1.1215 1.2372 1.3529 1.4685 1.5840 1.6996 1.8151 Sat. The difference between the hydraulic grade line and the energy line is the v2/2g term. C Electrical and
 Computer Engineering Schematic Symbol N-CHANNEL JFET D iD G Junction Field Effect Transistors (JFETs) and Depletion MOSFETs (Low and Medium Frequency) Mathematical Relationships Small-Signal (AC) Equivalent Circuit Cutoff Region: vGS < Vp iD = (IDSS /Vp2)[2vDS | Vp iD = 0 gm = 2 I DSS I D Vp Triode Region: vGS > Vp and vGD > Vp iD = (IDSS /Vp2)[2vDS | Vp2)[2vDS | Vp3][2vDS | 
 (vGS - Vp) - vDS2] is P-CHANNEL JFET D iD G is S N-CHANNEL DEPLETION MOSFET (NMOS) where IDSS = drain current with vGS = 0 (in the saturation region) = KV p2, K = conductivity factor For JFETs, Vp = pinch-off voltage For MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds Q point D iD G is S N-CHANNEL DEPLETION MOSFET (NMOS) where IDSS = drain current with vGS = 0 (in the saturation region) = KV p2, K = conductivity factor For JFETs, Vp = pinch-off voltage For MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = VT = threshold voltage iD (t) G v gs g mv gs S where rd = \(\partial v\) ds did Q point D iD G is S N-CHANNEL DEPLETION MOSFETs, Vp = \(\partial v\) ds did Q point D iD G is S N-CHANNEL D iD G iS N-C
SIMPLIFIED SYMBOL D iD G iS S P-CHANNEL DEPLETION MOSFET (PMOS) Same as for N-Channel with current directions and voltage polarities reversed D iD G iS S 387 D + Saturation region Same as for N-Channel rd v ds Electrical
 and Computer Engineering Schematic Symbol N-CHANNEL ENHANCEMENT MOSFET (NMOS) D Enhancement MOSFET (Low and Medium Frequency) Mathematical Relationships Small-Signal (AC) Equivalent Circuit gm = 2K(vGS - Vt ) in saturation region cutoff Region : vGS > Vt and vGD > Vt 2 iD = K [2vDS (vGS - Vt )]
 GS - Vt) - vDS | iD G B is S SIMPLIFIED SYMBOL D Saturation Region: vGS > Vt and vGD < Vt 2 iD = K (vGS - Vt) where K = conductivity factor V t = threshold voltage iD vgs D g m vgs S where rd = \(\partial v\) vds \(\frac{\partial i}{\partial v}\) in V and vGD < Vt 2 iD = K (vGS - Vt) where K = conductivity factor V t = threshold voltage iD vgs D g m vgs S where rd = \(\frac{\partial v}{\partial v}\) vds \(\frac{\partial v}{\partial v}\) in V t = threshold voltage iD vgs D g m vgs S where rd = \(\frac{\partial v}{\partial v}\) vds \(\frac{\partial v}{\partial v}\) in V t = threshold voltage iD vgs D g m vgs S where rd = \(\frac{\partial v}{\partial v}\) vds \(\frac{\partial v}{\partial v}\) vds \(\frac{\partial v}{\partial v}\) in V t = threshold voltage iD vgs D g m vgs S where rd = \(\frac{\partial v}{\partial v}\) vds \(\frac{\partial v}{\partial v}\) vd
D iD G B is S SIMPLIFIED SYMBOL D iD G is S 388 Same as for N-channel rd + vds - Electrical and Computer Engineering Number Systems and Codes An unsigned number of base-r has a decimal equivalent D defined by where n m k=0 i=1 - D = / akr k+/ air i ak = the / the radix point ai = the ith digit to the right of the
radix point Binary Number System In digital computers, the base-2, or binary, number system is normally used. Codes of ethics and licensure B. Computer Network Security: Barrett, Diane, Martin M. Model Rules, Section 240.15 Rules of Professional Conduct To safeguard the health, safety, and
 welfare of the public and to maintain integrity and high standards of skill and practice in this section shall be binding upon every licensee and on all firms authorized to offer or perform engineering or surveying services in this jurisdiction. Flow measurement
(e.g., weirs, orifices, flumes) F. Contact [email protected] for more information. Handles Not or Cut-outs GOOD Not POOR Loose Part / Irreg. Coordinate systems (e.g., state plane, latitude/longitude) E. (2) Examination Requirements An individual seeking licensure as a professional engineer shall take and pass the NCEES Fundamentals of
 Engineering (FE) examination and the NCEES Principles and Practice of Engineering (PE) examination as described below. Y(s) represents the controlled variable, R(s) represents the reference input, and L(s) represents the controlled variable, R(s) represents the reference input, and L(s) represents the reference input, and 
Simpson's 1/3 Rule: Area = w > h1 + 2 e n-2 / k = 3, 5, f kk o + 4 e n-1 / k = 2, 4, f 308 kk o + hnH w = common interval 3 n must be odd number of measurements (only for Simpson's 1/3 Rule) Civil Engineering Construction project scheduling and analysis questions may be based on either the activity-on-node method or the activity
 onarrow method. Signature—The term "Signature," as used in this Act, shall be in accordance with the Rules. Probabilities (e.g., permutations, sets, laws of probability) B. Licensees shall not injure or attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of
 other licensees, nor indiscriminately criticize other licensees' work. Signal words are placed on labels to convey a level of care that should be taken (especially personal protection) when handling and using a product, from purchase to disposal of the empty container, as demonstrated by the Pesticide Toxicity Table. 20. On a multiprocessor or
 multicore system, threads can be executed in a true concurrent manner, with every processor or core executing a separate thread simultaneously. Recycle/bypass processes F. No (Surface) Parallel planes, parallel to a datum plane (or axis) within which the elements of a surface must lie Parallel planes, within which the center plane of a slot is
permitted to vary from the true (theoretically exact) position Additional Comments No Variations of Size The actual local size of an individual feature at each cross section shall be within the specified tolerance of size. Ki = correction factor = (4C2 - C - 1) / [4C (C - 1)] C = D/d The deflection \theta and moment Fr are related by Fr = k\theta where the spring
 end acknowledges the other end's initial sequence number itself, but no data. The inequality 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be transformed into 3x1 + x2 - 4x3 > 10 might be t
Note that, in view of the symmetry of the t-distribution, t1-\alpha, v=-t\alpha, v=-t\alpha,
 as: limit! f_xi i Dxi = #a f ^ xh dx n b n " 3i= 1 Also, Δxi →0 for all i. Remediation of soil, sediment, and/or groundwater (e.g., recovery, ex-situ/in-situ treatment) 12. Goodness of fit (e.g., correlation coefficient, standard errors, R2) 6-9 3. It is used by network devices, including routers, to send error messages and operational information indicating
for example, that a requested service is not available or that a host or router could not be reached. Electrical fundamentals (e.g., charge, current, voltage, resistance, power, energy) B. Models, biasing, and performance of discrete devices (e.g., charge, current, voltage, resistance, power, energy) B. 2.0 Full 1 223 Best: Most sensitive full-bridge version of previous setup.
 Engineering Ethics and Societal Impacts A. It is possible to assemble a four-bar in two different configurations for a given position of the input link (2). Electrostatics/magnetostatics (e.g., spatial relationships, vector analysis) B. Thermodynamic laws (e.g., first law, second law) D. Constants and conversion factors provided are approximate, with
 sufficient accuracy to solve exam questions. 31-33. These concepts are incidence rates and severity rates. _ A F istoichiometric # 100 Vapor-Liquid Equilibrium (VLE) Henry's Law at Constant Temperature At equilibrium, the
partial pressure of a gas is proportional to its concentration in a liquid. Commonly referred to as the freezing current or "let-go" range. HASTELLOY C = < 0.002 IN. First-Order Linear Difference Equation Dt = ti + 1 - ti yi + 1 = yi + y' Dt i Newton's Method for Root Extraction Given a function f(x) which has a simple root of f(x) = 0 at x = a and x
  important computational task would be to find that root. Mx = yFz - zFy M = r \times F My = zFx - xFz Mz = xFy - yFx Systems of Forces F = \Sigma Fn M = \Sigma (rn \times Fn) Equilibrium Requirements \Sigma Fn = 0 \Sigma Mn = 0 107 Statics Centroids of Masses, Areas, Lengths, and Volumes The following formulas are for discrete masses, areas, lengths, and volumes: rc = 0 \times Fn M = 0 \times
 \Sigma mnrn /\Sigma mn where mn = mass of each particle from a selected reference point The moment of area (Ma) is defined as Xac = May /A = \Sigma xn an /A = \Sigma x
yac = Max/A = \Sigma yn an/A where A = \Sigma an The following equations are for an area, bounded by the axes and the function <math>y = f(x). However destination node should process the packet normally even if hop limit becomes 0. Work Design A. WEP - Wired Equivalent Privacy - Uses 40 bit(10 hex digits) or 104(26 hex digits) bit key WPA- Wifi Protected
 Access - Replacement for WPA, added TKIP and MIC WPA2 - Replaced WPA and implements of 802.11i, particularly mandatory support for CCMP(AES encryption mode) WPA3 - Replaces WPA2. Noncircular Ducts In place of the diameter, D, use the equivalent (hydraulic) diameter (DH) defined as DH = 4 # cross-sectional
 area wetted perimeter Circular Annulus (Do > Di) In place of the diameter, D, use the equivalent (hydraulic) diameter (DH) defined as DH = Do - Di Liquid Metals (0.003 < Pr < 0.05) NuD = 6.3 + 0.0167 Re0D.85 Pr0.83 (uniform heat flux) NuD = 6.3 + 0.0167 Re0D.85 Pr0.83 (uniform heat flux) NuD = 6.3 + 0.0167 Re0D.85 Pr0.85 Pr0.86 (constant wall temperature) Boiling Evaporation occurring at a solid-liquid
 interface when Tsolid > Tsat, liquid q" = h(Ts - Tsat) = hΔTe where ΔTe = excess temperature Pool Boiling - Liquid is quiescent; motion near solid surface is due to free convection and mixing induced by bubble growth and detachment. Shredders G. (3) Experience Requirements An individual seeking licensure as a professional engineer shall present
  evidence of a specific record of four years of progressive engineering experience after a qualifying degree is conferred as described in a(1) above. Must use dummy gauges if compensating for temperature. 87 Periodic Table of Elements I VII 1 2 H He 1.0079 Atomic Number II 3 4 Li Be 6.941 9.0122 Symbol III IV V VI VII 4.0026 9 10 B C N O F Ne
 10.811 12.011 14.007 15.999 18.998 20.179 5 Atomic Weight 6 7 8 11 12 13 14 15 16 17 18 Na Mg Al Si P S Cl Ar 22.990 24.305 26.981 28.086 30.974 32.066 35.453 39.948 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr 39.098 40.078 44.956 47.88 50.941 51.996 54.938 55.847 58.933
 94 95 96 97 98 99 100 101 102 Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr 227.03 232.04 231.04 238.03 237.05 (244) (247) (251) (252) (257) (258) (259) (257) (258) (259) (257) (258) (259) (258) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259) (259)
Curve-Fit Constants for Estimating (Cu/Q)max from H as a Function of Atmospheric Stability Constants Stability a b c d A -1.0563 -2.7153 0.1261 0 B -1.8060 -2.1912 0.0389 0 C -1.9748 -1.9980 0 0 D -2.5302 -1.5610 -0.0934 0 E -1.4496 -2.5910 0.2181 -0.0343 F -1.0488 -3.2252 0.4977 -0.0765 Adapted from Ranchoux, R.J.P., 1976. For example, a
rotating saw blade or an uncontrolled high-pressure jet of water has the capability (hazard) to slice through flesh. Where necessary the geometric tolerance may be greater than the size tolerance may be greater than the size tolerance may be greater than the size tolerance. 439 Mechanical Engineering Some Preferred Fits Clearance Free running fit: not used where accuracy is essential but good for large temperature
variations, high running speeds, or heavy journal loads. Licensees shall not accept compensation, financial or otherwise, from more than one party for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to in writing by all interested parties. Initial Licensure as a Professional Engineer An applicant who
presents evidence of meeting the applicable education, examination, and experience requirements as described below shall be eligible for licensure as a professional engineer. 155 Thermodynamics Chemical Reaction Equilibrium For the reaction aA + bB @ cC + dD \DeltaGq = -RT ln Ka Ka = `atCc j`at Dd j âi = activity of component i = `at aA j`at Bb j
 \Pi _ati i v i where f c i vi fit fic = fugacity of pure i in its standard Gibbs energy change of reaction Ka = chemical equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure, often 1 bar tfi = y P = p i i where pi = partial pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure of the equilibrium constant For mixtures of ideal gases: f ci = unit pressure of the equilibrium constant For mixtures of t
 component i Then Ka = Kp = `pCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`yDdj`yAaj`yBbj = Pc + d - a - b`yCc j`yDdj`yAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yCc j`pDdj`pAaj`yBbj = Pc + d - a - b`yC
Temp. • If the SYN flag is clear (0), then this is the accumulated sequence number of the first data byte of this segment for the current session. 211 Heat Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE Transfer BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BOILING REGIMES FREE CONVECTION NUCLEATE ISOLATED BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BUBBLES 107 C CRITICAL HEAT FLUX, q"min ONE TRANSFER BUBBLES 107 C CRITICA
ΔTe, A ΔTe, B 103 FILM JETS AND COLUMNS q"max 106 TRANSITION 10 ΔTe, C ΔTe, D 30 120 ΔTe = Ts – Tsat (°C) 1,000 Incropera, Frank P. The center of buoyancy is located at the centroid of the displaced fluid volume. Fluid statics (e.g., hydrostatic head) E. To apply this rule to the slider-crank mechanism, consider links 1, 2, and 3 whose ICs
are I12, I23, and I13, all of which lie on a straight line. 0.8 0.6 0.4 11 0 0.0 01 009 Pressure-Enthalpy Diagram 400 450 500 550 2 3 01 .001 .0014 .001650.00186 .0020 0 . H. NUMBERS ON CURVES REPERED TO WATER AT 4°C. It indicates: • If the SYN flag is set
(1), that the TCP peer is ECN capable. NOTE: In some chemistry texts, the reactions and the signs of the values (in this table) are reversed; for example, the half-cell potential Eo is positive, the reaction proceeds spontaneously as written. Using or attempting to use an
 expired, suspended, revoked, inactive, retired, or nonexistent certificate of licensure B. Similar expressions exist for other quantities. • 5,N,BBBB,EEEE,... 443 Mechanical Engineering Geometric Dimensioning and Tolerancing (GD&T) Tolerance Types Drawing Callout Meaning Drawing Callout Example ASME Symbol Ø10±0.2 0.1 0.1 Tol. Cycles can
be used either for refrigeration or as heat pumps. Hypothesis testing (e.g., t-test, outlier testing, analysis of the variance) 4-6 3. It is frequently not written explicitly in engineering equations. Control valves, conceptual process control, distributed control
system [DCS] programming, programming, programming, interlocks) 4-6 16. Boolean logic C. Energy sources concepts (e.g., conventional and alternative) B. • Stateless address autoconfiguration (SLAAC) allows for hosts to automatically configure themselves when connecting to an IPv6 network. An individual shall be
construed to practice engineering, within the meaning and intent of this Act, if he or she does any of the following: a. All NCEES material is copyrighted under the laws of the United States. Dimensionless numbers (e.g., Reynolds number) C. Testing and standards (e.g., water, wastewater, air, noise) K. Steady and unsteady flow 12–18 9. The integrals of the United States are not all NCEES material is copyrighted under the laws of the United States.
 have the same value when evaluated over any interval of length T. Bober, W., and R.A. Kenyon, Fluid Mechanics, Wiley, 1980. Current and voltage laws (e.g., Kirchhoff, Ohm) C. Extracting the object referenced by a pointer is defined as dereferencing. Length This field that specifies the length in bytes of the UDP header and UDP data. Chlorophyll is
 the primary photosynthesis compound and it is found in organisms ranging from tree and plant leaves to single celled algae. The formula for determining the total injury/illness incidence rate N = Number of injuries, illnesses, and fatalities T = Total hours worked by all
 employees during the period in question The number 200,000 in the formula represents the number of hours per week \times 50 weeks = 2,000 hours per week \times 50 hours per week \times 50 weeks = 2,000 hours per week \times 50 
Viscosity section. This represents 95% of the area under a Normal probability distribution and is often called 2 sigma. Cost (e.g., fixed, variable, direct and indirect labor, incremental, average, sunk) C. For a single-mass stream, the following applies: hi + q = he Heat Exchangers: No heat loss to the surroundings or work. A two-force body in static
 decimal point dictates the number of significant digits to the left of decimal point. 376 Electrical and Computer Engineering (PAM) Pulse-Amplitude Modulation—Natural Sampling A PAM signal can be generated by multiplying a message by a pulse train with pulses having duration τ and period Ts = 1/fs n = +3 t - nT xN ^t h = m ^t h ! P; x s E = n
 = -3 t nT! m ^t h P; -s E x n = +3 XN _ f i = xfs! sinc _kxfsi M _ f - kfsi k = -3 The message m(t) can be recovered from xN(t) with an ideal low-pass filter of bandwidth W. Higher orders of multiplicity imply higher powers of x. An injective (one-to-one) relationship exists if, and only if, \forall x1, x2 \in X, if f (x1) = f (x2), then x1 = x2 A
 surjective (onto) relationship exists when \forall y \in Y, \exists x \in X such that f(x) = y A bijective (one-to-one) and surjective (onto). Economic analyses (e.g., benefit-cost, breakeven, minimum cost, overhead, life cycle) D. 136 Mechanics of Materials Composite Sections The bending stresses in a beam composed of dissimilar materials.
 into a section composed of a single material. Uncertainty (e.g., expected value and risk) E. F(x) 1 U1 U2 X2 0 X2 X Inverse Transform Method for Continuous Random Variables 420 Industrial and Systems Engineering Forecasting Moving Average n where dtt = / dt - i i=1 n dtt = forecasted demand for period t dt - i = actual demand for ith period
preceding t n = number of time periods to include in the moving average Exponentially Weighted Moving Average Exponentially Weighted Moving Average where dtt = \alphadt - 1 + 1 - \alphai dtt - 1 dtt = forecasted demand for t \alpha = smoothing constant, 0 \le \alpha \le 1 2n Factorial Experiments Ei = Y i 2 - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y i j m - cY i j - Y 
 Xi set at level k, k = 1, 2 km Y ij = average response value for all r2n - 2 observations having Xi set at level m, m = 1, 2. into an electrical signal (also called a sensor). :: 1 Software Unspecified address. If the differences are equal, the series is arithmetic. PACKET DESTINATION SOURCE ACK Transmission Algorithms
  Sliding window protocol is used where delivery of data is required while maximizing channel capacity. The sequence number of the actual first data byte and the acknowledged number in the corresponding ACK are then this sequence number of the actual first data byte and the acknowledged number in the corresponding ACK are then this sequence number plus 1. Logic minimization (e.g., SOP, POS, Karnaugh maps) E. 150 Thermodynamics Clausius' Statement of
 Second Law No refrigeration or heat pump cycle can operate without a net work input. Any fraud or deceit in obtaining or attempting to obtain or renew a certificate of licensure 2. 133 Mechanics of Materials Hooke's Law Three-dimensional case: \epsilon x = (1/E)[\sigma x - v(\sigma y + \sigma z)] \gamma xy = \tau xy /G \epsilon y = (1/E)[\sigma y - v(\sigma z + \sigma x)] \gamma yz = \tau yz /G \epsilon z = (1/E)[\sigma z - v(\sigma x + \sigma y)]
\gamma z = \tau z x / G Plane stress case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Existing \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y) Uniaxial case (\sigma z = 0): \epsilon x = (1/E)(\sigma x - v \sigma y)
 (ingredient disclosure): Name or number used for a hazardous product on a label or in the SDS • Supplier identification: The name, address, and telephone number of the supplier • Supplemental information: nonharmonized information of the supplier • Supplemental information of the supplier identification: The name, address, and telephone number of the supplier identification: The name, address, and telephone number of the supplier identification: The name, address, and telephone number of the supplier identification: The name, address, and telephone number of the supplier identification: The name, address, and telephone number of the supplier identification of the supplier i
 28-DAY COMPRESSIVE STRENGTH, PSI Concrete 8,000 6,000 NO ADDED AIR 4,000 2,000 1,000 RECOMMENDED PERCENT ENTRAINED AIR 0.40 0.60 0.80 1.00 W/C BY WEIGHT Concrete strength decreases with increases in water-cement ratio for concrete with and without entrained air. Failure theories and analysis C. Pr vt = ti where Pr and
  va = 1 2t t = wall thickness r+r r = 1 2 0 Stress and Strain Principal Stresses For the special case of a two-dimensional stress state, the equations for principal stress reduce to 2 vx + v y vx - v y n + x 2xy va, vb = ! 0 2 2 vc = 0 1 ne two nonzero values calculated from this equation are temporarily labeled of and the third value of is always zero
in this case. z1 \times z2 = (c1 \times c2) \angle (\theta1 + \theta2) z1/z2 = (c1/c2) z1/z2 = (c1/c2
h rad/s 375 Electrical and Computer Engineering The phase deviation is \phi th = kPm \dot{\phi} th rad The complete bandwidth of an angle-modulated signal is infinite. A combination is the set itself without reference to order. N. The buoyant force exerted on a submerged or floating body is equal to the weight of the fluid displaced by the body. • PSH (1)
bit): Push function. Effective temperature (ET) is the dry bulb temperature at 50% relative humidity, which results in the same physiological effect as the present conditions. Transportation Engineering A. Thus: r = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = rer v = roer + rio ei 2 = roer
etc. Y(s) is related to R(s) and L(s) by Y ^ sh = G1 ^ sh G2 ^
weight of the gas, the result, often designated as R, has units of energy per degree per unit mass [k]/(kg·K) or ft-lbf/(lbm-QR)] and becomes characteristic of the particular gas. 12 Safety Definition of Safety Safety is the condition of protecting people from threats or failures that could harm their physical, emotional, occupational, psychological, or
financial well-being. If A = C and B = 0, a circle is defined. Professional Engineer—The term "Professional Engineer by the board. Sometimes other concentration units are used besides mole fraction with a corresponding change in ki. Conversion,
yield, and selectivity D. Destination Address This field is the IPv4 address of the receiver of the packet. If z1 = a1 + jb1 = c1 (cos \theta1 + j\sin\theta2) = c1 \angle \theta1 and z2 = a2 + jb2 = c2 (cos \theta2 + j\sin\theta2) = c1 \angle \theta1 and c2 = a2 + jb2 = c2 (cos \theta2 + j\sin\theta2) = c2 \angle \theta2, then c1 \angle \theta1 and c2 = a2 + jb2 = c2 (cos c2 \angle \theta2).
form, it is more convenient to perform these operations in polar form. Equilibrium of rigid bodies D. Cost Estimation Cost Indexes Cost indexes are used to update historical cost data to the present. Volume 1, Human Health Evaluation Manual (part A). The not operator inverts the sense of a binary value (0 \rightarrow 1, 1 \rightarrow 0) C=A A LOGIC SYMBOL De
Morgan's Theorems First theorem: A + B = A : B Second theorem: A : B = A + B These theorems define the NAND gate and the NOR gate. Refinement of size. Using the process of long division (as for polynomials), two power series may be divided one by the other within their common interval of convergence. Agreements, contracts, and contract law
(e.g., noncompete, nondisclosure, memorandum of understanding) C. Deflection of statically determinant beams, trusses, and frames C. The equivalent radial load Fr = applied constant axial (thrust) load For radial contact, deep-groove ball bearings: V = 1 if
 inner ring rotating, 1.2 if outer ring rotating, 1.2 if outer ring rotating, If Fa /(VFr) > e, -0.247 F X = 0.56, and Y = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.56, and Y = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.56, and Y = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.56, and Y = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 0.236 F where e = 0.513 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalog If Fa /(VFr) > e, -0.247 F X = 0.840 e Ca o 0 CO = basic static load rating from bearing catalo
Token Ring STATIONS RING INTERFACE Bus BUS STATIONS 405 Electrical and Computer Engineering Communication Methodologies Txd Rxd GND CLK SERIAL STR B D0 D1 D2 DN GND PARALLEL
Serial A communications channel where data is sent sequentially one bit at a time. Weiss, and Kirk Hausman, CompTIA Security+TM SYO-401 Exam Cram, 4th ed., Pearson IT Certification, Pearson Education, Inc., 2015. (c R = = = = c x) xc yc zc \rho = = = = c x) xc yc zc \rho = = = = 4 3 \piR \rho 3 0 0 0 mass/vol. Work-energy of particles E. The number of ICs, c, for a given
mechanism is related to the number of links, n, by ^{\circ} h c= n n- 1 2 Kinetics of a Rigid Body In general, Newton's second law for a rigid body, with constant mass and mass moment of inertia, in plane motion may be written in vector form as \Sigma F = \max \Sigma M c = Ic a \times M c a \times M c a \times M
center both in the plane of motion, Mc are moments and \alpha is the angular acceleration both about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the mass moment of inertia about the normal axis through the no
9: Pelargonic. Index properties and soil classifications B. Cloudiness is defined as the fraction of sky covered by the clouds. Queueing Models Definitions Pn L Lq W Wq λ mu μρ s = probability of n units in the system = expected waiting time in system = expected waiting
time in queue = mean arrival rate (constant) = effective arrival rate = mean service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the arrival process B = the service rate (constant) = server utilization factor = number of servers M = the service rate (constant) = server utilization factor = number of server utilization factor
Fundamental Relationships L = \lambda W Lq = \lambda W Q = Wq + 1/\mu \rho = \lambda/(s\mu) 418 Industrial and Systems Engineering Single Server Models (s = 1) Poisson Input—Exponential Service Time: M = \infty P0 = 1 - \lambda/\mu = \lambda/(\mu - \lambda) Wq = W - 1/\mu = \lambda/(\mu - \lambda) Finite queue: M < \infty
\infty \lambda u = m - 1 - Pm j P0 = (1 - \rho)/(1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn = [(1 - \rho)/(1 - \rho M + 1)] pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/(1 - \rho) + (1 - \rho M + 1) Pn L = \rho/
such words as set forth in the previous subsection, or any modifications or derivatives thereof, except licensees and those firms holding certificates of authorization issued under the previous subsection, or any modifications or derivatives thereof, except licensees and those firms holding certificates of authorization issued under the previous subsection. A PDF version of the FE Reference Handbook similar to the one you will use on exam day is also available there. Atmospheric modeling and
meteorology (e.g., stability classes, dispersion modeling, lapse rates) E. In addition to any other sanction provided in this section, the board shall have the power to sanction as follows any firm where one or more of its managing agents, officers, directors, owners, or managers have been found guilty of any conduct which would constitute a violation
under the provisions of this Act or any of the rules or regulations of the board: 1. Chemical Engineering 0.3 to 7.0 2.4 (spiral) 14 I CONE CLASSIFIER Suitability and Applications Classification occurs near deep end of sloping, elongated pool, Hazard Assessments Hazard Assessment The fire/hazard diamond below summarizes common hazard data
available on the Safety Data Sheet (SDS) and is frequently shown on chemical labels. O. • Dynamic host configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol (DHCP) is a networking protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that allows a router to assign the IP address and other configuration protocol that all the IP address and other configuration protocol that all the IP address and other configuration protocol that all the IP address and other configuration protocol that all the IP address are the IP address and other c
Q/Treservoir where Q is measured with respect to the reservoir. Superplasticizers are the most typical way to increase workability. F \le \mu s N where F = friction force between surfaces in contact Screw Thread For a screw-jack, square thread, M = Pr tan (\alpha \pm \phi) where F = friction force between surfaces in contact Screw Thread For a screw-jack, square thread, M = Pr tan (\alpha \pm \phi) where F = friction force between surfaces in contact Screw Thread For a screw-jack, square thread, M = Pr tan (\alpha \pm \phi) where F = friction force between surfaces in contact Screw Thread For a screw-jack, square thread For a screw-jack properties are the most typical way to increase workability.
screw loosening M = \text{external moment applied to axis of screw P} = \text{load on jack applied along and on the line of the axis r} = \text{mean thread moment applied in the direction of impending motion} = \text{force applied to resist}
impending motion = coefficient of static friction = total angle of contact between the surfaces expressed in radians Statically Determinate Truss: Method of Joints The method consists of solving for the forces in the members by writing the two equilibrium equations for each joint of the truss. Basic Heat-Transfer Rate Equations
Conduction Fourier's Law of Conduction dT Qo = kA dx where Qo = rate of heat transfer (W) k = thermal conductivity [W/(m\cdotK)] A = surface area perpendicular to direction of heat transfer (m2) Convection Newton's Law of Cooling where Qo = hA Tw T =  convection heat transfer (m2) Convection heat transfe
surface area (m2) = wall surface temperature (K) = bulk fluid temperature (K) = body is given by Oo = εσAT 4 where εσ AT = emissivity of the body = Stefan-Boltzmann constant = 5.67 × 10-8 W/(m2 • K4) = body surface area (m2) = absolute temperature (K) Conduction Conduction Through a Plane Wall – kA T2
- T1 i Qo = L where A L T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 = wall surface area normal to heat flow (m2) = wall thickness (m) = temperature of the wall (K) L 204 Q Heat Transfer Conduction Through a Cylindrical Wall Q T1 T2 T1 k T2 
Insulation Radius k rcr = insulation Resistance (K/W): L R = kA where L = wall thickness Cylindrical Wall Conduction Resistance (K/W): r ln d r2 n 1 R = 2\pikL where L = cylinder length Convection
Resistance (K/W): R = 1 hA 205 Heat Transfer Composite Plane Wall Fluid 1 \times 1 To 1 \times 1 Ha 1
capacitance model is valid if where hV Biot number, Bi = kA 1 0.1 s h V k As Body = convection heat-transfer coefficient of the body (m2) As ρ, V, c P, T Constant Fluid Temperature If the temperature may be considered uniform within the
body at any time, the heat-transfer rate at the body surface is given by where dT Qo = hAs T - T3 i = -\rho V cP ic dt m T T\propto \rho cP t = body temperature (K) = fluid temperature (T) = fluid temperat
where 1 b=x x = time constant ^ s h The total heat Transferred (Qtotal) up to time t is Qtotal = ρVcP Ti - Tj where Ti = initial body temperature at any location within the solid is the same as that of the midplane/centerline/
centerpoint temperature To. INFINITE CYLINDER AND SPHERE PLANE WALL For Fo at L2 > 0.2 T (x, 0) Ti r* T, h 8 8 T, h at > 0.2 r o2 For Fo r T (r, 0) ro Ti 8 T, h L L x* where ro x L T\infty Ti To L x ro r h t = bulk fluid temperature of solid = temperature at midplane of wall, centerline of cylinder, centerpoint of sphere
at time t = half-thickness of plane wall = distance from midplane of wall = radius of cylinder/sphere = radial distance from centerline of cylinder/sphere = convective heat transfer coefficient = time k α = thermal diffusivity = tc k = thermal diffusivity of solid c = specific heat of solid To - T3 j / Ti - T3 j = C1
exp \ - q12 Fo j where C1 and q are obtained from the following table 207 Heat Transfer Coefficients used in the one-term approximation to the series solutions for transient one-dimensional conduction Plane Wall Bi* ζ1 (rad) C1 Sphere ζ1 (rad) C1 0.01 0.0998 1.0017 0.1412 1.0025 0.1730 1.0030 0.02 0.1410 1.0033
0.1995\ 1.0050\ 0.2445\ 1.0060\ 0.03\ 0.1732\ 1.0049\ 0.2439\ 1.0075\ 0.2989\ 1.0090\ 0.04\ 0.1987\ 1.0066\ 0.2814\ 1.0099\ 0.3450\ 1.0173\ 0.4550\ 1.0209\ 0.08\ 0.2791\ 1.0130\ 0.3960\ 1.0197\ 0.4860\ 1.0239\ 0.09\ 0.2956\ 1.0145
0.4195\ 1.0222\ 0.5150\ 1.0268\ 0.10\ 0.3111\ 1.0160\ 0.4417\ 1.0246\ 0.5423\ 1.0298\ 0.15\ 0.3779\ 1.0237\ 0.5376\ 1.0365\ 0.6608\ 1.0445\ 0.20\ 0.4828\ 1.0311\ 0.6170\ 1.0483\ 0.7593\ 1.0580\ 0.8516\ 1.0932\ 1.0580\ 0.8516\ 1.0932\ 1.0528\ 1.1164\ 0.50\ 0.6533\ 1.0701
0.9408\ 1.1143\ 1.1656\ 1.1441\ 0.60\ 0.7051\ 1.0814\ 1.0185\ 1.1346\ 1.2644\ 1.1713\ 0.70\ 0.7506\ 1.0919\ 1.0873\ 1.1539\ 1.3525\ 1.1978\ 0.80\ 0.7910\ 1.1016\ 1.1490\ 1.1725\ 1.4320\ 1.2558\ 1.2071\ 1.5708\ 1.2732\ 2.0\ 1.0769\ 1.1795\ 1.5995\ 1.3384\ 2.0288\ 1.4793\ 3.0\ 1.1925\ 1.2102
1.7887 1.4191 2.2889 1.6227 4.0 1.2646 1.2287 1.9081 1.4698 2.4556 1.7201 5.0 1.3138 1.2402 1.9898 1.5029 2.5704 1.7870 6.0 1.3496 1.2570 2.1286 1.5526 1.7654 1.8921 9.0 1.4149 1.2598 2.1566 1.5611 2.8044 1.9106 10.0 1.4289 1.2620 2.1795
1.5677\ 2.8363\ 1.9249\ 20.0\ 1.4961\ 1.2699\ 2.2881\ 1.5919\ 2.2881\ 1.5919\ 2.9857\ 1.9781\ 30.0\ 1.5202\ 1.2717\ 2.3261\ 1.5973\ 3.0372\ 1.9898\ 40.0\ 1.5325\ 1.2723\ 2.3455\ 1.5993\ 3.0632\ 1.9990\ \infty\ 1.5707\ 1.2733\ 2.4050\ 1.6018\ 3.1415\ 2.0000\ *Bi = hL/k for the plane wall
and hro/k for the infinite cylinder and sphere. In general the ic acid is dropped and aldehyde added. Repeat 1, 2, and 3 until all jobs have been scheduled. Professions are self-regulating, in that they control the training and evaluation processes that admit new persons to the field. Concrete Manual, 8th ed., U.S. Bureau of Reclamation, 1975. \sigma = EE
where E = elastic modulus Key mechanical properties obtained from a tensile test curve: • Elastic modulus • Ductility (also called percent elongation): Permanent engineering stress • Yield strength: Engineering stress at which permanent deformation
is first observed, calculated by 0.2% offset method. Reliability engineering (e.g., MTTF, MTBR, availability, parallel and series failure) 8-12 487 Fundamentals of Engineering (FE) MECHANICAL CBT Exam Specifications Effective Beginning with the July 2020 Examinations • The FE exam is a computer-based test (CBT). Drawdown (e.g., Dupuit,
Jacob, Theis, Thiem) D. Water conservation and reuse 13. A Costas loop is often used. Null Space of A = \{0\}. Mathematics A. Indoor air quality modeling and controls (e.g., air exchanges, steadyand nonsteady-state reactor model) 8-12 14. No elevation change, no heat transfer, and no work. Ferric chloride 2 FeCl3 + 3 Ca(HCO3)2 \Rightarrow 2 Fe (OH)3 + 3
CaCl2 + 6 CO2 Phosphorus Removal Equations 1. Destruction of excess alkalinity 2HCO3− + Ca(OH)2 → CaCO3(s) + CO32− + 2H2O 7. Se TERMINAL SETTLING VELOCITY (ft/s) 1 10 -3 NOTES 2. Cost analyses (e.g., fixed/variable, breakeven, estimating, overhead, inflation, incremental, sunk, replacement) D. Public protection and regulatory issues
4-6 4. Basic hydraulics (e.g., Manning equation, Bernoulli theorem, open-channel flow) C. liquid hf Enthalpy kJ/kg Evap. INLET TURBINE EXIT For an ideal gas with constant specific heats: Wo turb = mc op Ti - Tei Per unit mass: wturb = cp Ti - Tei Turbine
 Isentropic Efficiency w T - Te hT = wa = i Ti - Te j + i 2 e n 194 • W out Fluid Mechanics Performance of Components Fans, Pumps, and Compressors Scaling Laws; Affinity Laws where d Q n ND3 2 d mo mo n = d n tND3 2 tND3 1 d H H n = d
2 2n N 2D 2 2 ND 1 d P P n = d 2 2n tN 2 D 2 2 tN D 1 d P P n = d 2 2n tN 2 D 2 2 tN D 1 e Wo Wo o = e 3 5o tN3D5 2 tN D 1 Q mo H P Wo ρ N D = d Q n ND3 1 = volumetric flowrate = mass flowr
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the same machine. The interest of the public 6. These practice exams contain questions that have been used on past exams and questions written just for study materials to give you extra practice. The maximum possible work is obtained in a reversible process. 60. # dx = ax + c 27a. 178 Fluid Mechanics Manometers P P P Bober, W., and R.A.

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released or absorbed in a reaction occurring reversibly at constant volume and temperature. Conversely, licensees serving as members, advisors, or employees of a government body or department, who are the principals or employees of a government body or department, who are the principals or employees of a government body or department, who are the principals or employees of a government body or department, who are the principals or employees of a government body or department, who are the principals or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department, and the principal or employees of a government body or department body or 
said concern to the governmental body that they serve. Violating any terms of any Order imposed or agreed to by the board or using a seal or practicing engineering or surveying while the firm's certificate of authorization is inactive or restricted 10. H)2 Free and Forced Vibration A single degree-of-freedom vibration system, containing a mass m, a
 spring k, a viscous damper c, and an external applied force F can be diagrammed as shown: EQUILIBRIUM POSITION x c k m 125 F Dynamics The equation of motion for the displacement of x is: mxp = -kx - cxo + F or in terms of x, mxp + cxo + kx = F One can define \sim n = k m c 2 km 1 K= k g= Then: mxp = -kx - cxo + F or in terms of x, mxp + cxo + kx = F One can define mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x is: mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in terms of x, mxp = -kx - cxo + F or in 
 externally applied force is 0, this is a free vibration, and the motion of x is solved as the solution to a homogeneous ordinary differential equation. Van Nostrand Co./Wadsworth Publishing Co., 1949. 224 Instrumentation, Measurement, and Control Examples of Common Chemical Sensors Sensor Type Principle Materials Analyte Semiconducting oxide
 sensor Conductivity impedance SnO2, TiO2, ZnO2, WO3, polymers O2, H2, CO, SOx, NOx, combustible hydrocarbons, alcohol, H2S, NH3 Electrochemical sensor (liquid electrolyte) Amperiometric composite Pt, Au catalyst H2, O2, O3, CO, H2S, SO2, NOx, NH3, glucose, hydrazine Ion-selective electrode (ISE) Potentiometric glass, LaF3, CaF2 pH, K+
Na+, Cl-, Ca2, Mg2+, F-, Ag+ Solid electrode sensor Amperiometric Potentiometric YSZ, H+-conductor YSZ, B-alumina, Nasicon, Nafion O2, H2, CO, combustible hydrocarbons, O2, H2, CO, combustible hydrocarbons, VOCs Catalytic
 combustion sensor Calorimetric Pt/Al2O3, Pt-wire H2, CO, combustible hydrocarbons Pyroelectric sensor Colorimetric Pyroelectric Pyro
 © 2003, The Electrochemical Society. Link 3 is joined to link 2 at the moving pivot A and to link 4 at the moving pivot B. P = pressure of the air-water mixture temperature) Pa = partial pressure of dry air Pv = partial pressure of water vapor P = Pa + Pv Specific Humidity (absolute humidity)
 humidity ratio) \omega: \omega = mv /ma where mv = mass of water vapor ma = mass of dry air \omega = 0.622Pv /Pa = 0.622Pv /Pa
 internal forces at all points between the hand and the foot. 32, No. 7, pp. The following definitions are followed: arcsin u = \sin - 1 u, (sin u)-1 = 1/sin u. Mass moments of inertia C. This field usually specifies the transport layer protocol used by a packet's payload. 251 Chemical Engineering Sieve Conversion Table Mesh to Micron Conversion Table
MICRONS 8000 6730 6350 5813 4783 4899 4000 3327 3175 2794 2362 2000 1851 1588 1397 1168 1000 841 707 595 500 420 354 297 250 210 177 149 125 105 88 74 63 53 44 37 32 25 20 US MESH TYLER MESH 2 1/2 3 3 1/2 4 5 6 4 5 6 7 8 10 12 7 8 9 10 14 16 18 20 25 30 35 40 45 50 60 70 80 100 120 140 170 200 230 270 325 400 450 500 635
 0.044 0.037 0.032 0.025 0.020 "+" before the sieve mesh indicates the particles will pass through the sieve; "-" before the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the particles will pass through the sieve mesh indicates the pass through the sieve mesh indicates through the sieve mesh indicates th
 with the transport of dangerous goods, emergency responders, poison centers, those involved with the professional use of pesticides, and consumers. Q = Av mo = \rho Q = \rho Av where Q = volumetric flowrate mo = mass flowrate Q = volumetric flow involved with the professional use of pesticides, and consumers. Q = Av mo = Q = volumetric flow involved with the professional use of pesticides, and consumers.
constant. Link 2 (the crank) rotates about the fixed center, O2. This section shall not require a certificate of authorization for a firm performing engineering or surveying for the horizon. This is the height of the surface of the liquid
 above the centerline of the pump Hs impeller (ft or m). Surveying A. # dx = 2 x x ax 9. "Module" is not a compilation unit • Function parameters are designated with parentheses () • Unless specified, procedure call are separated by semicolons • Class definitions
 start with "cls" (e.g., clsClassName) • Classes, properties, and procedures are by default public and may be optionally modified by "private" or "protected" • To instantiate an object, the follow syntax must be used: new clsName objName • For input, read ("filename.ext", )—if reading from console, do not use the first argument • For output, write
 ("filename.ext", )—if writing to console, do not use the first argument • The Boolean data type is "boolean"; the return result of all comparison operators is a boolean type 412 Electrical and Computer Engineering • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within that variable • The operator "&" in front of a variable is used to return the data at the address location within the data at the address location
 a variable is used to return the address of a given variable. Uncertainty (e.g., expected value and risk) D. Materials A. 285 Civil Engineering Fy = 50 ksi \phi = 0.90 Cb = 1 \phi Mn kip-ft LRFD AVAILABLE MOMENT VS. Cost estimation C. Consider using position or profile before specifying symmetry. Reactive systems (e.g., combustion) 10-15 473 9.
 Analytic geometry (e.g., areas, volumes) B. Although these variables usually have zero costs (depending on the application), they can have non-zero cost (depending on the application), they can have non-zero cost (depending on the application), they can have non-zero cost (depending on the application), they can have non-zero cost (depending on the application).
 finishing an undergraduate engineering degree from an EAC/ABET-accredited program. Flow Through a Packed Bed A porous, fixed bed of solid particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L = length of particles can be characterized by L
dimensionless (0-1) The Ergun equation can be used to estimate pressure loss through a packed bed under laminar and turbulent flow conditions. Orifices The cross-sectional area at the vena contracta A2 is characterized by a coefficient of coeffic
 type of chemical has a toxicity hazard, the risk of illness rises with the degree to which that chemical contacts your body or enters your lungs. To obtain dynamic similarity between two flow pictures, all independent force ratios that can be written must be the same in both the model and the prototype. Options have up to three fields: Option-Kind (1
 byte), Option-Length (1 byte), Option-Data (variable). Gas Turbines Brayton Cycle (Steady-Flow Cycle) 2 COMBUSTOR COMPRESSOR 3 TURBINE 1 4 w12 = h1 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (T3 - T4) wnet = w12 + w34 q23 = h3 - h2 = cp (
 2 \text{ W} = 0 \text{ 3 s} = \text{c s} = \text{c W} = 0 \text{ 1 4 v T 3 P} = \text{c Q} = 0 \text{ 2 4 Q} = \text{m} 1 \text{ h} 1 + \text{m} 2 \text{ h} 2 = \text{m} 1 \text{ h} 3 + \text{m} 2 \text{ h} 4 \text{ Steam Trap A steam trap removes condensate from steam piping or a}
 heat exchanger. Hole basis represents a system of fits corresponding to a basic hole size. If no errors are detected in the packet was received correctly. General Character of Probability The probability P(E)
of an event E is a real number in the range of 0 to 1. When a block in the cache is written to, its dirty bit is set to indicate that the main memory's copy is stale. 100 mA-2,000 mA Ventricular fibrillation (uneven, uncoordinated pumping of the heart). Volumetric Efficiency 2mo a hv = taVd ncN (four-stroke cycles only) where mo a = mass flow rate of
 air into engine (kg/s) ta = density of air (kg/m3) Specific Fuel Consumption (SFC) mo f sfc = o = 1, kg J hHV W Use hb and Wob for bsfc and hi and Woi for isfc. Polymers, ceramics, and composites 4-6 472 5. Half-Duplex Provides communications in two directions but only one at a time Full Duplex (Duplex) Allows communications in both directions
 simultaneously 407 Electrical and Computer Engineering Computer Systems Memory/Storage Types RAM - Primary memory system in computing systems, volatile Cache - faster, but smaller segment of memory used for buffering immediate data from slower memory example 1 cache, fastest memory available • L2: Level 2 cache, next level away
from CPU. If a2 + b2 - c is negative, locus is imaginary. Environmental impact of energy sources and production, carbon footprint, thermal, water needs) 4-6 484 8-12 12-18 Fundamentals of Engineering (FE) INDUSTRIAL AND SYSTEMS CBT Exam Specifications Effective Beginning with the July 2020 Examinations energy sources and production, carbon footprint, thermal, water needs) 4-6 484 8-12 12-18 Fundamentals of Engineering (FE) INDUSTRIAL AND SYSTEMS CBT Exam Specifications Effective Beginning with the July 2020 Examinations and production (e.g., greenhouse gas production).
 • The FE exam is a computer-based test (CBT). Reviewing it before exam day will help you become familiar with the charts, formulas, tables, and other reference information provided. H9/d9 Sliding fit: where parts are not intended to run freely but must move and turn freely and locate accurately. Behavior of ideal gases 3-5 10. Often at pressures
 close to atmospheric, U i The fugacity coefficient is a correction for vapor phase nonideality. Note that this address may be changed in transit by a network address translation device. In determining the amount of fine to be assessed pursuant to this section, the board may consider such factors as the following: 1. Sometimes it is approximated by a
pure component value from a correlation. Work, energy, and power (e.g., particles, rigid bodies) 6. Window Size (16 bits) The size of the receive window, which specifies the number of window size units (by default, bytes) (beyond the segment is currently
  terms are defined above. Equilibrium of rigid bodies (e.g., support reactions) E. Furthermore, the probability (type I error) The probability of a type I error is known as the level of significance of the test. hi + Vi2/2 =
 he + Ve2/2 Isentropic Efficiency (nozzle) = Ve2 - Vi2 2 `hi - hes j where hes = enthalpy at isentropic exit state. The product of a complex number used in calculations of basal metabolic rate when estimated from the ratio of CO2 produced to the
O2 consumed. Engaging in any fraud or deceit in obtaining or attempting to obtain a certificate of licensure or intern certification 5. Reduction - The gaining of electrons. Licensees shall not solicit or accept gratuities, directly or indirectly, from contractors, their agents, or other parties in connection with work for employers or clients. • Last-in, first-
V2 RP 1 = • V1 R1 1 + sRPC R1R2 R1 + R2 ω ω C H(s) = RS L RP = 379 ω C = 1 RS C s L RP V2 RP = • V1 R1 1 + s L RP R1R2 R1 + R2 ω C = RP L Electrical and Computer Engineering Band-Pass Filters H ( jω L ) = H ( jω
 Bandwidth = BW = \omegaU - \omegaL 3-dB Bandwidth = BW = \omegaU - \omegaL Frequency Response Freque
 RS BW = 1 LC 1 RS C R1 v1 + V2 R2 s = • L s 2 + sRS L + 1 LC V1 H (jω 0) = + v2 V2 R2 s 2 + 1 LC = • 2 V1 RS s + s RS C + 1 LC R2 RS = R1 + R2 C R2 BW = H(s) = 1 LC RP = RS L L + R2 v2 V2 RP s 2 + 1 LC = • 2 V1 R1 s + sR P L + 1 LC R1R2 R1 + R2 H (0) = 380 C R2 R = P R1 + R2 R1 ω0 = BW = 1 LC RP L Electrical and
 Computer Engineering Operational Amplifiers Ideal v2 v0 v1 v0 = A(v1 - v2) where A is large (> 104), and v1 - v2 is small enough so as not to saturate the amplifier. Note: D = 100% is equivalent to 90 dBA time-weighted average (TWA). This requires adding a "dirty bit" for each block in the cache. — 0.01 to 1.2 — 300 \mum to 5 \mum (1400 \mum to 45 \mum)
to 20 m3/min 4 to 35 2 to 15 30 to 50 35 to 400 kN/m2 pressure head Small cheap device, widely used for closed circuit grinding. CD 00 01 11 10 m0 m1 m3 m2 01 m4 m5 m7 m6 11 m12 m13 m15 m14 10 m8 m9 m11 m10 AB 00 Computer Networking Modern computer networks are primarily packet switching networks. Reconnaissance 2. It should
be noted that the various sinusoids present in the series are orthogonal on the interval 0 to T and as a result the coefficients are given by a0 = _1 T i #0T f ^+ t h dt an = _2 T i #0T f ^+ t h dt an = _2 T i #0T f ^+ t h dt an = _1 T i #0T f ^+ t h sin _1 T in the series are orthogonal on the interval 0 to T and the
 corresponding series is called the Fourier series of f(t) over the same interval. The Fundamentals of Engineer (P.E.). 1,135 1,310 2,345 519 609 84 1,544 1,472 3,380 2,721 1,983 86 1,947 312 4,436 2,804 620 356 1,202 2,282 -38 4,748 2,651 4,397
 5,486 2,829 3,221 145 3,565 102 4,190 1,760 208 1,418 5,432 579 3,092 449 3,038 6,128 2,075 3,488 786 3,362 895.9 209.3 347.5 284.7 2,051.5 125.6 234.5 127.7 636.4 188.4 406.5 431.2 389.4 330.7 129.8 238.6 138.2 456.4 129.8 430.7 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8 129.8
 36 86 157 8 7.8 139 94 53 88 72 72 104 151 58 117 428 142 - 57 10 54 68 22 177 27 31 117 23 Materials Science/Structure of Matter Some Extrinsic, Elemental Semiconductors Element Dopant Si B AI Ga P As Sb Al Ga In As Sb Ge Periodic table group of dopant III A III A III A VA VA VA III A III A VA VA VA III A III A VA VA Maximum solid solubility of dopant
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ATE D 10 8 0.1 LIQ UID - 20 200 20 20 40 60 80 100 120 140 160 180 0 220 240 T = 20°F 100 80 40 60 80 100 120 140 ENTHALPY, Btu/lb Reprinted with permission from 2009 ASHRAE: 2009. 2934, American Chemical Society. P1A1 - P2A2cos \alpha - V1) Fy - W - P2A2sin \alpha = Qp (v2sin \alpha - 0)
 where F = force exerted by the fluid on the fluid (the force exerted by the fluid on the pipe line = cross-sectional area of the pipe line = cross-sectional area o
line = weight of the fluid = velocity of the fluid = velocity of the fluid = fluid volumetric flowrate Jet Propulsion v v Vennard, J.K., Elementary Fluid Mechanics, 6th ed., J.K. Vennard, 1954. Thus: n a n / yij yi• = and y•• / / yij j=1 i=1 j=1 One-Way Analysis of Variance (ANOVA) Given independent
random samples of size ni from k populations, then: //`yij - y •• j2 = / ni _y i• - y •• i2 + //`yij - y i• j2 k ni k i=1 j=1 ni k y2 SStotal = //yij2 - N•• i=1 j=1 k y2 y2 SStreatments = / ni • - N•• i=1 i = SSerror SStotal - SStreatments
Montgomery, Douglas C., and George C. Any DS field that ends with two '1' bits is intended for local or experimental use.[4] The remaining two bits are used for Explicit Congestion control and non-congestion control traffic. Industrial hygiene (e.g.
 toxicity, noise, PPE, ergonomics) C. Hooke's Law applies in such a case. Power cycles G. Piezoelectric transducers can have many different geometries, including using multiple layers to increase gain. STRESS CRACKS AT HIGHER TEMPS. Stress types (e.g., normal, shear) B. Force couple systems D. Multimedia equilibrium partitioning (e.g., Henry's
law, octanol partitioning coefficient) 7-11 7. Stress-strain diagrams C. Air entrainment is used to improve durability. 304 Civil Engineering where D = density (veh/hr) Do = optimum density (veh/hr) Vm = maximum flow (veh/hr) Vm = maximu
 critical speed) (mph) Sf = theoretical speed selected by the first driver entering a facility (i.e., under zero density and zero flow rate conditions) (mph) Gravity Model A jFijKij Tij = Pi > / A jFijKij Ti
 attracted to Zone j = friction factor that is an inverse function of travel time between Zones i and j = socioeconomic adjustment factor for travel between Zones i and j = socioeconomic adjustment factor for travel between Zones i and j = socioeconomic adjustment factor for travel time, cost, and so forth) = coefficient value for attributes i (negative, since
 the values are disutilities) If two modes, auto (A) and transit (T), are being considered, the probability of selecting Mode x can be written as: eUx P_x i = n / eUx x = 1305 Civil Engineering Traffic Safety Equations Crash
 Rates at Intersections RMEV = where A # 1,000,000 V RMEV = crash rate per million entering vehicles A = number of crashes, total or by type occurring in a single year at the location V = ADT \times 365 ADT = average daily traffic entering intersection Crash Rates for Roadway Segments A # 1,000,000 RMVM = VMT where RMVM = crash rate per
 million vehicle miles = number of crashes, total or by type at the study location, during a given period \times (length of road) ADT = average daily traffic on the roadway segment Crash Reduction Crashes prevented = N # CR where ADT after
                                     ADT before improvement i N = expected number of crashes if countermeasure is not implemented and if the traffic volume remains the same CR = CR1 + (1 - CR1)(R2 + (1 - CR1)(R2 + (1 - CR1)(R3 + R1))(R2 + (1 - CR1)(R3 + R1)(R3 + R1)(R3 + R1)(R3 + R3)(R3 + R3
 purchased time expires. 393 Electrical and Computer Engineering Internet Protocol Addressing This section from Hinden, R., and S. The hazard associated with a rotating saw blade or the water jet continues to exist, but the probability of causing harm, and thus the risk, can be reduced by installing a guard or by controlling the jet's path. 19. Static
 friction 7. Continuous contact methods (e.g., number of transfer units, height equivalent to a theoretical plates) F. Option Length 8 Indicates the size of the entire option (including this field). Stress and strain caused by axial loads D. A table of derivatives and integrals is available in the Derivatives
 and Indefinite Integrals sections. Ignoring nodal and queueing delays, the round-trip delay of delivering a packet from one node to another in the stop-and-wait system is D = 2 dprop + dtransData Because the sending host must wait until the ACK packet is received before sending another packet, this leads to a very poor utilization, U, of
 resources for stop-and-wait links with relatively large propagation delays: U = dtrans/D For this reason, for paths with large propagation delays, most computer networking systems use a pipelining system called go-back-N, in which N packets are transmitted in sequence before the transmitter receives an ACK for the first packet. 213 Heat Transfer
 Film Condensation of a Pure Vapor On a Vertical Surface 0.25 where t2 gh L3 Nu L = h L = 0.943 > l fg H kl nlkl Tsat - Tsi \rhol = density of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (9.81 m/s2) hfg = latent heat of vaporization (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (J/kg) L = length of surface (m) \mul = dynamic viscosity of liquid phase of fluid (kg/m3) g = gravitational acceleration (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface (m) \mul = dynamic viscosity (J/kg) L = length of surface 
 conductivity of liquid phase of fluid [W/(m•K)] Tsat = saturation temperature of fluid (K) Ts = temperature of fluid properties at the average temperature Ts. Outside Horizontal Tubes tl2 gh fg D3 hD = = H Nu D 0.729 > k n k `T - T j l l saturated temperature Ts.
0.25 s where D = tube outside diameter (m) Note: Evaluate all liquid properties at the average temperature Tsa and the surface temperature Ts. Natural (Free) Convection Vertical Flat Plate in Large Body of
 stationary fluid. Calculus (e.g., differential, integral, single-variable, multivariable) F. In general F = \mu s N, at the point of impending slip F = \mu s N, when slip is occurring Here, \mu s = 0 coefficient of static friction \mu s = 0.
rigid body rotation \theta \omega = d\theta/dt \alpha = d\omega/dt \alpha d\theta = \omega d\omega Instantaneous Center of Rotation (Instantaneous center of rotation (instant center) is a point, common to two bodies, at which each has the same velocity (magnitude and direction) at a given instant. % Solids Feed Overflow Underflow Power (kW) 1 mm to 45 µm (25 mm) 5 to
 850 Not critical 2 to 20 45 to 65 0.4 to 110 Used for closed circuit grinding, washing and dewatering, desliming; particularly where clean dryunderflow is important. State machine design H. Single-Sideband: xLSB fi = XDSB fi =
f nG 2fc In either case, if M(f) = 0 for |f| > W, then the bandwidth of xLSB(t) or of xUSB(t) is W. Linear Combination is an expression constructed from a set of terms by multiplying each term by a constant and adding the results (e.g., if z is a linear combination of x and y, then z = ax + by where a and b are
 constants). 402 Electrical and Computer Engineering Checksum The checksum field may be used for error-checking of the header and data. 94 Materials Science/Structure of Matter Properties of Materials Electrical Capacitance: The charge-carrying capacity of an insulating material Charge held by a capacitor q = CV where q = charge C =
 capacitance V = V and the plates of a parallel plate capacitance of a parallel plate capacitance of the plates 
 that determines the resistor R
 solids, liquids or gases) as a consequence of their absorption of energy from electromagnetic radiation of very short wavelength and high frequency. 0.70 NFPA Standard 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, Section 4.10.1.2 Fire Sprinkler Discharge where Q = KP1/2 Q = flow (gpm) K = measure of the ease of
 To be eligible for licensure as a professional engineer or professional surveyor, an individual must meet all of the following requirements: 1. DSB signals must be demodulated with a synchronous demodulator. For example, a network layer packet is encapsulated in a data link layer frame. The first term is a. Hosts, routers, and link-layer switches
  showing the four-layer protocol stack with different sets of layers for hosts, a switch, and a router are shown in the figure below. Chemical equilibrium H. The field size sets a theoretical limit of 65,535 bytes (8 byte header + 65,535 bytes (8 byte header + 65,527 bytes of data) for a UDP datagram. Cache Size - C (bytes) = S*A*B where S*A*B*B where S*A*B*B*B where S*A*B*B where S*A*B where S*A*B where S*A*B where S*A*B where S*A*B where S*A*B wh
 Block size (bytes) To search for the requested block in the cache, the CPU will generally divide the address into three fields: the tag, index, and block offset. MMC and LMC must be specified on the drawing where it is required. Transportation planning (e.g., travel forecast modeling, safety, trip generation) 9-14 14. The method can be extended to nth
 decision making C. When set to a non-zero value, it serves as a hint to routers and switches with multiple outbound paths that these packets should stay on the same path, so that they will not be reordered. Qo in h5 - h8 COPref = o = o h Win, 1 + Wo in, 2 2 - h1 + h6 - h5 Qo out h2 - h3 COPHP = o = h2 - h1 + h6 - h5 Win, 1 + Wo in, 2 173
 Thermodynamics Air Refrigeration Cycle out in in T 2 Qout P = ^{1} 4 Qin s h1 - h4 COPref = ^{1} 4 Qin s h1 - h4 COPref = ^{1} 4 Qin s h1 - h4 COPref = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Society of Heating, Refrigeration Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in in T 2 Qout P = ^{1} 6 Samerican Cycle out in T 2 Qout P = ^{1} 6 Samerican Cycle out in T 2 Qout P = ^{1} 6 Samerican 
 m2 m1 3 1 2 m2 m1 h1 + m2 h2 = h3 (m1 + m2) 459 Mechanical Engineering Pump ηp 2 1 w w = h1 - h 2 = (h1 - h2S) / ηp h 2S - h1 = v (P2 - P1) w= v (P1 - P2) ηp 460 Index Symbols ASTM grain size 100 ASTM standard reinforcement bars 276 atmospheric dispersion modeling (Gaussian) 310 atomic bonding 94 atomic number 85
 authentication, computer network security 416 automatic request for retransmission (ARQ) 378 available strength in axial compression, W shapes 289 average and range charts 82 average and range chart
circuits 359 acids, bases, and pH 86 ac machines 366 ac power 363 activated carbon adsorption 336 activated sludge 332 addition of two matrices 57 aerobic digestion 310 air refrigeration cycle 174 air stripping 337 alcohols 89 aldehydes 89 algebra of
complex numbers 36 algorithm efficiency (Big-O) 412 algorithms 410 allowable stress design 272 amorphous materials 104 amplitude modulation 375 analog filter circuits 379 analog filter circuits 379 analog to-digital conversion 225 analysis of variance for 2n factorial designs 421 angle modulation 375 angle of repose 256 angular momentum or
 moment of momentum 121 anion 92 anode 93 anote 180 area formulas 308
 area moment of inertia 111 arithmetic progression 50 Arrhenius equation 238 ASD 272, 281 ASHRAE Psychrometric Chart No. 1 (English units) 175 ASME Y14.5 442 associative law 64 B baghouse 316 balanced three-phase systems 363 bases 86 basic cycles 149 basic freeway segment highway
capacity 303 basic heat transfer rate equations 204 Basquin equation 99 batch reactor, constant volume 238 batch reactor, variable volume 240 Bayes' theorem 65 beams 135, 268, 281 beams-shear 276 beams 135, beams 135 benefit-cost
procedures 332 boiling 211 boiling point elevation 85 bonds 231 break-through time for leachate to penetrate a clay liner 326 brittle materials 446 bulk (volume) modulus of elasticity 131 bus, network topologies 405 C cantilevered beam slopes and deflections 141 capacitors and inductors 358 capacitors and
 inductors in parallel and series 359 461 Index INDEX capitlary rise 178 cartoxylic acids 89 carcinogens 23 Carnot cycle 149, 172 Cartesian coordinates 114 catalyst 85 cathode 92 cathode reactions (reduction) 94 cation 92 cellular biology 93 centrifugal pump characteristics 191 centroids and moments of inertia 50, 112
 centroids of masses, areas, lengths, and volumes 108 characteristics of a static liquid 178 chemical reaction equilibria 155 chemical reaction equilibrium 156 chemical sensors 225 chemical reaction equilibria 155 chemical reaction equilibria 155 chemical reaction equilibria 156 chemical reaction equilibrium 156 chemical sensors 225 chemical reaction equilibria 155 chemical reaction equilibria 
head loss equation 297 circular sector 40 circular segment 40 Clapeyron equation 155 classifiers: wet and dry operations 255 Clausius tatement of second law 151 closed-system exergy (availability) 152 closed thermodynamic system 147 coagulation equations 341 code of ethics 4 coefficient of
 performance (COP) 149 columns 137, 281 combustion 347 communication methodologies 407 communication methodologies 407 communication theory and concepts 372 composite materials 101 composite plane wall 206 composite sections 137
compressibility factor 171 compressible flow 189 compressible fluid 195 computer network security 413 computer network network security 413 computer network n
plane wall 204 confidence interval for interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 74 confidence interval for the wariance of a normal distribution 75 confidence interval for the mean of a normal distribution 74 confidence interval for the wariance of a normal distribution 74 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 74 confidence interval for the wariance of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 74 confidence interval for the wariance of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 74 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distribution 75 confidence interval for the mean of a normal distr
space safety 20 conic section equation 45 conic section equation 45 consequences of fluid flow 183 conservation 309 continuity equation 181 control network security 413 control systems 226 convection 204, 209, 243 conversion 155 conversion factors 2, 3
convolution 370 copyrights 11 corrosion 94 cost estimation 256 coupling multiplier (CM) 31 CPM precedence relationships 309 creep 99 critical insulation 78 critical values of X distribution 79 crystallization processes 256 cumulative
 binomial probabilities 80 cumulative distribution functions 65 current 356 cycles and processes 455 cyclone 314, 315 cylindrical pressure vessel 131 D Darcy's law 291 Darcy-Weisbach equation 183 data quality objectives (DQO) for sampling soils and solids 329 data structures 411 dc machines 367 dechlorination of sulfite compounds 332
 462 Index INDEX decibels and Bode plots 373 definition of safety 13 definitions used in ASME Y14.5 442 deflection MOSFETs (low and
 medium frequency) 387 depreciation 231 derivative for defferential calculus 45 derivatives 48 design compressive strength 281 design of reinforced concrete components (ACI 318-14) 274 design of steel components (ANSI/AISC 360-16) LRFD, ASD 281 design shear strength 281
determinants 58 deviations for shafts 441 dew-point temperature 150 differential amplifier 383 differe
 diodes 385 directed graphs, or digraphs, or digraphs, or digraphs, of relation 34 discrete math 34 discrete 
 linear program 417 ductile materials 447 Dupuit's formula 292 dynamics 449 dynamics of mechanisms 435 463 E earned-value analysis 309 earthwork formulas 308 effective length factor, K 287 effective stack height 312, 313 effect of overburden pressure 326 elastic strain energy 138 electrical and
computer engineering 355 electrical properties of materials 95 electrostatic precipitator efficiency 317 electrostatic fields 368 electrostatic precipitator efficiency 317 electrostatic precipitator efficiency 317 electrostatic precipitator efficiency 317 electrostatic precipitator efficiency 317 electrostatic fields 368 electrostatic precipitator efficiency 317 electrostatic precipitator efficiency 318 electrostatic precipitator efficiency 319 e
 endurance limit for steels 448 endurance limit modifying factors 448 energy 347 energy equation 181 energy line (Bernoulli equation) 182 energy sources and conversion processes 347 engineering economics 230 engineering strain 130 enhancement MOSFET (low and medium frequency) 387 enthalpy 150 enthalpy curves 161 entropy 151
environmental engineering 310 equations of state (EOS) 146 equilibrium constant of a chemical reaction 85 equilibrium requirements, system of forces 107 ergonomics 30 ergonomics: hearing 429 error coding 377 essential prime implicant 391 ethers 89 ethics 4 Euler's approximation 62 Euler's approximation 182 Euler's identity 37 Euler's or forward
rectangular rule 61 evapotranspiration rates for grasses 291 exergy (availability) 151 expected values 65 exponentially weighted moving average 421 exposure 27 external flow 210 Index F INDEX frame deflection by unit load method 269 free convection boiling 212 free flow speed 303 free vibration 125 freezing point depression 85 frequency
 modulation 376 frequency response and impulse response 372 Freundlich isotherm 336 friction 110, 122 full duplex (Duplex) 407 fundamental constants 2 fundamental constants 2 fundamental relationships 418 facility planning 423 facultative pond 333 families of organic compounds 90 fan characteristics 192 fans, pumps, and compressors 195 Faraday's law 85 fate and
transport 319 fatigue 99 film boiling 213 film condensation of a pure vapor 214 filtration equations 340 finite queue, single server models 419 finite state machine 34 fins 209 fire hydrant: calculating rated capacity 298 fire hydrant discharge 298 fire hydrant di
control system model 228 first-order linear difference equation 60, 370 first-order linear homogeneous differential equations 51 fits, manufacturability 440 fixed blade 188 flammable gases 20 flat bars or angles, bolted or welded steel 282 flat roof
 snow loads 273 flip-flops 391 flow chart definition 413 flow in closed circuits 201 flow in noncircular conduits 184 flow measurement 195 fluid flow measurement 195 fluid mechanics 177 force 107 forced convection boiling 211 forced
vibration 125, 126 force method of analysis 270 forces on submerged surfaces and the center of pressure 180 forecasting 309, 421 Fourier transform theorems 55 Fourier transform 52 Fourier transform and its inverse 372 Fourier transform and its inverse 372 Fourier transform pairs 55 Fourier transform theorems 55 fracture toughness 100 G gamma function 68 gas flux 326 gauge factor (GF) 222
Gaussian distribution 67 Gauss' law 355 general requirements for licensure 7 geometric dimensioning and tolerancing (GD&T) 442, 444 geometric progression 50 geotechnical 259 Gibbs phase rule 155 Globally Harmonized System (GHS) of Classification 15 Goodman theory, modified 447 grade line 182 granular storage and
 process safety 20 graph traversal 411 gravity model 305 greenhouse gases: global warming potential 353 Greenshields model 304 H half-duplex 407 half-life 328 hardenability 101 hazard assessments 14 Hazen-Williams equation 185, 296 head loss due to flow 183 heat exchangers 215 heats of reaction 152 heats of reaction, solution,
 formation, and combustion 85 heat transfer 204 heat-transfer rate equations 204 Helmholtz free energy 152 Henry's law at constant temperature 153 highway pavement design 307 hollow, thin-walled shafts 135 Hooke's law 134 horizontal curves 301 horizontal stress profiles and forces 263 humid volume 150 464 Index job sequencing 425 joining
 methods 436 junction field effect transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 294 hydrology/water resources 290 hydrology/water resources 290 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 294 hydrology/water resources 290 hydrology/water resources 290 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 294 hydrology/water resources 290 hydrology/water resources 290 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 294 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 294 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 295 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydraulic elements graph 296 hydrology/water feet transistors (JFETs) 387 INDEX HVAC 452 hydrology/water feet transistors (JFETs) 487 INDEX HVAC 452 hydrology/water feet transistors (JFETs) 487 INDEX HVAC 452 hydrology/water feet transistors (JFETs) 487 INDEX HVAC 452 hydrology/w
ketones 89 kiln formula 317 kinematics, dynamics, and vibrations 449 kinematics of a rigid body 123 kinematics of a rigid body 125 kinematics of a rigid body 126 kinematics of a rigid body 127 kinematics of a rigid body 128 kinematics of a rigid bo
 ideal-impulse sampling 376 identity matrix 57 impact 121 impulse and momentum 121 impulse and momentum principle 187 impulse and impulse a
 inflation 231 influence lines for beams and trusses 268 instrumental methods of analysis 87 interest rate tables 233 intermediate- and long-length columns 443, 446 internal flow 210 international tolerance grades 441 internet control
message protocol 403 internet protocol addressing 394 internet protocol version 4 header 396 inverse transform method 420 IPv4 special address blocks 395 iron-iron carbide phase diagram 106 irreversibility 152 isentropic flow relationships 190 L lake
 classification 291 landfill 325 Langmuir isotherm 336 Laplace transforms 56 lateral-torsional buckling 281 law of compound or joint probability 64 learning curves 423 least squares 69 Le Chatelier's principle for chemical equilibrium 85 Le Chatelier's Rule 20 level of service (LOS) 303 lever rule 105 Lewis equation 435
L'Hospital's Rule 47 life-cycle analysis 12 lime-soda softening equations 341 limiting reactant 155 limits and fits, manufacturability 439 limits for longitudinal reinforcements 278 linear combinations 68 linear momentum 121 linear programming 417 linear regression and goodness of fit 69 line balancing 425 live load reduction 272 load combination
using allowable stress design (ASD) 272 load combinations using strength design (LRFD) 272 loads: exposure factor 273 loads: importance factor 273 loads: thermal factor 273 loads: the factor 273 loads: 
LRFD 272, 281 J jet propulsion 188 job safety analysis 14 465 Index M INDEX Mach number 189 mass transfer 242 mass transfer 248 material balance 318 material handling 425 material properties 138
uncertainty 69, 226 mechanical design and analysis 431 mechanical engineering 431 mechanical properties of materials 96 median 63 member fixed-end moments (magnitudes) 271 memory/storage types 408 mensuration of areas and volumes 39 mesh, network topologies 406 methanol requirement for biologically treated wastewater 332 metric
 prefixes 1 microbial kinetics 320 microprocessor architecture 409 minimum heat flux 213 minor losses in pipe fittings, contractions, and expansions 183 minterm 391 mode 63 model law 6 model rules 4 modified accelerated cost recovery system (MACRS) 231 Mohr's Circle--Stress, 2D 133 molality of solutions 85 molarity of solutions 85 molar voluments.
 of an ideal gas 85 mole fraction of a substance 85 Mollier (h, s) diagram for steam 159 moment of inertia parallel axis theorem 109 moment of moment of inertia parallel axis theorem 109 moment of in
moving concentrated load sets 268 multicore, computer systems 409 multipath pipeline problems 187 multiplication of two matrices 57 municipal solid wastes (MSW) 352 N national research council (NRC) trickling filter performance 331 natural (free) convection 214 Nernst equation 86 net energy exchange by radiation
between two black bodies 218 net tensile strain 275 network optimization 417 network topologies 400, 405 Newton's method of minimization 61 Newton's method of minimization 61 Newton's second law for a particle 119 NIOSH formula 30 nmap 413 NOAEL 24 noise pollution 32 nomenclature for areas and volumes 39 non-annual compounding 231 noncarcinogens 24 non-constants
 acceleration 118 normal and tangential components 116 normal and tangential kinetics for planar problems 119 normal distribution (Gaussian distribution) 67 normality of solutions 85 normal shock relationships 190 Norton equivalent 358 NRCS (SCS) rainfall-runoff 290 nuclear 349 nucleate boiling 212 number systems and codes 389 numerical
 integration 61 numerical methods 60 numerical methods 60 numerical solution of a particle (constant mass) 119 one-way analysis of variance (ANOVA) 70 open-channel flow 294 open-channel flow and/or pipe flow of water 185 open-system exergy (availability) 152 466 Index
 INDEX open thermodynamic system 147 operational amplifiers 381 orifice discharging freely into atmosphere 186 orifices 196 Otto cycle 172 outdoor air changes per hour 319 overburden pressure 326 oxidation 92 P pan evaporation 290 parabolic rule 62 parabolic rule 63 parabolic rule 64 parabolic rule 65 parabolic rule 65 parabolic rule 65 parabolic rule 66 parabolic rule 66 parabolic rule 67 parabolic rule 67 parabolic rule 67 parabolic rule 68 parabolic rule 6
 Parseval's theorem 373 particle curvilinear motion 115 particle kinematics 114 particle kinematics 119 particle kinematics 119
 outdoor air 319 percent reduction in area (RA) 130 performance of components 195 periodic table of elements 88 permissible noise exposure 33 permutations and combinations 64 PERT 426 pH 86 phase relations 155 phasor transforms of sinusoids 360 P-h diagrams 160, 161, 165 phosphorus removal equations 342 photoelectric effect 95
 photosynthesis 87 pH sensors 224 pictograms, GHS 15, 17, 18 piezoelectric effect 95, 222 piezoresistive effect 222 pin fin 209 pipe bends, enlargements, and contractions 187 pipe flow of water 185 pipeline type 409 piping segment slopes and deflections 142 pitot tube 195 plane circular motion 116 plane frame 271 plane motion of a rigid body 122
 plane truss 271 467 plane truss: method of joints 110 plane truss: method of sections 110 plant location 424 pointers 410 polar coordinate system 36 polymer additives 104 polymers 104 pool boiling 211 population modeling 327 population projection equations 327 port scanning 415 possible cathode reactions (reduction) 94 potential energy 120
 pound-force 1 pound-mass 1 power absorbed by a resistive element 357 power and efficiency 120 power conversion 384 power screws 433 power series 50 power transmission 433 pressure sensors 224 pressure versus enthalpy curves for
 Refrigerant 134a 161 pressure versus enthalpy curves for Refrigerant 410A 165 primary bonds 94 principle of work and energy 119 principles of one-dimensional fluid flow 181 prismoid 41 probability and density functions: means and variances 84 probability
density function 65 probability functions, and expected values 65 process capability 418 product of inertia 109, 111 professional practice 4 progressions and series 50 projectile motion 118 propagation of error 68 properties for two-phase (vapor-liquid) systems 144 properties of air 311 properties of liquid 166 properties of materials 95
properties of materials: electrical 95 properties of series 50 properties of materials: mechanical 96 properties of saturated liquid and saturated vapor 162 properties of series 50 properties 50 propertie
 modulation--natural sampling 377 pulse-code modulation 377 pump power equation 192 PVT behavior 144 INDEX Q quadratic equation 35 queueing models 418 R radial and transverse components for planar motion 114 radiation: types of bodies 217 radius of gyration 109 rainfall 290 randomized
complete block design 70 random variate generation 420 Rankine cycle 172 Raoult's law for vapor-liquid equilibrium 153 rapid mix and flocculator design 343 rate-of-return 231 rate of transfer as a function of gradients at the wall 249 rational formula 290 RC and RL transients 362 real gas 146 recommended weight limit (RWL) 30 rectangular fin 209
 reduction, electrochemistry 92 reference dose (RfD) 24 Refrigerant 134a (1,1,1,2-Tetrafluoroethane) properties of liquid on bubble line and vapor on dew line 166 refrigeration and HVAC 173 refrigeration cycle 172 regular polygon 41 reinforced concrete
temperature detector (RTD) 220 resistivity 356 resistors in series and parallel 357 resolution of a force 107 resonance 362 resultant force (two dimensions) 107 retaining walls 264 reversed Carnot cycle 172 468 reverse osmosis 344 Reynolds number 182 right circular cone 42 right circular cylinder 42 rigid body motion about a fixed axis 124 rigorous
 vapor-liquid equilibrium 154 risk 231 risk assessment/toxicology 21 RMS values 360 roots 37 rotating machines 365 RSA public-key cryptosystem 416 runoff 290 S safety 13 safety and prevention 13 safety data sheet (SDS) 18 sample correlation coefficient and coefficient and coefficient of determination 70 sampled messages 376 sample size 75 sampling 225
 selected properties of air 311 selected rules of nomenclature in organic chemistry 89 selectivity, chemical reaction equilibria 155 semiconductors 98 serial, communications methodologies 407 series resonance 362 servomotors and generators 368 settling equations 339 Shannon channel capacity formula 379 shape factor (view factor, configuration
 factor) relations 217 shear 281 shearing force and bending moment sign convertions 135 shear stress-strain 130 short columns 278 Sieder-Tate equation 211 sieve conversion table 252 signal conditioning 226 signal words 19 significant figures 2 similitude 197 simplex, communication methodologies 407 simply supported beam slopes and
 deflections 140 Simpson's Rule/Parabolic Rule 62 Index INDEX simulation 375 singly-reinforced beams 275 slope failure along planar surface 265 societal considerations 12 Soderberg theory 447 software engineering 410 software process
 flows 412 software syntax guidelines 412 software testing 413 soil classification 265, 266 soil landfill cover water balance 326 solar 351 solids processing 253 solid-state electronics and devices 382 solid with sudden convection 207 solubility product 85 sorption zone 336 source equivalents 357 specific energy diagram 295 specific
gravity 177 specific gravity for a solids slurry 331 specific humidity 150 specific volume 177 specific weight 177 sphere 40 spherical particles 203 springs 431 sprinkler K factors 298 stability, determinated, and classification of structures 271 standard deviation charts 82 standard error of estimate 69 standard time determination 424 star, network
 topologies 406 state functions (properties) 143 statically determinate truss 110 static liquid 178 statics 107 statics 107 statics 107 statics 107 statics 107 statics 107 statics 108 statics 107 statics 108 statics 107 statics 108 sta
 storativity 291 straight line 35 strain gauge 222 strength design 272 stress and strain 132 469 stress-strain curve for mild steel 130 structural analysis 268 structural design 272 student's t-distribution 77 sub-cooled boiling 211 submerged orifice operating under steady-flow
            itions 186 sum of squares of random error 422 superheated water tables 158 surface tension and capillarity 178 surface water system hydrologic budget 290 sustainability 354 sweep-through concentration change in a vessel 29 switching function terminology 391 synchronous machines 366 system performance studies 227 systems of forces 107 surface water system hydrologic budget 290 sustainability 354 sweep-through concentration change in a vessel 29 switching function terminology 391 synchronous machines 366 system performance studies 227 systems of forces 107 surface water system hydrologic budget 290 sustainability 354 sweep-through concentration change in a vessel 29 switching function terminology 391 synchronous machines 366 system performance studies 227 systems of forces 107 surface water system hydrologic budget 290 sustainability 354 sweep-through concentration change in a vessel 29 switching function terminology 391 synchronous machines 366 system performance studies 267 systems of forces 107 s
T taxation 231 Taylor's series 51 Taylor tool life formula 426 t-distribution 68 temperature conversion 1 temperature sensors 220 tension members 282 terminal velocities 203 tests on means of normal distribution---variance unknown 73 tests on means of normal distribution---variance unknown 73 tests on means of normal distribution formula 426 t-distribution formula 426 t
tests on variances of normal distribution with unknown mean 74 test statistics 75 Theim equation 293 thermal and mechanical properties 104 thermal resistance (R) 205 thermistors 221 thermocouple (TC) 221 Thévenin equivalent 357 threading, computer
systems 409 three-phase transformer connection diagrams 365 threshold limit value (TLV) 23 thyristor or silicon controlled rectifier (SCR) 385 torsion 134 torsional strain 134 torsional vibration 127 toxicity 19, 22, 23 toxicology 21 trademarks 11 trade secrets 12 traffic flow relationships 304 traffic safety equations 306 Index INDEX traffic signal
timing 299 transducer 220 transformers 364 transient conduction using the lumped capacitance model 206 transmission control protocol 400 transmission algorithms 378 transmission control protocol 400 transmission algorithms 378 transmission control protocol 400 transmission control protocol 400 transmission algorithms 378 transmission control protocol 400 transmission control pr
tree traversal 411 trigonometry 37 trigonometry 37 trigonometry 37 trigonometry 37 trigonometry 38 truss deflection by unit load method 268 turbines 194 turns ratio 364 two-factor factorial designs 71 two first-order irreversible reactions in parallel 241 two-port parameters 368 two-stage cycle 173 voltage 356 voltage
regulation 368 volume flow rate of outdoor air 318 W wastes with fuel value 352 wastewater treatment and technologies 331 water resources 290 water treatment technologies 336 web vulnerability testing 415 weir formulas 296 wind 349 wind loads 274 wind
turbines 350 work 120 work sampling formulas 426 W shapes available moment vs. Tolerance, ΔD or Δd, is the difference between the maximum and minimum size limits of a part. For a two-gear train, mv = -Nin /Nout where Nin is the number of teeth on the input gear and Nout is the number of teeth on the output gear. A typical dose-response
curve is shown below. Quality management, planning, assurance, and systems (e.g., Six Sigma, OFD, TOM, house of quality, fishbone, Taguchi loss function) B. 10 10 1 PHASE LEAD \phi/R ADIANS AMPLITUDE X0 /KF0 0 \zeta = 0.0 \zeta = 
= 0.4 -3 3 ζ = 0.01 ζ = 0.05 ζ = 0.1 0 0.5 1 1.5 2 2.5 FREQUENCY ω/ω n 3 (b) Steady state vibration of a force spring-mass system (a) amplitude (b) phase. OSHA uses the term "permit-required confined spaces" (permit space) to describe a confined spaces that has one or more of the following characteristics: contains or has the potential to contain a
hazardous atmosphere: contains a material that has the potential to engulf an entrant; has walls that converge inward or floors that slope downward and taper into a smaller area that could trap or asphyxiate an entrant; or contains any other recognized safety or health hazard such as unguarded machinery, exposed live wires or heat stress.
Optionally, leading zeros in a group may be dropped in order to shorten the representation, e.g., 2001:db8:85a3:0:0:8a2e:370:7334. Diagrams reprinted by permission of William Bober and Richard A. Capacity Equipment Size range Exponent Dryer, drum, single vacuum 10 to 102 ft2 0.76 Dryer, drum, single atmospheric 0.40 10 to 102 ft2 Fan,
centrifugal 0.44 103 to 104 ft3/min Fan, centrifugal 2 × 104 to 7 × 104 ft3/min 1.17 Heat exchanger, shell and tube, fixed sheet, c.s. 0.44 100 to 400 ft2 5 to 20 hp 0.69 Motor, squirrel cage, induction, 440 volts, explosion proof 20 to 200 hp 0.99 Tray, bubble cup, c.s. 3- to 10-ft
diameter 1.20 Tray, sieve, c.s. 3- to 10-ft diameter 0.86 Motor, squirrel cage, induction, 440 volts, explosion proof Classification of Cost Estimates Class 3 10% to 40% Class 3 10% to
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 Index of 1) Preparation Effort (Relative to Lowest Cost Index of 1) 4 to 20 1 3 to 12 2 to 4 2 to 6 3 to 10 1 to 3 5 to 20 1 10 to 100 (From AACE Recommended Practice No. 17R-97 [4], AACE International, 209 Prairie Ave., Morgantown, WV; ) Whiting, Wallace B., Turton, Richard, Shaeiwitz, Joseph A., Bhattacharyya, Debangsu, and Bailie, Richard C.
Analysis, Synthesis and Design of Chemical Processes, 4th ed., Prentice Hall, 2012, p. D. The possible options that can be put in the header are as follows: Size (bits) Field Copied Description 1 Set to 1 if the options need to be copied into all fragments of a fragmented packet. 451 Mechanical Engineering HVAC Nomenclature h = specific enthalpy hf
= specific enthalpy of saturated liquid mo a = mass flowrate of dry air mo w = mass flowrate of water Qo = rate of heat transfer Twb = wet bulb temperature ω = specific humidity, humidity ratio) HVAC—Pure Heating and Cooling MOIST AIR ma 1 2 Q ω 1 2 or 2 1 Qo = mo a h2 - h1 i T 452 Mechanical Engineering Cooling and
Dehumidification Qout MOIST AIR ma 2 1 3 LIQUID OUT Qo out = mo a 9 h1 - h 2 i - h f3 ~1 - ~2 iC mw mo w = mo a ~4 - ~2 i d53 Mechanical Engineering Adiabatic
Humidification (evaporative cooling) MOIST AIR ma 1 2 WATER 3 mw \omega 2 T wb = C ON ST AN T 1 T h2 = h1 + h3 \sim 2 \sim 3 = a1 1 mo a3 mo \sim + mo a2 \sim 3 = a1 1 mo a3 mo \sim + mo a2 \sim 3 = a1 1 mo a3 T 454 ma3 Mechanical
Engineering Cycles and Processes Internal Combustion Engines Diesel Cycle P 2 3 s=C s=C 4 1 v T 3 P=C 2 r = V1 V2 rc = V3 V2 h = 1- r k-1 > k = cp cv 1 r ck - 1 H ^cold air standardh k _rc - 1 j 4 v=C 1 s Brake Power R N where F Wob = 2\piFRN Wo b T N F R = brake power (W) = torque (N•m) = rotation speed (rev/s) = force at end
of brake arm (N) = length of brake arm (M) = length of brake arm (m) 455 Mechanical Engineering Indicated Power (W) Brake Thermal Efficiency Wob nb = mo f A HV h where nb = brake thermal efficiency mo f = fuel consumption rate (kg/s) HV = heating value of fuel (J/kg) Indicated Thermal
Efficiency Wo i hi = mo f ^ HV h Mechanical Efficiency h Wo hi = ob = hb i Wi Displacement Volume B Vc Cylinder Piston S 2 Vd = rB S, m3 for each cylinder 4 Total volume (m3) = Vt = Vd + Vc Vc = clearance volume (m3) Efficiency h Wo hi = ob = hb i Wi Displacement Volume B Vc Cylinder Piston S 2 Vd = rB S, m3 for each cylinder 4 Total volume (m3) = Vt = Vd + Vc Vc = clearance volume (m3) Efficiency h Wo hi = ob = hb i Wi Displacement Volume B Vc Cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder A Total volume (m3) Efficiency h Wo hi = ob = hb i Wi Displacement Volume B Vc Cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder A Total volume (m3) Efficiency h Wo hi = ob = hb i Wi Displacement Volume B Vc Cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cylinder Piston S 2 Vd = rB S, m3 for each cy
= number of crank revolutions per power (fmep), indicated power (fmep), d. The energy loss shows up as a decrease in fluid pressure (head). A \times B = A B n \sin \theta where n = \text{unit vector perpendicular to the plane of } A
and B Gradient, Divergence, and Curl dz = c \cdot 2i + 2j + 2km = 2x \cdot 2y \cdot 2z \cdot d = V = c \cdot 2i + 2j + 2km = V \cdot 1i + V \cdot 2j + V \cdot 3k \cdot i \cdot 2x \cdot 2y \cdot 2z \cdot d = V = c \cdot 2i + 2j + 2km = V \cdot 1i + V \cdot 2j + V \cdot 3k \cdot i \cdot 2x \cdot 2y \cdot 2z \cdot d = V = c \cdot 2i + 2j + 2km = V \cdot 1i + V \cdot 2j + V \cdot 3k \cdot i \cdot 2x \cdot 2y \cdot 2z \cdot d = V = c \cdot 2i + 2j + 2km = V \cdot 1i + V \cdot 2j + V \cdot 3k \cdot i \cdot 2x \cdot 2y \cdot 2z \cdot d = V \cdot 2km = V \cdot 2km
i•i=j•j=k•k=1 i•j=j•k=k•i=0 If A•B=0, or A is perpendicular to B. unbraced length 286 W shapes dimensions and properties 284 X Y yield 155 yielding 281 U Z ultimate bearing capacity 264 ultrafiltration 345 uniaxial loading and deformation 131 uniaxial stress-strain 130 unified design provisions 277 Unified Soil
Classification System 267 unit hydrograph 291 unit normal distribution 76 units in FE exam 1 unsaturated acyclic hydrocarbons 89 user datagram protocol 402 z-transforms 370 V Vadose zone penetration 323 vaporized liquids 29 vapor-liquid equilibrium (VLE) 153, 246 variable loading failure theories 447 variances 309 vectors 59 vectors: gradient,
divergence, and curl 59 vectors: identities 60 velocity pressure exposure coefficient 274 Venturi meters 196 vertical curve formulas 308 verti
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       ..476 Electrical and Computer....
                                                                                                                                                                                                                                                                                                                                                                                                                                                     .485 Mechanical.
                                                                                                                                                                                                                     .482 Industrial and Systems.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   .488 Other
Environmenta
                                                                                                                                                                                                     ..492 471 Fundamentals of Engineering (FE) CHEMICAL CBT Exam Specifications Effective Beginning with the July 2020 Examinations • The FE exam is a computer-based test (CBT). Risk Assessment Guidance for Superfund. In IPv6 only the source port field is
Disciplines.
optional. Normality of Solutions - The product of the molarity of a solution and the number of valence changes taking place in a reaction. 49 Thermodynamics Upper limit of COP is based on reversed Carnot Cycle: COPc = TL /(TH - TL) for heat pumps and COPc = TL /(TH - TL) for refrigeration. # sin x dx = - cos x 11. Holbrow, J. e. Analytical
chemistry (e.g., wet chemistry and instrumental chemistry) D. Visit the root node. 152 Thermodynamics Combustion Processes First, the combustion equation should be written and balanced. Any fraud or deceit in obtaining or attempting to obtain or renew a certificate of authorization 2. Use an inflation adjusted interest rate per interest period d for
computing present worth values P. Concurrent force systems C. Henry Rushton, 1952, v. 345 Environmental Engineering Typical Removal Credits and Inactivation Requirements for Various Treatment Technologies Process Conventional Technologies Process Conventio
Giardia Viruses 0.5 2.0 2.5 2.0 Direct Filtration 2.0 1.0 1.0 3.0 Slow Sand Filtration 2.0 1.0 1.0 3.0 Slow Sand Filtration 2.0 1.0 1.0 3.0 Filtration 2.0 1.0 1.0 3.0 Slow Sand Filtration 2.0 Slow Sand Filtrat
32.174 ft/sec2. Identification This field is an identification field and is primarily used for uniquely identifying the group of fragments of a single IP datagram. For direct central impact with no external forces m1v1 + m2v2 = m1v11 + m2v12 where m1, m2 = masses of the two bodies v1, v2 = velocities of the bodies just before impact v l1, v l2 =
velocities of the bodies just after impact For impacts, the relative velocity expression is e = where vl2 in e = vl2 
limiting values e = 1, perfectly elastic (energy conserved) e = 0, perfectly plastic (no rebound) Knowing the value of e = 0, perfectly plastic (no rebound) Knowing the value of e = 0, perfectly plastic (no rebound) Knowing the value of e = 0, perfectly plastic (energy conserved) e = 0, perfectly plastic (energy conserved) e = 0, perfectly plastic (no rebound) Knowing the value of e = 0, perfectly plastic (energy conserved) e = 0, perfectly 
diagrams of pure components and mixtures (e.g., steam tables, psychrometric charts, T-s, P-h, x-y, T-x-y) C. This is also expressed as: the curvature of a curve at a given point is the rate-of-change of its inclination with respect to its arc length. It has the following format: Offsets Octet Octet Bit 0 0 4 32 8 64 12 96 16 128 20 160 24 192 28 224 32 256
36 288 0 0 1 2 3 1 4 Version 5 6 7 8 9 10 11 2 12 13 14 15 16 17 18 19 3 20 21 22 23 24 25 26 27 28 29 30 31 Flow Label Traffic Class Payload Length Next Header Hop Limit Source Address Destination Address Version (4 bits) The constant 6 (bit sequence 0110). Using the same basic formula with only minor substitutions, safety managers can
calculate the following types of incidence rates: 1. k t P2 T ^{\circ} k - 1h d 2n = d t2 n P1 = T1 1 k The stagnation temperature, T0, at a point in the flow is related to the static temperature as follows: 2 T0 = T + V 2: cp Energy relation between two points: V2 V2 h1 + 21 = h2 + 22 Vennard, J.K., Elementary Fluid Mechanics, 6th ed., J.K. Vennard, 1954
This number is a key design parameter. Worker Deaths by Electrocution; A Summary of NIOSH Surveillance and Investigative Findings, U.S. Health and Human Services, (NIOSH), 1998. Codes of ethics (e.g., NCEES Model Law, professional and technical societies, ethical and legal considerations) B. A power series, which is convergent in the interval
 -R < x < R, defines a function of x that is continuous for all values of x within the interval. Societal impacts (e.g., economic, sustainability, life-cycle analysis, environmental, public safety) 5-8 492 8-12 6. Professional Surveyor (Professional Surveyor, Professional Surveyor and Mapper,
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Geomatics Professional, or equivalent term); See Model Law. Licensees shall undertake assignments only when qualified by education or experience in the specific technical fields of engineering or surveying involved. Corresponds to a fall afternoon, or a cloudy summer day, or clear summer day with the sun 15-35°. Internal flow E. Limited Use in Vacuum or Reducing. 50 Mathematics Taylor's Series h 2 n f l a h f m a h f n a h

Hardness: Resistance to penetration. Nodal Processing Delay – It takes time to examine the packet's header and determine where to direct the packet to its destination. 9 Ethics and Professional Practice D. Power screws H. At constant pressure the amount of heat (Q) required to increase the temperature of something by ΔT is $Cp\Delta T$, where Cp is the constant pressure heat capacity. The number of different permutations of n distinct objects taken r at a time is n! P ^n, r h = ^n - rh! nPr is an alternative notation for P(n,r) 2. Expenses do not include capital items, which should be depreciated. A constant of integration should be added to the integrals. Mass balance and loading rates (e.g., removal efficiencies) C. Measuring devices (e.g., voltmeter, ammeter, wattmeter) E. 15. Principles and tools (e.g., planning, organizational structure) B. Phase relations C. The figure above shows how W/C expressed as a ratio of weight of water and cement by weight of concrete mix affects the compressive strength of both air-entrained concrete. 200 250 300 350 400 500 600 700 800 900 1000 1100 1200 1300 0.2404 0.2608 0.2931 0.3241 0.3544 0.3843 0.4433 0.5018 0.5601 0.6181 0.6761 0.7340 0.7919 0.8497 0.9076 Superheated Water Tables u h kJ/kg kJ/kg p = 0.01 MPa (45.81oC) s kJ/(kg·K) v m3/kg 2437.9 2443.9 2515.5 2587.9 2661.3 2736.0 2812.1 2968.9 3132.3 3302.5 3479.6 3663.8 3855.0 4053.0 4257.5 4467.9 4683.7 2584.7 2592.6 2687.5 2783.0 2879.5 2977.3 3076.5 3279.6 3489.1 3705.4 3928.7 4159.0 4396.4 4640.6 4891.2 5147.8 5409.7 8.1502 8.1749 8.4479 8.6882 8.9038 9.1002 9.2813 9.6077 9.8978 10.1608 10.4028 10.6281 10.8396 11.0393 11.2287 11.4091 11.5811 2506.1 2506.7 2582.8 2658.1 2733.7 2810.4 2967.9 3131.6 3301.9 3479.2 3663.5 3854.8 4052.8 4257.3 4467.7 4683.5 2675.5 2676.2 2776.4 2875.3 2974.3 3074.3 3074.3 3278.2 3488.1 3704.4 3928.2 4158.6 4396.1 4640.3 4891.0 5147.6 5409.5 7.3594 7.3614 7.6134 7.8343 8.0333 8.2158 8.5435 8.8342 9.0976 9.3398 9.5652 9.7767 9.9764 10.1659

Kenyon, Fluid Mechanics, Wiley, 1980. Flammability Flammable describes any solid, liquid, vapor, or gas that will ignite easily and burn rapidly. If σ1 ≥ σ2 ≥ σ3, then the theory predicts that failure occurs whenever σ1 ≥ Sut or σ3 ≤ - Suc where Sut and Suc are the tensile and compressive strengths, respectively. Helmholtz Free Energy, ΔA Energy

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= -3 The Fourier Transform and its Inverse + X fi = #-3 x ^t h e-j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e j2rft dt 3 + x ^t h = #-3 X fi e 
 1 \text{ a} + \text{j} 2\text{rf te at u} \wedge \text{th 2a 2 a} + \text{2rf i} - \text{at - e e 2a 2 a} + \text{2rf i} \times (-\text{f}) \times (\text{f - f0}) 
d \sin 2rf + i j 19 j = -j - -j = +3 x = -3 t for d f = 
  rt i rt 1 P ti = *1, t # 2 0, otherwise K ti = (1 - t, t # 1 0, otherwise sinc ti = 55 n (j 2πf) n X (f) 1 X(f) j 2πf 1 + X (0)δ (f) 2 Mathematics Laplace Transforms The unilateral Laplace Transforms The unila
                             response of linear time invariant systems. U.S. patent grants are effective only within the United States, U.S. territories, and U.S. possessions. Power theory (e.g., power factor, single and three phase, voltage regulation) B. Learning curves 7-11 486 12. Angles, distances, and trigonometry B. The UFL is also referred to as the upper
 explosive limit (UEL). The formula for d is d = i + f + (i × f) Depreciation Straight Line Dj = C - Sn n Modified Accelerated Cost Recovery System (MACRS) Dj = (factor) C A table of MACRS factors is provided below. As part of his/her responsibility to the public, an engineer is responsible for knowing and abiding by the code. 10.0.0.0/8 10.0.0.0-
10.255.255.255 16777216 Private network Used for local communications within a private network. These organic vapors and dusts may also be explosive. Material Steel Aluminum Copper Gray cast iron A 0.78715 0.79670 0.79568 0.77871 b 0.62873 0.63816 0.63553 0.61616 The approximate tightening torque required for a given preload Fi and for
a steel bolt in a steel member is given by T = 0.2 Fid. Algorithms (e.g., sorting, searching, complexity, big-O) B. Still dangerous under certain conditions. Four out of five successive points fall on the same side of and more than one sigma unit from the center line. max-retries: Caps number of port scan probe retransmissions. Ferric chloride FeCl3 +
 PO43- \rightarrow FePO4(\downarrow) + 3 Cl- 2. Patents A patent for an invention is the grant of a property right to the inventor, issued by the United States Patent and Trademark Office. i31, 2=2 arctan d where E ! E 2 - 4DF n 2D D = \cos \theta 2 - K1 + K4 \cos \theta 2 + K5 E=-2\sin \theta 2 F=K1+(K4-1)\cos \theta 2 + K5 E=-2\sin \theta 2 E=-2\sin
 63, using the minus sign in front of the radical yields the open solution. of Hg in. Reactors C. Payload Length (16 bits) The size of the payload in octets, including any extension headers. 85 Chemistry and Biology Nernst Equation + where Mn RT DE = `E 20 - E10 j - nF ln > 1n + H M2 E10 = half-cell potential (volts) R = ideal gas constant (J/kmol•K)
 [Note: 1J = (1 \text{ volt})(1 \text{ coulomb})] n = number of electrons participating in either half-cell reaction (dimensionless) T = absolute temperature (K) + + M1n and M 2n = molar ion concentration (mol/L of solution) Acids, Bases, and pH (aqueous solutions) pH = log10 f where 1 p 7H +A [H+] = molar concentration of hydrogen ion, in gram moles per liter.
Spiral, rake or drag mechanism lifts sands from pool. COMBUSTIBLE CONCENTRATION SATURATED VAPORAIR MIXTURES MIST UPPER LIMIT FLAMMABLE MIXTURES B A TL AUTOIGNITION LOWER LIMIT AIT Tu TEMPERATURE The SFPE Handbook of Fire Protection Engineering, 1st ed., Society of Fire Protection Association, 1988.
dA = f^x dA = g y i dy The first moment of area with respect to the y-axis, and the x-axis, respectively, are: dA = g y i dy The first moment of inertia I of an area about a point is equal to the sum of the moments of the moment of area, is defined as dA = g y i dy The first moment of inertia I of an area about a point is equal to the sum of the moments of area.
 inertia of the area about any two perpendicular axes in the area and passing through the same point. Performance curves I. 0 0 0 0 0 s.p oo 60 90 80 90 70 600 650 0.0030 ??3?/kg 0.0040 m = e m lu o v 0.0060 0.0080 0.010 50 40 20 10 -40 0.02 -60 0.01 0.8 0.65 0.70 0.75 0.80 0.85 0.90 0.95 1.00 1.05 1.10 1.15 1.20 1.25 1.30 1.35 1.40 1.45 1.50 1.55
 1.60\ 1.65\ 1.70\ 1.75\ 1.80\ 1.85\ 1.90\ 1.95\ 2.00\ 2.05\ 2.1\ 0.70\ 0.6\ 0.5\ 0.3\ QU\ ALI\ TY = 0.4\ 0.04\ -30\ 0.9\ satura\ ted\ va\ por\ -20\ -10\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1.00\ 1
2.5 220 °C TEMPERATURE = 220 5 230 240 id 0.2 ura t 0.1 ed liqu sat 0.1 0.08 0.06 -20 100 150 200 250 300 40. A moment M is defined as the cross product of the force. Public protection issues (e.g., licensing boards) C. Thermal (e.g., conductivity, expansion) 6. d 2 z = d : ^dzh
= 1d: dg z d \# dz = 0 d: \land d \# Ah = 0 d \# d 
 = cost per unit flow from i to j uij = capacity of arc (i, j) bi = net flow generated at node i We wish to minimize the total cost of sending the available supply through the network to satisfy the given demand. Estimation, confidence intervals, and hypothesis testing (e.g., normal, t, chi-square, types of error, sample size) D. Register or log in to MyNCEES
to download your free copy of the FE Reference Handbook. 399 Electrical and Computer Engineering Destination Address (128 bits) The IPv6 address of the destination node(s). Plant Location The following is one formulation of a discrete plant location problem. Mass and energy balances B. 70 20 70 3' 5' B 7 3/4" 7' 72 70 50 11' C 6 3/4" 60 40 10 P
3H TOTAL DYNAMIC HEAD 60 15 1750 RPM NOTE: NOT RECOMMENDED FOR OPERATION BEYOND PRINTED H-Q CURVE. Water Resources and Environmental Engineering A. SSB signals can be demodulated with a synchronous demodulator or by carrier reinsertion and envelope detection. Zone at MMC (4.8) 0.1 M A B M Location A B 0.5 Tol.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               .85 Materials Science/Structure of
  Matter.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   .471 v Units and Conversion Factors Distinguishing pound-force from pound-mass The FE exam and this handbook use both the metric system of units and the
conic section equation, if that conic section has a principal axis parallel to a coordinate axis. The approach is a necessary part of software testing at the unit, integration and system levels, needed to uncover errors or problems, but does not detect unimplemented parts of the specification or missing requirements. Computer Networks A. dx/dx = 13.
Tg TEMPERATURE Tm The above curve shows the temperature dependent strength (σ) or modulus (E) for a thermoplastic polymer. Inverse Transform Method If X is a continuous random variable with cumulative distribution function F(x), and Ui is a random number between 0 and 1, then the value of Xi corresponding to Ui can be calculated by
solving Ui = F(xi) for xi. An example is Voice over IP (VoIP), which is used for interactive voice services. Exergy (Availability) Exergy (also known as availability) is the maximum possible work that can be obtained from a cycle of a heat engine. Phase Relations Clapeyron Equation for phase transitions: h s c dP m = fg = fg v Tv dT sat fg fg where hfg:
enthalpy change for phase transitions vfg = volume change sfg = entropy change T = absolute temperature (dP/dT)sat = slope of phase transition (e.g., vapor-liquid) saturation line Clausius-Clapeyron Equation This equation results if it is assumed that (1) the volume change (vfg) can be replaced with the vapor volume (vg), (2) the latter can be replaced with the vapor volume (vg), (2) the latter can be replaced with the vapor volume (vg), (3) the latter can be replaced with the vapor volume (vg), (4) the latter can be replaced with the vapor volume (vg), (5) the latter can be replaced with the vapor volume (vg), (6) the latter can be replaced with the vapor volume (vg), (7) the latter can be replaced with the vapor volume (vg), (8) the latter can be replaced with the vapor volume (vg), (9) the latter can be replaced with the vapor volume (vg), (1) the latter can be replaced with the vapor volume (vg), (1) the latter can be replaced with the vapor volume (vg), (1) the value (vg), (2) the latter can be replaced with the vapor volume (vg), (2) the latter can be replaced with the vapor volume (vg), (3) the latter can be replaced with the vapor volume (vg), (4) the value (v
 replaced with PRT from the ideal gas law, and (3) hfg is independent of the temperature (T). Fatigue life is the number of cycles to failure. Rule #1 only applies to each circular element. Mix design of concrete and asphalt B. Project management (e.g., WBS, scheduling, PERT, CPM, earned value, agile) C. 303 Civil Engineering V vp = PHF # N # 1
                                                     = demand flowrate under equivalent base conditions (pc/h/ln) V = demand volume under prevailing conditions (veh/h) PHF = peak-hour factor for presence of heavy vehicles in traffic stream, calculated with 1 fHV = 1 + PT ET - 1 i fHV = heavy-vehicle
  adjustment factor PT = proportion of single unit trucks and tractor trailers in traffic stream ET = passenger-car equivalent (PCE) of single unit truck or tractor trailer in traffic stream PCE by Type of Terrain where Vehicle Level Rolling ET 2.0 3.0 vp D= S D = density(pc/mi/ln) vp = demand flow rate (pc/h/ln) S = mean speed of traffic stream under
 base conditions (mph) Traffic Flow Relationships Greenshields Model Sf SPEED (mph) SPEED (
 of Highways and Streets, 6th ed., 2011. Dimension of Heater, L 0.149 Width or diameter 18.9 K1 Width or diameter 0.12 Radius 0.12 L*-0.25 Radius 0.12 L*-0.25 Radius 0.12 Cr Range of L* L*> 1.2 U.15 < L*< 1.2 L*< 1.2
 Approach, 3rd ed., New York: McGraw-Hill, 2007. Internal testing—The pen tester has access to the application behind the firewall. Just as with single-processor systems, cores in multicore systems may implement architectures such as superscalar, VLIW, vector processing, SIMD, or multithreading. Runoff calculations (e.g., land use, land cover, time
 of concentration, duration, intensity, frequency, runoff control, runoff management) B. Sustainable approaches during planning, design, and construction or manufacture will carry forward throughout a project's or product's operation and maintenance to end-of-life. Then 2 f ^ xh = 1 e- x/2, where - 3 # x # 3. Solid waste management (e.g., collection
transportation, storage, composting, recycling, waste to energy) C. Given a, b, c, and d, \theta2, \theta3, \theta4, and \omega2 \sim3 = \sim4 = a\sim2 sin i3, VBAy = b\sim3 cos i3 VBx = - c\sim4 sin i4, VBy = c\sim4 cos i4 Acceleration Analysis. Matrix Transpose Rows become
columns. Industrial hygiene (e.g., carcinogens, toxicology, exposure limits, radiation exposure, biohazards, half-life) B. 378 Electrical and Computer Engineering Shannon Channel Capacity in Hz (bits/sec) BW = bandwidth in Hz (bits/sec) S = power of the signal at the receiving device (watts)
N = noise power at the receiving device (watts) S N = Signal to Noise Ratio Analog Filter Circuits Analog Filters are used to separate signals with different frequency content. Design of steel components (e.g., codes and design philosophies, beams, columns, tension members, connections) H. Population projections and demand calculations (e.g.,
 water, wastewater, solid waste, energy) B. [[[FIFPFIFVFIFGFIFEFIFT]]]] = p = p = p = p[[[FIFPFIFVFIFGFIFEFIFT]]]] = m = m[[[FIFPFIFVFIFGFIFEFIFT]]]] = m = m[[FIFPFIFVFIFGFIFEFIFT]]]] = m = m[[FIFPFIFVFIFEFIFT]]]] = m = m[[FIFPFIFVFIFGFIFEFIFT]]]] = m = m[[FIFPFIFVFIFEFIFT]]]] = m = m[[FIFPFIFVFIFEFIFT]]]] = m = m[[FIFPFIFVFIFEFIFT]]]] = m = m[[FIFPFIFVFIFEFIFT]]] = m = m[[FIFPFIFVFIFEFIFT]]]
\sigma = \text{Ca p} = \text{Ca m m} = \text{We p} = \text{We m m} Fluid Mechanics where the subscripts p and m stand for prototype and model respectively, and FI = inertia force FV = viscous force FC = gravity force FE = elastic force FV = viscous force FO = gravity force FC =
 characteristic length v = velocity \rho = density \sigma = surface tension \rho = density \rho = density
the airfoil as seen from above (plan area). Estimated average trend curves for net hearing loss at 1,000, 2,000, and 4,000 Hz after continuous exposure to steady noise. Often one of the inputs is zero, which is achieved by grounding either the sun or the ring gear. Routing (e.g., channel, reservoir) D. d(eu)/dx = eu du/dx 15. Steady-state mass balance
B. 377 Electrical and Computer Engineering Delays in Computer Networks Transmission link: where dtrans = L/R L = packet size (bits/packet) R = rate of transmission (bits/sec) Propagation Delay - The time taken for a bit to travel from one end of the link to the other:
  where dprop = d/s d = distance or length of the link s = propagation speed The propagation speed is usually somewhere between the speed of light c and 2/3 c. Bottom slope is less than 8% Settling Equations General Spherical vt = 4g \tau t p - tf j d 3CD t f where CD = drag coefficient = 24/Re (Laminar; Re \le 1.0) = 24/Re + 3/(Re1/2) + 0.34
(Transitional) = 0.4 (Turbulent; Re \geq 104) v td Re = Reynolds number = tn g = gravitational constant \rho p = density of fluid d = diameter of sphere \mu = bulk viscosity vt = terminal settling velocity Stokes' Law vt = where g \(^t p - t f \) d 2 g t f \(^s S.G. - 1 \) j d 2 = 18n 18n Approach velocity = horizontal
  velocity = Q/Ax Hydraulic loading rate = Q/A Hydraulic residence time = V/Q = \theta Q = flowrate Ax = cross-sectional area A = surface area, plan view V = tank volume \rhof = fluid mass density S.G. = specific gravity 339 Environmental Engineering Filtration Equations Filter bay length-to-width ratio = 1.2:1 to 1.5:1 Effective size = d10 Uniformity
 coefficient = d60 /d10 dx = diameter of particle class for which x% of sample is less than (m or ft) Filter equations can be used with any consistent set of units. The fields in the header are packed with the most significant byte first (MSB 0 bit
numbering). Assuming no friction losses and that no pump or turbine exists between sections 1 and 2 in the system, 2 2 P 2 v2 P1 v1 + + = + g z 2 \rho Q 2 + z1 g where P1, P2 = pressure at sections 1 and 2 v1, v2 = average velocity of the fluid at the sections z1, z2 = vertical distance from a datum to the
 sections (the potential energy) γ = specific weight of the fluid (ρg) = acceleration (i.e., temporal acceleration) in the x-direction, the change in pressure between two points in a fluid can be determined by Euler's equation: where
  ^{\circ} P2 + c : z2 j - ^{\circ} P1 + c : z1 j = - Dx : t : ax P1, P2 = pressure at Locations 1 and 2 γ = specific weight of the fluid (\rhog) z1, z2 = elevation at Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration of fluid in the x-direction \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration of fluid in the x-direction \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration of fluid in the x-direction \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration of fluid in the x-direction \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration of fluid in the x-direction \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 1 and 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 2 \rho = fluid density ax = local (temporal) acceleration \Deltax = distance between Locations 2 \rho = fluid density ax = local (temporal) acceleration \Delta = local (temporal) acceleration \Deltax = distance between Local (temporal) acceleration \Deltax = local
 ed., New York: John Wiley and Sons, 1980, p. 25. Junction at 32°F el lum. A vs nst an tan Ch rom el n nta Con vs. The most important photosynthesis reaction is summarized as follows. Used as a refinement of size, the profile tolerance must be contained within the size limits. If not used, it should be zero. Cullen, C., Matrices and Linear
                                                 COXICANT 100 50 10 LD 10 LD 50 LOGARITHM OF LD50 DOSE LC50 Median lethal concentration in air that, based on laboratory tests, is expected to kill 50% of a group of test animals when administered as a single exposure over 1 or 4 hours. M = 1 \, \text{C} = 
  +4h\ 2\ 12\ I\ xc = I\ z\ c\ rx2c = rz2c = 3R12\ + 3R22\ + h\ 2\ 12\ (3R12\ ) + 3R22\ + h\ 2\ R22\ + h\ 2\ R22\ + R22\ 2 = M\ 12\ I\ yc = I\ y = M\ R2\ 5\ rz2c = rz2c = 2\ R2\ 5\ I\ yc = I\ y = 2\ MR\ 2\ 5\ ry2c = ry2\ = 2\ R2\ 5\ I\ yc = I\ y = 2\ MR\ 2\ 5\ rz2c = rz2c = rz2c = 2\ R2\ 5\ I\ yc = I\ y = 2\ MR\ 2\ 5\ ry2c = ry2\ rz2c = rz2c = 2\ R2\ 5\ I\ yc = I\ y = 2\ R2\ 5\ I\ yc = I\ y = 2\ MR\ 2\ 5\ rz2c = rz2c = rz2c = rz2c = rz2c = rx2c =
 2 R 2 5 Housner, George W., and Donald E. Static friction H. The PDF version of the FE Reference Handbook that you use on exam day will be very similar to the printed version. Confined space entry and ventilation rates F. n 2 3 4 5 6 7 8 9 10 c4 0.7979 0.8862 0.9213 0.9400 0.9515 0.9594 0.9650 0.9693 0.9727 d2 1.128 1.693 2.059 2.326 2.534
2.704\ 2.847\ 2.970\ 3.078\ d3\ 0.853\ 0.888\ 0.880\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.833\ 0.864\ 0.848\ 0.864\ 0.848\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.864\ 0.8
 unit step input to a normalized underdamped second-order control system, the time required to reach a peak value to another to reach a peak walue to a normalized underdamped second-order control system, the time required to reach a peak value to another to reach a peak walue to another to reach a peak walue to another to reach a peak walue to reach a peak walue to another to reach a peak walue to reach a peak walue
 underdamped second-order system, the logarithmic decrement is 1 1n d xk n = d = m xk + m 2rg 1 - g2 where xk and xk + m, respectively. The primary purpose of the network is to exchange messages between endpoints of the network called hosts or nodes, typically computers, servers, or
  handheld devices. Deering, eds., RFC 1884--IP Version 6 Addressing Architecture, 1995, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, RFC 791--Internet Protocol, 1981, as found on on October 16, 2019; and Information Science Institute, University of Southern California, Information Info
decimal numbers separated by dots, e.g., 192.268.1.1. IPv6 addresses are 128 bits and are represented by eight groups of 4 hexadecimal digits separated by colons. Manufacturing, Service, and Other Production Systems A. Interfacing 5-8 17. Ferrous metals D. When the transmitted frame is received, the receiver is required to transmit an ACK for
 each received frame before an additional frame can be transmitted. These are all subject to errors and are often unreliable. Write Policy - With caches, multiple copies of a memory block may exist in the system (e.g., a copy in the cache and a copy in main memory). (variable bits, N is either 10, 18, 26, or 34)- Selective ACKnowledgement (SACK)
These first two bytes are followed by a list of 1-4 blocks being selectively acknowledged, specified as 32-bit begin/end pointers. SR Flip-Flop J Q CLK Q KQn+1 D Qn+1 D Q
  (99.9%) 4-log (99.99%) 2-log (99%) Treatment Removal and/or inactivation Removal and/or inactivation Removal Guidance Manual LT1ESWTR Disinfection Agency, 2003. 80. Vector analysis B. D 5 3/4" 30 P 2H 0 0 20 40 60 80 10 100 20 CAPACITY HP HP 3/4 5 10 /2 11 P 1H 20 120 140 30
 liquid. Discrete mathematics D. Impact During an impact, momentum is conserved while energy may or may not be conserved. The lengths of links 2, 3, 4, and 1 are a, b, c, and d, respectively. Its sense is such that its moment is in the same direction (CW or CCW) as M. Algebra (e.g., fundamentals, matrix algebra, systems of equations) F. 6: Enable
 IPv6 scanning A: Enable OS detection, version detection, script scanning, and traceroute V: Print version number h: Print this help summary page. If n is greater than 1, the value of a determinant of order n is the sum of the n products formed by multiplying each element of some specified row (or column) by its cofactor. H)1 = \Sigma(syst. This allows a
 Acutely Lethal Doses Actual Ranking No. LD 50 (mg/kg) Toxic Chemical 1 15,000 PCBs 2 10,000 Alcohol (ethanol) 3 4,000 Table salt—sodium chloride 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a sedative 8 142 Tylenol (acetaminophen) 9 2 Strychnine—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Ferrous sulfate—an iron supplement 5 1,375 Malathion—pesticide 6 900 Morphine 7 150 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Phenobarbital—a rat poison 10 1 Nicotine 4 1,500 Phenobarbital Phenobarbi
11 0.5 Curare—an arrow poison 12 0.001 2,3,7,8-TCDD (dioxin) 13 0.00001 Botulinum toxin (food poison) Republished with permission of John Wiley and S.M. Roberts, 2 ed, 2000; permission conveyed through Copyright Clearance Center
 Inc. Selected Chemical Interaction Effects Effect Relative toxicity (hypothetical) Example Additive 2+3=5 Organophosphate pesticides Synergistic 2 + 3 = 20 Cigarette smoking + asbestos Antagonistic 6+6=8 Toluene + benzene or caffeine + alcohol Republished with permission of John Wiley and Sons, from Principles of Toxicology: Environmental
and Industrial Applications, Williams, P.L., R.C. James, and S.M. Roberts, 2 ed, 2000; permission conveyed through Copyright Clearance Center, Inc. 22 Safety Exposure Limits for Selected Compounds N Allowable Workplace Chemical (use) Exposure Level (mg/m3) 1 0.1 Iodine 2 5 Aspirin 3 10 4 55 5 188 Perchloroethylene (dry-cleaning fluid) 6 170
Toluene (organic solvent) 7 269 Trichloroethylene (solvent/degreaser) 8 590 Tetrahydrofuran (organic solvent) 1,510 Trichloroethane (solvent/degreaser) 1,510 Trichloroethane (solvent/degreaser) 8 590 Tetrahydrofuran (organic solvent) 1,510 Trichloroethane (solvent/degreaser) 8 590 Tetrahydrofuran (organic solvent) 1,510 Trichloroethane (solvent/degreaser) 1,510 Trichloroethane (solvent/degreaser
 151.1 \ 121.1 \ / \ 132.3 \ 93.6 \ / \ 100.0 \ 64.3 \ / \ 69.8 \ 78.6 \ / \ 84.2 \ 67.5 \ / \ 72.6 \ 49.2 \ / \ 52.7 \ 18.1 \ / \ 19.0 \ 45.2 \ / \ 49.3 \ 35.5 \ / \ 39.2 \ 10.6 \ / \ 173.6 \ 148.9 \ / \ 162.4 \ 131.1 \ / \ 142.8 \ 101.2 \ / \ 109.9 \ 70.2 \ / \ 75.4 \ 85.0 \ / \ 90.6 \ 73.3 \ / \ 78.6 \ 55.7 \ / \ 59.4 \ 23.3 \ / \ 24.3 \ 49.8 \ / \ 54.3 \ 39.8 \ / \ 44.2 \ 13.7 \ / \ 14.4 \ 171.3 \ / \ 184.4 \ 159.3 \ / \ 172.7 \ 141.9 \ / \ 152.4 \ 108.8 \ / \ 119.0 \ 75.9 \ / \ 80.4 \ 90.7 \ / \ 90.7 \ 78.5 \ / \ 90.8 \ 78.6 \ 79.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 90.8 \ / \ 
 Continuous-Stirred Tank Reactors in Series With a first-order reaction A \rightarrow R, no change in volume. No. of moles of fuel = A/F id M air n fuel Stoichiometric (theoretical) air-fuel ratio is the air-fuel ratio calculated from the stoichiometric combustion
 equation. Stress and strain caused by shear G. These are different from the software construct with no CPU-level representation. RS-232 and RS-485 are common interfaces of this type. Kenyon. DC circuit analysis (e.g., Kirchhoff's laws, Ohm's law, series, parallel) C. Hop Limit (8 bits) Replaces the time to live field of
IPv4. An edge of form (a, a) is called a loop. Used for primary dewatering where the separations involve large feed volumes, and underflow drainage is not critical. Does not control straightness or taper. Q. INLET COMPRESSOR EXIT For an adiabatic compressor with ΔPE = 0 and negligible ΔKE: Wocomp =-mo he - hi i For an ideal gas with
constant specific heats: Wocomp =-mc o p Te - Ti i Per unit mass: wcomp =-cp Te - Ti i Per unit mass ws = isentropic compressor work per unit mass ws = isentropic exit temperature For a compressor where ΔKE is included: V2 – V2 Wocomp
= -mo d he - hi + e 2 i n V 2 - Vi2 n = -mo d cp _Te - Ti j + e 2 Adiabatic Compression Wo comp = where 1-1 k mo Pi k > d Pe n ^ k - 1h ti hc Pi - 1H Wo comp = fluid or gas power (W) Pi = inlet or suction pressure (N/m2) Pe = exit or discharge pressure (N/m2) k = ratio of specific heats = cp/cv \rhoi = inlet gas density (kg/m3) \etac = isentropic
compressor efficiency 193 Win Fluid Mechanics Isothermal Compression RTi P Wo comp = ln e (mo) Mhc Pi where Wo comp, Pi, Pe, and ηc as defined for adiabatic compression R = universal gas constant Ti = inlet temperature of gas (kg/kmol) Blowers WRT P 0.283 - 1G Pw = Cne1 = d P2 n 1 where C = 29.7
efficiency (usually 0.70 < e < 0.90) Metcalf and Eddy, Wastewater Engineering: Treatment, Disposal, and Reuse, 3rd ed., McGraw-Hill, 1991. Law of Compound or Joint Probability If neither P(A) nor P(B) is zero, P(A, B) = P(A)P(B | A) = P(B)P(A | B) where P(B | B
probability that A occurs given the fact that B has occurred If either P(A) or P(B) is zero, then P(A, B) = 0. Formerly used for IPv6 to IPv4 relay (included IPv6 address block 2002::/16). Analog filters C. In addition, NCEES will periodically revise and update the Handbook, and each FE exam will be administered using the updated version. Usually
measured by strain rate. Common network topologies to interconnect cores include bus, ring, two-dimensional mesh, and crossbar. The voltage gain of an ideal switching dc-dc converter: 1 - D For an n-pulse rectifier with a line-to-line RMS input voltage
of Vrms and no output filter, the average output voltage is n 2 r Vdc = Vrms # r sin n For a three-phase voltage of Vdc and sine-triangle pulsewidth modulation with a peak modulation with an input voltage is n 2 r Vdc = Vrms # r sin n For a three-phase voltage of Vdc and sine-triangle pulsewidth modulation with a peak m
harmonic injection 0 \le m \le 1.15. Zone Concentricity Datum A A 10\pm 0.2 5\pm 0.2 0.1 A 0.1 Tol. Network models (e.g., OSI, TCP/IP) E. Functional analysis and configuration management C. 383 Electrical and Computer Engineering i Normalized collector current, IC Linear region 1.0 iC1 I iC2 I 0.8 0.6 x 0.4 0.2 0 -10 -8 6 8 10 vB1 - vB2 Normalized collector current, IC Linear region 1.0 iC1 I iC2 I 0.8 0.6 x 0.4 0.2 0 -10 -8 6 8 10 vB1 - vB2 Normalized collector current, IC Linear region 1.0 iC1 I iC2 I 0.8 0.6 x 0.4 0.2 0 0.6 x 0.4 0.2 0 0.6 x 0.4 0.2 0 0.6 x 0.4 x 0.4 0.6 x 0.4 
differential input voltage, VT -6 -4 -2 0 2 4 Transfer characteristics of the BJT differential amplifier with α ≅ 1 Sedra, Adel, and Kenneth Smith, Microelectronic Circuits, 3rd ed., ©1991, p. 22 v h f = e vB o t 340 Environmental Engineering where Lf = depth of fluidized filter media (m) Q vB = backwash velocity (m/s) = A B plan QB = backwash
flowrate vt = terminal setting velocity \eta f = \mu 0 H1: \mu \neq \mu 0 | Z0| > Z\alpha /2 H0: \mu = \mu 0 H1: \mu \neq \mu 0 | Z0| > Z\alpha /2 H0: \mu = \mu 0 H1: \mu \neq \mu 0 Z0 = X - \mu 0 Z0 = X - \mu 0 Z0 < -Z \alpha n \sigma H0: \mu = \mu 0 H1: \mu \neq 
H1: \mu > \mu 0 Z0 > Z \alpha H0: \mu 1 - \mu 2 = \gamma H1: \mu
maximum-shear-stress theory states that yielding begins when the maximum shear stress in a tension-test specimen of the same material when that specimen begins to yield. l = a + (n - 1)d S = n(a + 1)/2 = n [2a + (n - 1)d]/2 Geometric Progression To determine whether a given finite sequence is a geometric
progression (G.P.), divide each number after the first by the preceding number. The magnitude of the shear force due to M is F2i = Mri n! ri2. In an endothermic process, heat is absorbed (enthalpy change is positive). 445 Mechanical Engineering Intermediate- and Long-Length Columns For both intermediate and long columns, the effective columns
  length depends on the end conditions. Option Data Variable Option-specific data. 47 Mathematics Derivatives In these formulas, u, v, and w represent functions of x. The exam appointment time is 6 hours long and includes Nondisclosure agreement (2 minutes) Tutorial (8 minutes) Exam (5 hours and 20 minutes) Scheduled break (25 minutes) Learn
more at the NCEES YouTube channel. Queueing Delay - The packet may experience delay as it waits to be transmitted onto the link. Loads and deformations (e.g., axial-extension, torque-angle of twist, moment-rotation) 9-14 10. No printed copies of the Handbook will be allowed in the exam room. Algorithm and logic development (e.g., flowcharts,
 pseudocode) 6-9 2. liquid vapor ufg uf ug sfg 0.00 20.97 42.00 62.99 83.95 104.88 125.78 146.67 167.56 188.44 209.32 230.21 251.11 272.02 292.95 313.90 334.86 355.84 376.85 397.88 2375.3 2361.3 2347.2 2333.1 2319.0 2304.9 2290.8 2276.7 2262.6 2248.4 2234.2 2219.9 2205.5 2191.1 2176.6 2162.0 2147.4 2132.6 2117.7 2102.7 2375.3 2382.3
4.1014\ 4.0172\ 3.9337\ 3.8507\ 3.7683\ 3.6863\ 3.6047\ 3.5233\ 3.4422\ 3.3612\ 3.2802\ 3.1992\ 3.1181\ 3.0368\ 2.9551\ 2.8730\ 2.7070\ 2.6227\ 2.5375\ 2.4511\ 2.3633\ 2.2737\ 2.1821\ 2.0882\ 1.8909\ 1.6763\ 1.4335\ 1.1379\ 0.6865\ 0\ 7.3549\ 7.2958\ 7.2387\ 7.1833\ 7.1296\ 7.0775\ 7.0269\ 6.9777\ 6.9299\ 6.8833\ 6.8379\ 6.7935\ 6.7502\ 6.7078\ 6.6663\ 6.6256
6.5857 6.5857 6.5465 6.5079 6.4698 6.4323 6.3952 6.3585 6.3221 6.2861 6.2503 6.2146 6.1791 6.1437 6.1083 6.0730 6.0375 6.0019 5.9804 5.5862 5.8417 5.3857 5.2112 5.0526 4.7971 4.4298 Evap. The second term on the right side of the equation is the impulse of the force F from
 time t1 to t2. Statics, dynamics, and materials C. where v2 = velocity of fluid exiting orifice Orifice Discharging Freely into Atmosphere Atm Dt h 1 h 2 A0 A2 Vennard, J.K., Elementary Fluid Mechanics, 6th ed., J.K. Vennard, 1954. HA*A - + H + 7A -A7H + A Ka = [email protected] pKa = - log  Ka i For water 7H + A7OH - A = 10 - 14 7 A denotes
 molarity Bioconversion Aerobic Biodegradation of Glucose with No Product, Ammonia Nitrogen Source, Cell Production Only, where Respiration Quotent (RQ) = 1.1 C6H12O6 + aO2 + bNH3 \rightarrow cCH1.800.5N0.2 + dCO2 + eH2O Substrate Cells For the above conditions, one finds that: a = 1.94 b = 0.77 c = 3.88 d = 2.13 e = 3.68 The c coefficient
 represents a theoretical maximum yield coefficient, which may be reduced by a yield factor. Flat Plate of Length L in Parallel Flow ReL = 105i ReL > 105i
  40 - 4,000 + 4,000 - 40,000 + 40,000 - 40,000 + 40,000 - 250,000 + C 1 < ReD < 70,000; 0.6 < Pr < 400 i Internal Flow ReD = tumD n Laminar Flow in Circular Tubes For laminar flow (ReD < 2300), fully developed conditions
(uniform heat flux) NuD = 4.36 NuD = 3.66 (constant surface temperature) For laminar flow (ReD < 2300), combined entry length with constant surface temperature (m) = 4.36 NuD = 
dynamic viscosity of fluid [kg/(m•s)] at inside surface temperature of the tube Ts 210 Heat Transfer Turbulent Flow in Circular Tubes Dittus-Boelter Equation NuD = 0.023 ReD4 5 Pr n where RS V SS0.7 # Pr # 160WWW W S where SSS ReD L 10 WW S T X n = 0.4 for heating n = 0.3 for cooling should be used for small to
moderate temperature differences RS V Sieder-Tate Equation SS0.7 # Pr # 16, 700WWW 0.14 W S n NuD = 0.027 ReD4 5 Pr1 3 e n o where SSS ReD L 10, 000 WWW s L WW SS D L 10 W S T X should be used for flows characterized by large property variations. It is 13 bits long and specifies the offset of a particular fragment relative to the
 beginning of the original unfragmented IP datagram. Double-Sideband Modulation (DSB) xDSB(t) = Acm(t)cos(2πfct) If M(f) = 0 for |f| > W, then the bandwidth of xDSB(t) is 2W. Zone at LMC (Ø5.2) 0.1 Tol. AFtime = 1/(1 - Aday) Aday = allowance fraction (percentage/100) based on workday. Energy, heat, and work
(e.g., efficiencies, coefficient of performance, energy cycles, energy conversion, conduction, convection, radiation) C. Software Engineering A. Occupational Safety and Health Administration, A Guide to The Globally Harmonized System of Classification and Labelling of Chemicals (GHS), United States Department of Labor, 18 Safety Signal Words The
  signal word found on every product's label is based on test results from various oral, dermal, and inhalation toxicity tests, as well as skin and foremost responsibility is to safeguard the health, safety, and welfare of the public when
performing services for clients and employers. 342 FERRIC AS FeCI3 • 6 H20, mg/L -2 Environmental Engineering Rapid Mix and Flocculator Design = G where P = nV cHL tn Gt = 104 to 105 G = root mean square velocity gradient (mixing intensity) [ft/(sec-ft) or m/(s•m)] P = power to the fluid (ft-lb/sec or N•m/s) V = volume (ft3 or m3) μ =
dynamic viscosity [lb/(ft-sec) or Pa •s] \gamma = specific weight of water (lb/ft3 or N/m3) HL = head loss (ft or m) t = time (sec or s) Reel and Paddle CD AP t f v 3r P = 2 where CD = drag coefficient = 1.8 for flat blade with a L:W > 20:1 Ap = area of blade (m2) perpendicular to the direction of travel through the water \rhof = density of H2O (kg/m3) vp =
 velocity of paddle (m/s) vr = relative or effective paddle velocity = vp• slip coefficient slip coefficient = 0.5 to 0.75 Turbulent Flow Impeller diameter (m) Values of the Impeller Constant KT (Assume Turbulent Flow) Type of Impeller of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller diameter (m) Values of the Impeller Constant KT (Assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller diameter (m) Values of the Impeller Constant KT (Assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller diameter (m) Values of the Impeller Constant KT (Assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller diameter (m) Values of the Impeller Constant KT (Assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant KT (Assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant KT (assume Turbulent Flow) Type of Impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see table) n = rotational speed (rev/sec) Di = impeller Constant (see tab
Propeller, pitch of 1, 3 blades Propeller, pitch of 2, 3 blades Fan turbine, 6 curved blades Fan turbine, 6 blades Fan turbine, 6 curved blades Fan turbine, 6 cu
 equal to 10% of the tank diameter. One or more consecutive groups containing zeros only may be replaced with a single empty group, using two consecutive groups containing zeros only may be replaced with a single empty group, using two consecutive colons (::), e.g., 2001:db8:85a3::8a2e:370:7334. Minimize m n n z = // cij yij + / fix j i=1 j=1 subject to m / yij # mx j, j = 1, f, n / yij = 1, i = 1, f, m i=1 n j=1 yij $ 0, for all i, j x j = 0, 1 i, for
all j Kennedy, W.J., and Daniel P. 44, no. RS WW 2 2 V - + \dot{j} j z H z H Q y 2 SSS WW 1 1 1 + exp f - 2 p Sexp f - 2
parameter (m) = average wind speed at stack height (m/s) = horizontal distance from plume centerline (m) = vertical distance from plume centerline (m) = h + \Delta h h = plume rise x = downwind distance from plume centerline (m) Maximum concentration at ground level and directly downwind from
an elevated source. Transition Boiling - Rapid bubble formation results in vapor film on surface and oscillation between film and nucleate boiling. ::1/128 ::1 1 Host Loopback address to the local host. Better: Rejects axial strain and is temperature compensated. On the σ, τ coordinate system, one circle is plotted for Sut and one for Suc. Lake
Classification Lake Classification Based on Productivity Lake Classification Oligotrophic Mesotrophic Eutrophic Average Range Average Range Average Range Average Range Chlorophyll a Concentration (μg/L) 8 3.0–17.7 26.7 10.9–95.6 84.4
 15-386 Source: Wetzel, 1983 Davis, MacKenzie and David Cornwell, Introduction to Environmental Engineering, 4th ed., New York: McGraw-Hill, 2008, p. Searching Algorithm - an algorithm that determines if an element exists in a collection of elements. Instead, the computer-based exam will include a PDF version of the Handbook for your use. The
 list of options may be terminated with an EOL (End of Options List, 0x00) option; this is only necessary if the end of the header. Firewalls A network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. 141 = Inverse
Neighbor Discovery Solicitation Message 0 142 = Inverse Neighbor Discovery Request Message 0 143 = Multicast Listener Discovery Reply Message 0 145 = Home Agent Address Discovery Reply Message 0 145 = Home Agent Address Discovery Reply Message 0 145 = Home Agent Address Discovery Reply Message 0 146 = Mobile Prefix Advertisement 0 148
 = Certification Path Solicitation 0 149 = Certification 0 151 = Multicast Router Advertisement 0 151 = Multicast Router Advertisement 0 152 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 151 = Multicast Router Advertisement 0 151 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 153 = Multicast Router Advertisement 0 154 = Multicast Router Advertisement 0 155 = RPL Control Message 0 404 Electrical and Computer Engineering Local Area Network (LAN) There are different methods for assigning IP addresses
for devices entering a network. Waste minimization, waste treatment, and regulation (e.g., air, water, solids, RCRA, CWA, other EPA, OSHA) F. One classical negative feedback control system model block diagram is L(s) R(s) + G1(s) - + + G2(s) Y(s) H(s) where G1(s) is a controller or compensator, G2(s) represents a plant model, and H(s) represents a plant model.
 the measurement dynamics. Licensees shall not offer, give, solicit, or receive, either directly or indirectly, any commission, or gift, or other valuable consideration in order to secure work, and shall not make any political contribution with the intent to influence the award of a contract by public authority. Groundwater, Soils, and Sediments A. This field
gets its name from the fact that it is also the offset from the start of the TCP segment to the actual data. Engaging in the practice or offer to practice o
 strain. Differential equations C. Free and forced vibrations 8. One may model a measurement as: x = xref + dsystematic is a disturbance from the measurement process such as a drift or bias, and drandom is a disturbance such as random noise.
 Measurement Uncertainty Measurement Accuracy is defined as "closeness of agreement between a measured quantity value and a true quantity value of a measurement Precision is defined as "closeness of agreement between indications or measured quantity value and a true quantity val
 measurements on the same or similar objects under specified conditions." [cite ISO JCGM 200:2012, definition 2.15] It is critical to always consider the measurement uncertainty of your instrumentation and processes when performing measurements. If B2 - 4AC = 0, the conic is a parabola. Oxidation and reduction (e.g., reactions, corrosion control
B. is called Taylor's series, and the function f(x) is said to be expanded about the point a in a Taylor's series. Normal Hydrogen Electrode Au \rightarrow Au3+ + 2e - Pd \rightarrow Pd2+ + 2e - Pd2+ + 2e
Cu2+ + 2e- Sn2+ → Sn4+ + 2e - 0.788 -0.771 -0.401 -0.337 -0.150 H2 → 2H+ + 2e - Pb → Pb2+ + 2e - Pb → Pb2+
Na++e-K\to K++e-+2.363+2.714+2.925*Measured at 25oC. 3. Phase diagrams, phase transformation, and heat treating H. Coulomb-Mohr Theory is based upon the results of tensile and compression tests. The definition of each function, its logic symbol, and its Boolean expression are given in the following table.
  is for "control" options, and 2 is for "debugging and measurement." 1 and 3 are reserved. Zone Datum A A Variations of Form (Envelope) of perfect form at MMC. Hole must also be within size limits. Object Comfort Grip Not GOOD Flex Fingers 90 Degrees FAIR Coup
1954. Tangent elevation = YPVC + g1x = YPVI + g2 (x - L/2) Curve elevation = YPVC + g1x + ax2 = YPVC + g1x + ax3 = YPVC + g1x
tangent offset at PVI g1 = grade of back tangent g2 = grade of forward tangent h1 = height of driver's eyes above the roadway surface (ft) K = rate of change of grade S = sight distance (ft) x = horizontal distance from PVC to point on curve xm =
horizontal distance to min/max elevation on curve y = tangent offset V = tangent of V = tangent 
2h1 + 2h2) 2L = 2S - AS2 2.158 L = 2S - L = (based on standard headlight criteria) <math>S > L 2AS2 400 + 3.5 S (based on adequate sight distance under an overhead structure to see an object beyond a sag vertical curve) L = AS2 h + h 800 C - 1 2 2 () C = vertical clearance for overhead structure (overpass) located within 200 feet of the second structure) <math>L = AS2 L = 2S - 2 L 
the midpoint of the curve PI I E T 100.00 M c I/2 I/2 R d PT LC D I NOT TO SCALE R = 5729.58 D LC 2 sin I 2i L = RI r = I 100 D 180 301 R T T = R tan I 2i = )) h +h 800 C - 1 2 A 2 Horizontal Curves R = A 400 + 3.5 S A Compiled from AASHTO, A Policy on Geometric Design of Highways and Streets, 6th ed., 2011. For
stoichiometric combustion of methane in air: CH4 + 2 O2 + 2 (3.76) N2 \rightarrow CO2 + 2 H2O + 7.52 N2 Combustion in Excess Air The excess oxygen on the right side of the combustion equations. Dose-response toxicity (e.g., differential, integral, differential, integral, differential, integral, differential equations) D. The probability is
termed a discrete probability if X can assume only discrete values, or X = x1, x2, x3, ..., xn The discrete probability of any single event, X = xi, occurring is defined by f (xk) = P(X = xk), k = 1, 2, ..., n Probability Density Function If X is continuous, the probability density
function, f, is defined such that b P ^ a # X # bh = # f ^ xh dx a Cumulative Distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function, F, of a discrete random variable X that has a probability distribution function function, F, of a discrete random variable X that has a probability distribution function fu
is defined by x F ^{x}h = \# f ^{x}h dx - 3 which implies that F(a) is the probability that X \leq a. The variate x is said to be normally distributed if its density function f (x) is given by an expression of the population ^{-3} # x # 3 When \mu = 0 and \sigma = 0 a
distribution is called a standardized or unit normal distribution. # x mdx = x m + 1 6. 493 G. Memory technology and systems C. Differential equations (e.g., ordinary, partial, Laplace) D. Angular motion (e.g., torque, inertia, acceleration) D. The CHF is independent of the fluid-heating surface combination, as well as the viscosity, thermal conductivity,
and specific heat of the liquid. 6CO2 + 6H2O + light \rightarrow C6H12O6 + 6O2 The light is required to be in the 400- to 700-nm range (visible light). Resonance C. = Q rR 4 DPf rD 4 DPf = 8n L 128nL Flow in Noncircular Conduits Analysis of flow in conduits having a noncircular cross section uses the hydraulic radius RH, or the hydraulic diameter DH, as
follows: RH = cross-sectional area = DH 4 wetted perimeter Drag Force FD on objects immersed in a large body of flowing fluid or moving object A = projected area (m2) of blunt objects such as spheres,
 ellipsoids, disks, and plates, cylinders, ellipses, and air foils with axes perpendicular to the flow \rho = 1.33/Re0.5 (104 < Re < 5 × 105) CD = 0.031/Re1/7 (106 < Re < 109) The characteristic length in the Reynolds Number (Re) is the length of the plate parallel with the flow. The bending
moment is positive if it produces bending of the beam concave upward (compression in top fibers and tension in bottom fibers). This line makes an angle with a tangent line to the pitch circle that is called the pressure angle φ. Human Factors, Ergonomics, and Safety A. 434 Mechanical Engineering Dynamics of Mechanisms Gearing Loading on
Straight Spur Gears: The load, W, on straight spur gears is transmitted along a plane that, in edge view, is called the line of action. Professional skills are important to the well-being of society. 98 Materials Science/Structure of Matter Stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the following apply: Engineering stress F v= A 0 where of the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined as force per unit area; for pure tension the stress is defined 
 engineering stress F = A of G = B initial cross-sectional area True stress where G = B initial cross-sectional area True stress where G = B initial cross-sectional area True stress where G = B initial cross-sectional area True stress where G = B initial cross-sectional area True stress where G = B initial cross-sectional area True stress G = B initial cross-sec
Design of reinforced concrete components (e.g., codes and design philosophies, beams, columns) 10-15 12. These functions may also be presented in discrete form where the range of particle sizes is divided into a number (m) of sub-range having a mean size as shown in the following figure: Discrete Particle Density Functions
density function cumulative function Fraction of Total Particles 1.2 1 0.8 0.6 0.4 0.2 0 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 Particle Size Mean Length (Number Length) Diameter (XML) DFv 2 1 i=1 x = XML #0= xdFN / xi DFN = m i DF i=1 / 3v i = 1 xi m m / 253 Chemical Engineering Sauter Mean (Surface-Mean) Diameter
(XSM) = XSM \# 01 \times 3 \text{ dFN} = \# 01 \times 3 \text{ dFN} = \# 01 \times 3 \text{ dFN} = \# 1 \text{ m} = / \times 2 \text{ DFN} = 1 \text{ m} = / \times 3 \text{ DFN} = 1 \text{ m} = / \times 3 \text{ DFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ m} = / \times 3 \text{ dFN} = 1 \text{ dFV} = 1
particles as function of particles in a size x FN = cumulative density function, fraction (based on number) of particles smaller than size x FV = cumulative density function, fraction of particles smaller than size x FV = cumulative density function, fraction of particles in a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with mean size x for a size sub range with 
 with mean size xi m = number of size sub range of feeds (in.) Range of Products (in.) Range of Products (in.) Range of Products (in.)
Max. For a compressible fluid, use the above incompressible fluid equation if the Mach number \leq 0.3. 195 Fluid Mechanics Venturi Meters Q = where CvA2 1 - _A2/A1 i 2 P P 2g d c1 + z1 - c2 - z2 n Q = volumetric flowrate Cv = coefficient of velocity A = cross-sectional area of flow P = pressure \gamma = \rho g z1 = elevation of venturi entrance z2 =
elevation of venturi throat The above equation is for incompressible fluids. It must be determined experimentally. Thermodynamics 164 155.00 160.00 Pressure Versus Enthalpy Curves for Refrigerant 410A (USCS units) 160 25 30 35 40 45 50 55 160 60 140 65 120 100 40 120 20 200 15 c.p. -80 4.0 2.0 20 40 1.0 100 80 0.80 20 0.60 0 60 40 T = -20°F
-40 D VAP OR -80 40 0.30 0.20 20 0.15 0.10 0.080 SATU 0.9 0.8 0.7 0.6 0.5 x=0 .4 0.3 0.2 SAT 10 8 0.1 URA TED LIQU ID -60 RATE 20 -20 0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300 320 340 T = 360°F 380 400 0.40 10 8 0.060 6 6 0.040 6 tu/ 0.020 0.4 4B 0.4 2 0.4 0 0.4 0.38 0.36 0.34 0.30 0.32 0.28 0.24 0.26 0.22 0.20 0.18 0.14
0.4 8 -120 4 0.030 S= 2 0.16 0.12 0.10 0.08 0.06 0.04 0.02 0.00 - 0.02 - 0.08 - 0.06 - 0.04 lb . Piezoelectric effect - many crystalline or special ceramic materials convert mechanical energy to electrical energy to electrical energy to electrical energy. 74 Engineering Probability and Statistics Confidence Interval for the Difference Between Two Means μ1 and μ2 (A) Standard deviations σ1 and
\sigma^2 known v12 v 22 n1 + n2 # n1 - n2 # X1 - X2 + Za/2 (B) Standard deviations \sigma^2 and \sigma^2 are not known X1 - X2 - Za/2 v12 v 22 n1 + n2 - 1 is 22C 1 2 X1 - X2 - ta/2 # n1 - n2 # X1 - X2 + ta/2 n1 + n2 - 2 where ta/2 corresponds to n1 + n2 - 2 degrees of freedom. Quick Sort: partitions list using a pivot value,
placing elements smaller than the pivot before the pivot 
ratio, f represents the switching frequency, and T represents the switching period. Examples include: Binary search value to the middle element of the array. KIC = Yv ra where a KIC = fracture toughness σ = applied engineering stress a = crack length Y = geometrical factor 2a
EXTERIOR CRACK (Y = 1.1) INTERIOR CRACK (Y = 
1, 2, ..., n x C(n, x) = number of combinations n, p = parameters The variance is given by the form: \sigma^2 = npq Normal Distribution (Gaussian Distribution) This is a unimodal distribution, the mode being x = \mu, with two points of inflection (each located at a distance \sigma to either side of the mode). • URG (1 bit): indicates that the Urgent pointer field is
significant • ACK (1 bit): indicates that the Acknowledgment field is significant. Sometimes links impose further restrictions on the packet size, in which case datagrams must be fragmented. Dynamic system response D. Measures of central tendencies and dispersions (e.g., mean, mode, standard deviation, confidence intervals) E. Potential Energy in
Gravity Field Vg = mgh where h = the elevation above some specified datum. Timing (e.g., diagrams, asynchronous inputs, race conditions and other hazards) 16. Linear algebra (e.g., matrix operations, vector analysis) 6-9 2. Time value of money (e.g., present worth, annual worth, future worth, rate of return) B. The common difference is d. Lost
workday injuries rate Noise Pollution SPL (dB) = 10 log10 (r1/r2) Line Source Attenuation \Delta SPL (dB) = 10 log10 (r1/r2) where SPL (dB) = 10
sum of multiple sources SPLtotal \Delta SPL (dB) = change in sound pressure level with distance, measured in decibels r 1 = distance from source to receptor at Point 1 r 2 = distance from source to receptor at Point 2 32 Safety Permissible Noise Exposure (OSHA) Noise dose D should not exceed 100%. Separation systems (e.g., distillation, absorption,
extraction, membrane processes, adsorption) D. M xc yc zc A ps A R = mean radius R = mean rad
rx2c = ry2c = R 2 2 I zc = MR 2 r22c = R 2 I zc = MR 2 r22c = R 2 I x = I y = 3MR 2 rz2 = ry2 = 3R 2 2 I z = 3MR 2 rz2 = 3R 2 y M xc yc zc ρ R c h z x y R2 R1 h z x y z πR2ρh 0 h/2 0 mass/vol. CT Values* For 3-LOG Inac value or normalized average power in mn(t) is 2 +T < mn2 ^t h > =
n- 1 b #a f ^ xh dx . Licensees shall disclose to their employers or clients all known or potential conflicts of interest or other circumstances that could influence or appear to influence or appear to influence their judgment or the quality of their professional service or engagement. where m = number of customers n = number of possible plant sites yij = fraction or
proportion of the demand of customer i which is satisfied by a plant located at site j; i = 1, ..., n; j = 1, if a plant is located at site j fj = fixed cost resulting from locating a plant at site j 424 Industrial and Systems Engineering Material
Handling Distances between two points (x1, y1) and (x2, y2) under different metrics: Euclidean: D = ^x1 - x2 + y1 - y2 i Line Balancing Nmin = bOR # / ti OT li = theoretical minimum number of stations Idle Time/Station
= CT - ST Idle Time/Cycle = / CT - ST i where Percent Idle Time = Idle Time/Cycle # 100 Nactual # CT CT = cycle time (time to complete task at each station) ti = individual task times N = number of stations Job Sequencing Two Work Centers—Johnson's
Rule 1. Systems Engineering, Analysis, and Design A. Baffling Factors Baffling Factors Unbaffled (mixed flow) 0.1 None, agitated basin, very low length to width ratio, high inlet and outlet flow velocities. Traffic Signal Timing v y = t + 2a! 64.4 G r = W+l v L Gp = 3.2 + S + 0.27 Nped p where t = driver reaction time (sec) v = vehicle
approach speed (ft/sec) W = width of intersection, curb-to-curb (ft) l = length of yellow interval to nearest 0.1 sec (sec) F = length of yellow interval to nearest 0.1 sec (sec) Gp = minimum green time for pedestrians (sec) L = crosswalk length (ft) Sp = pedestrian speed (ft/sec), default 3.5 ft/sec Nped = number of
pedestrian in interval a = deceleration rate (ft/sec2) ± G = percent grade divided by 100 (uphill grade "+") SSD = stopping sight distance (ft) ISD = intersection sight
distance (ft) t = driver reaction time (sec) t = driver react
as used in this Act or Rules promulgated under this Act, shall mean being presented as trustworthy and competent when used to describe products, processes, applications, or data resulting from the practice of surveying," surveying, "surveying," or any
modification or derivative thereof in his or her name or form of business activity except as licensed in this Act 3. Logic gates and circuits D. Properties of ideal gases and pure substances B Energy transfers C. Their shared secret key k is: k = (gx)y (mod p) = (gy)x (
linear programming (LP) problem is: Maximize Z = c1x1 + c2x2 + ... + a2nxn \le b2 h am1x1 + a12x2 + ... + a2nxn \le b1 a21x1 + a22x2 + ... + a2nxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1 a21x1 + a22x2 + ... + annxn \le b1
null hypothesis be H0: m = m0 and let the alternative hypothesis be H1: m \neq m0 Rejecting H0 when it is true is known as a type I error, while accepting H0 when it is wrong is known as a type I error, while accepting H0 when it is true is known as a type I error, while accepting H0 when it is true is known as a type I error, while accepting H0 when it is wrong is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error, while accepting H0 when it is true is known as a type II error.
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(radians) of twist T = torque L = length of shaft T/φ gives the twisting moment per radian of twist. Safety (e.g., grounding, material safety data, PPE, radiation protection) 4-6 4. 239 Chemical Engineering Reactions of Shifting Order - rA = ln e k1CA 1 + k2CA CAo o k C C kt CA + 2 Ao - Ai = 1 ln `CAo CAj k1t k CAo - CA = - 2 + CAo - CA This form of the company o

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alloy steel (A232, A401) Bearings Ball/Roller Bearing Selection The minimum required basic load rating (load for which 90% of the bearings from a given population will survive 1 millions of revolutions) = 3 for ball
bearings, 10/3 for roller bearings 432 Mechanical Engineering When a ball bearing is subjected to both radial load must be used in the equation above. 220 Instrumentation, Measurement, and Control Thermistors - Typically manufactured from a semiconductor, with a negative temperature coefficient. DeWitt,
Fundamentals of Heat and Mass Transfer, 3rd ed., Wiley, 1990, p. Linear Systems A. Intellectual Property is the creative product of the intellect and normally includes inventions, symbols, literary works, patents, and designs. Phasors G. The velocities in a planetary set are related by \omega L - \omega arm = \omega f - \omega arm ! mv where \omegaf =
speed of the first gear in the train \omega L = speed of the last gear in the train \omega L = speed of the arm Neither the first nor the last gear can be one that has planetary motion. JSA techniques work well when used on a task that the analysts understand well. Using the definition of an instant center (IC), we see that the pins at O2, A, and B are ICs that are
designated I12, I23, and I34. 430 Mechanical Engineering Mechanical Engineering Mechanical Engineering Springs: The shear stress in a helical linear spring is where x = Ks d F D Ks C 8FD rd 3 = wire diameter = applied force = mean spring diameter = (2C + 1)/(2C) = D/d The deflection and force are related by F = kx
 where the spring rate (spring constant) k is given by k= d 4G 8D3 N where G is the shear modulus of elasticity and N is the number of active coils. Converts small signal to useful output. Deformations J. (Drag classifier sands not so clean.) In closed circuit grinding discharge mechanism (spirals especially) may give enough lift to eliminate pump. Gives
relatively efficient separations of fine particles in dilute suspensions. Fluid Mechanics and Hydraulics A. Requests for permissions should be addressed in writing to [email protected] ISBN 978-1-947801-11-0 Printed in the United States of America Second printing May 2020 Edition 10.0.1 Preface About the Handbook The Fundamentals of
Engineering (FE) exam is computer-based, and the FE Reference Handbook is the only resource material you may use during the exam. Overpressure and underpressure protection (e.g., graphical methods, McCabe-Thiele, efficiency) E. Greenwald E.K., Electrical Hazards
and Accidents—Their Cause and Prevention, Van Nostrand Reinhold, 1991. Project selection (e.g., comparison of projects with unequal lives, lease/buy/make, depreciation, discounted cash flow) 474 3-5 7-11 4-6 14. In determining the amount of fine to be assessed pursuant to this section, the board may consider such factors as the following: a. These
are known as alias frequencies. Parallel A communications channel where data is sent several bits as a whole. Basic safety equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control, personal protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control protective equipment (e.g., pressure-relief valves, emergency shutoffs, fire prevention and control protective equipment (e.g., pressure-relief valves, emergency shutoffs, em
of Selected Flow Configurations Open-Channel Flow and/or Pipe Flow of Water Manning's Equation K Q = n AR H2 3 S 1 2 2 Q V K n A = discharge (ft3/sec or m3/s) = velocity (ft/sec or m3/s) = velocity 
or m) = P P = wetted perimeter (ft or m) S = slope (ft/ft or m/m) Hazen-Williams Equation 0.54 \text{ v} = k1C \text{ R} 0.63 \text{ H} \text{ S} Q = k1CARH0.63S 0.54 where k1 = 0.849 \text{ for SI} units, 1.318 \text{ for USCS} units C = 0.849 \text{ for SI} units, C = 0.849 \text{ for SI} units
Register for an FE exam by logging in to your MyNCEES account and following the onscreen instructions. - - r/2 i _0 - cot -1 u + r/2 i _0 cot -1 u +
0.4 1.5 2.0 650 0.2 700 0.1 Pressure (bar) 300 100 250 0 200 0.0 SUVA 10. Dev. K = limit Da = da ds Ds " 0 Ds Wade, Thomas L., Calculus, Boston, Ginn and Company, 1953. Kinetics (e.g., chemical conversion, growth and decay) C. Source Address (128 bits) The IPv6 address of the sending node. Option Number 5 Specifies an option. Refrigeration
and heat pump cycles H. Mathematics and Statistics A. Typically made from platinum, the controlling equation for an RTD is given by: where RT = R0 81 + a T - T0 iB RT = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resistance of the RTD at temperature T (in °C) R0 = resi
600\ 700\ 800\ 850\ Temperature\ (^{\circ}C) From Tempco Manufactured Products, as posted on www.tempco.com, July 2013. Consequently, the router must calculate a new checksum. Ferric sulfate Fe2 (SO4)3 + 3 Ca(HCO3)2 \Rightarrow 2 Fe (OH)3 + 3 Ca(HCO3)2 \Rightarrow 4 Ca(HCO3)2 \Rightarrow 3 Ca(HCO3)2 \Rightarrow 4 Ca(HCO3)2 \Rightarrow 5 Ca(HCO3)2 \Rightarrow 6 Ca(HCO3)2 \Rightarrow 7 Ca(HCO3
17.0 48.0 Environmental Engineering 4. Hashing: uses a hashing function that maps data of arbitrary size (e.g., an integer) and then to compute an index that suggests where the entry can be found in a hash table (an array of buckets or slots, from which the desired value can be found through the
 index). Material failure (e.g., Euler buckling, creep, fatigue, brittle fracture, stress concentration factors, factor of safety, and allowable stress) 11. Eliminate that job from consideration. The 14th field is optional and named: options. Hazard analysis helps integrate accepted safety and health principles and practices into a specific task. The fugacity
coefficient U it = 1. Viscosity °F centipoise 70 0.0181 70 0.981 10,000 PARTICLE DIAMETER (MICRON = MICROMETER = \mu = \mu m) De Nevers, Noel, Fluid Mechanics for Chemical Engineers, 3rd ed., New York: McGraw-Hill, 2004, p. Logic symbols for these gates are shown below. In short, an MSS option field with a value of 0x05B4 will show up as
(0x02 0x04 0x05B4) in the TCP options section. Analog-to-Digital Conversion When converting an analog signal to digital form, the resolution of the conversion is an important factor. Licensees shall sign and seal only those plans, surveys, and other documents that conform to accepted engineering and surveying standards and that safeguard the
health, safety, and welfare of the public. The specified tolerance and the datum reference apply only on an RFS basis. The pressure PC = pressure PC = pressure at the centroid of area PCP = pressure at center of pressure yC = slant
distance from liquid surface to the centroid of area yC = hC/sin \theta hC = vertical distance from liquid surface to center of pressure \theta = angle between liquid surface and edge of submerged surface IxC = moment of inertia about
the centroidal x-axis If atmospheric pressure acts above the liquid surface and on the non-wetted side of the submerged surface: yCP = yC + pg \sin \theta \ln \theta \ln \theta + pg \sin \theta \ln \theta \ln \theta and Buoyancy 1. In particular, there may be circumstances in
which terminology in the code is not clearly defined, or in which two sections of the code may be in conflict. — 0.6 to 3.7 — 600 µm to 45 µm (6 mm) 2 to 100 Not critical 5 to 30 35 to 60 None Low cost (simple enough to be made locally), and simplicity can justify relatively inefficient separation. Discipline (including voluntary surrender of a
professional engineer's or professional surveyor's license in order to avoid disciplinary action) by another jurisdiction, foreign country, or the United States government, if at least one of the grounds for disciplinary action sites and
separate from surface; vapor escapes as jets or columns. A binary word of length n bits can represent q quantization levels: q = 2n The minimum bandwidth required to transmit the PCM message will be B \propto 2nW = 2W \log 2 q Error Coding Error coding is a method of detecting and correcting errors that may have been introduced into a frame during
data transmission. Option Class 2 A general options category. Values of Z\alpha/2 Confidence Interval 80% 90% 95% 96% 98% 99% 75 Z\alpha/2 1.2816 1.6449 1.9600 2.0537 2.3263 2.5758 Engineering Probability and Statistics Unit Normal Distribution f x x x x f(x) F(x) R(x) 0.0 0.1 0.2 0.3 0.4 0.3989 0.3970 0.3910 0.3814 0.3683 0.5000 0.5398 0.5793 0.6179
1.315\ 1.314\ 1.313\ 1.311\ 1.310\ 1.282\ 6.314\ 2.920\ 2.353\ 2.132\ 2.015\ 1.943\ 1.895\ 1.860\ 1.833\ 1.812\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.753\ 1.746\ 1.771\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 1.761\ 
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2.977\ 2.947\ 2.947\ 2.947\ 2.947\ 2.898\ 2.878\ 2.878\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.885\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 2.881\ 
represents the critical values of F corresponding to a specified upper tail area (α). 192.88.99.0-192.88.99.0-192.88.99.255 256 Internet Reserved. V = fV N + VL Note that with this strategy, the highest measurable voltage is one voltage resolution less than VH, or VH - fV. Link 3 couples the crank to the slider (link 4), which slides against ground
(link 1). Energy, impulse, and momentum of fluids 6-9 9. 306 Civil Engineering Highway Pavement Design AASHTO Structural number for the pavement at = layer coefficient Di = thickness of layer (inches) mi = drainage coefficient (assume m equals 1.0 unless
otherwise given) Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Axle Load kN lb Load Equivalency Factors Single Tandem Axles Axles Gross Ax
26.7\ 6,000\ 0.01043\ 213.5\ 48,000\ 44.50\ 4.17\ 35.6\ 8,000\ 0.0343\ 222.4\ 50,000\ 52.88\ 4.86\ 44.5\ 10,000\ 0.0877\ 0.00688\ 231.3\ 52,000\ 5.63\ 53.4\ 12,000\ 0.189\ 0.0144\ 240.2\ 54,000\ 6.47\ 62.3\ 14,000\ 0.360\ 0.0270\ 244.6\ 55,000\ 6.93\ 66.7\ 15,000\ 0.478\ 0.0360\ 249.0\ 56,000\ 7.41\ 71.2\ 16,000\ 0.623\ 0.0472\ 258.0\ 58.000\ 8.45\ 80.0\ 18.000\ 1.000\ 0.0773\ 267.000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\ 0.0000\
329.0 74,000 21.32 151.2 34,000 11.18 1.095 333.5 75,000 22.47 155.7 35,000 12.50 1.23 338.0 76,000 23.66 160.0 36,000 13.93 1.38 347.0 78,000 21.08 2.08 Note: kN converted to lb are within 0.1 percent of lb shown 307 Civil Engineering Latitudes and Departures + Latitude -
Departure + Departure - Latitude Earthwork formulas Average End Area formulas Area of mid-section L = distance between A1 and A2 Pyramid or Cone V = h (area of base)/3 Area formulas Area by Coordinates: Area = [XA (YB - YN) + XB (YC - YA) + XC (YD - YB) + ... If all
poles of a G(s) function have negative real parts, then dc gain = lim G ^ sh s " 0 Note that G(s) could refer to either an open-loop or a closed-loop transfer function. Kinetic Energy, KE = my2/2gc, with KE in (ft-lbf); Potential Energy, KE = my2/2gc, with KE in (ft-lbf); Potential Energy, FE = mgh/gc, with PE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); Potential Energy, FE = my2/2gc, with FE in (ft-lbf); FI = my2/2gc, with F
Shear Stress, τ = (μ/gc)(dv/dy), with shear stress in (lbf/ft2). 398 Electrical and Computer Engineering Internet Protocol version 6 Header The fixed header starts an IPv6 packet and has a size of 40 octets (320 bits). Wastewater Treatment—no specific requirements (use the same criteria as for water) Dimensions 1. This means that the messages in
the system are broken down, or segmented into packets, and the packets are transmitted separately into the network. Denoting this frequency, which is called the Nyquist frequency, as fN, the sampling theorem requires that fs > 2fN When the above condition is not met, the higher frequency, as fN, the sampling theorem requires that fs > 2fN When the above condition is not met, the higher frequency, as fN, the sampling theorem requires that fs > 2fN When the above condition is not met.
represented and will appear as lower frequencies in the sampled data. Mixes tested 3 had a water-cement ratio of 0.50, a slump of 3.5 in., cement content of 556 lb/yd, and air content of 556 lb/yd, and air content of 36%, and air content of 36%, and air content of 4%. Processes E. 409 Electrical and Computer Engineering Abbreviation CISC Complex instruction set computing CPU Central processing unit
FIFO First-in, first-out LIFO Last-in, first-out LIFO Last-in, first-out I/O Input/output LFU Least frequently used MRU Most recently used MRU Most recently used MRU Most recently used RISC Reduced instruction set computing RAM Random access memory ROM Read only memory Software Engineering Endianness MSB - most significant bit first. Combustion products 10-15 12.
394. Two out of three successive points fall on the same side of and more than two sigma units from the center line. For incompressible flow through a horizontal orifice meter installation Q = CAO 2 t P1 - P 2 i Dimensional Homogeneous equation has the same dimensions on the left and right sides
of the equation. A task consists of elements. Ix = Ixc + d 2y A Iy = Iyc + d x2 A where dx, dy = distance between the two axes in question Ixc, Iyc = moment of inertia about the centroidal axis Ix, Iy = moment of inertia about the centroidal axis Ix, Iy = moment of inertia about the new axis y yc dA dx C xc dy x 0 Hibbeler, R.C., Engineering Mechanics: Statics and Dynamics, 10 ed., Pearson Prentice
Hall, 2004. L. Solid waste disposal (e.g., landfills, leachate and gas collection) D. Surveying deliverables provide spatial information to a level of positional accuracy, whether that accuracy is stated, regulated, or implied. 4 Ethics and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear. See the section "Combinations and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear. See the section "Combinations are considered by the combination of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear. See the section "Combinations are considered by the combination of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Professional Practice 6. Reproduced with permission of the Licensor through PLSclear and Planta Pl
of Random Variables" for how variances and standard deviations of random variables combine. If B2 - 4AC > 0, a hyperbola is defined. The application, presentation, and session) of the OSI model. For steady-state creep this is: where Q df = n - RT dt Av e A = pre-
exponential constant n = stress sensitivity Q = activation energy for creep R = ideal gas law constant T = absolute temperature • Fatigue: Time-dependent failure under cyclic load. The common ratio is r. Basic theories, conversions, formulas, and definitions examinees are expected to know have not been included. • 2,4,SS (32 bits): Maximum
segment size • 3,3,S (24 bits): Window scale • 4,2 (16 bits): Window scale • 4,2 (16 bits): Selective Acknowledgement permitted. U = W = P\delta/2 The strain energy per unit volume is u = U/AL = \sigma 2/2E (for tension) Material Properties Table 1 - Typical Material Properties Table 1 - Typical Material Properties Table 2 below) Modulus of Elasticity, E
[Mpsi (GPa)] Material Steel Aluminum Cast Iron Wood (Fir) Brass Copper Bronze Magnesium Glass Polystyrene Polyvinyl Chloride (PVC) Alumina Fiber Silicon Carbide Fiber 29.0 (200.0) 10.0 (69.0) 14.5 (100.0) 14.5 (100.0) 14.8 – 18.1 (102 – 125) 17 (117) 13.9 – 17.4 (96 – 120) 6.5 (45)
10.2 (70) 0.3 (2) 1 - d P2 n P1 k- 1 1 H Polytropic process (ideal gas): Pvn = constant Closed system wrev = (P2v2 - P1v1)/(1 - n) Steady-Flow Systems The system does not change state with time. Brown Blue -454 to 752^{\circ}F - 270 to 400^{\circ}C Mild Oxidizing, Reducing Vacuum or Inert. This
field may not exist for simple options. Licensure as a Professional Engineer a. Private network Used for local communications within a private network. 8: Caprylic. and David P. This length is the total length of the given options field, including Option-Kind and Option-Length bytes. Data, logic development, and analytics (e.g., databases, flowcharts,
algorithms, data science techniques) B. In addition to or in lieu of any other sanction provided in this section, any licensee or intern that violates a provision of the board of not more than [insert amount] dollars for each offense 1. It is also a point in
space about which a body rotates, instantaneously. 1: (one carbon atom) Formic. ASHRAE Psychrometric Chart No. 1 (English units) Δ Δ Fluid Mechanics Definitions of density, specific Weight, and Spe
DV = tg DV " 0 also where SG = \gamma \gamma w = \rho \rho w t = density (also called mass density) \Delta m = mass of infinitesimal volume \Delta V = v weight of an infinitesimal volume \Delta V = v weight of an infinitesimal volume \Delta V = v where \Delta V = v also where \Delta V = v where \Delta V = v also where \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density (also called mass density) \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = v and \Delta V = v are the density \Delta V = 
specific weight of water at standard conditions = 9,810 N/m3 (62.4 lbf/ft3) = 9,810 kg/(m2 • s2) Stress, Pressure, and Viscosity Stress is defined as where where x ^{1} h = limit DF/DA DA " 0 x ]1g = surface stress vector at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 1 \Delta F = force acting on infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 1 \Delta A = infinitesimal area at Point 1 \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal area at Point 2 \Delta A \Delta A = infinitesimal ar
y) \tau and \tau = normal and tangential stress components at Point 1, respectively P = pressure at Point 1, respectively P = pressure at Point 1, respectively Q = differential distance, measured from boundary 177 Fluid Mechanics \upsilon =
 kinematic viscosity (m2/s or ft2/sec) n where y = t For a thin Newtonian fluid film and a linear velocity profile, where v(y) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a thin Newtonian fluid film For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a power law index v(t) = v/\delta v = velocity of plate on film \delta = t For a power law index \delta = t 
Tension and Capillarity Surface tension \sigma is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension}, force/length F = \text{surface tension}, force/length \sigma = F/L where \sigma = \text{surface tension}, force/length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = \text{surface tension} is the force per unit contact length \sigma = F/L where \sigma = 
wetted tube wall \gamma = \text{specific weight of the liquid } The Capillary tube Characteristics of a Static Liquid The Pressure Field in a Static Liquid The Pressure = atmospheric pressur
pressure - vacuum gauge pressure reading Bober, W., and R.A. Kenyon, Fluid Mechanics, Wiley, 1980. The critical Reynolds number (Re)c is defined to be the minimum Reynolds number at which a flow will turn turbulent. This series of compounds begins with acetylene, or C2H2. Slight tingling sensation. Inflation To account for inflation, the dollars
are deflated by the general inflation rate per interest period f, and then they are shifted over the time scale using the interest period i. MMC or RFS only. This same area is used in defining the drag coefficient for an airfoil. Overall Material Balances Total Material: F=D+B Component A: FxF = DxD + BxB Operating Lines Rectifying
section Total Material: Vn+1 = Ln + D Component A: Vn+1 = Ln + D Comp
ratio is defined as that value which results in an infinite number of contact stages. The sampling rate or frequency is given by fs = 1 Dt Nyquist's (Shannon's) sampling theorem states that in order to accurately reconstruct the analog signal from the discrete sample points, the sample rate must be larger than twice the highest frequency contained in
the measured signal. d loga u i = loga e i 1u du dx dx ^ h 12. Codes of ethics (professional and technical societies) B. I14 \in I13 I14 \in I24 I12 2 I23 3 I34 4 1 GROUND Similarly, if body groups 1, 2, 4 and 2, 3, 4 are considered, a line drawn through known ICs I12 and I14 to the intersection of a line drawn through known ICs I23 and I34 locates I24.
6. Implicant - A Boolean algebra term, either in sum or product form, which contains one or more minterms or a function. Presenting to use the certificate of licensure or seal of a licensee 4. 119 Dynamics Kinetic Energy Particle T = 1 2 mv 2 T = 1 2 1 mvc + Ic ω 2 2 2 Rigid Body (Plane Motion) subscript c represents the
center of mass Potential Energy V = Vg + Ve , where Vg = Wy , Ve = 1/2 ks2 The work done by an external agent in the presence of a conservative field is termed the change in potential energy. A composite control which includes roundness and axis offset. Grain bins should not be entered when the grain is being removed since grains flow to the
center of the emptying bin and create suffocation hazards. Interpretation of engineering drawings 8-12 478 Fundamentals of Engineering (FE) ELECTRICAL AND COMPUTER CBT Exam Specifications Effective Beginning with the July 2020 Examinations • The FE exam is a computer-based test (CBT). The compressibility factor is not a constant but
 varies with changes in gas composition, temperature, and pressure. Limiting reactant - Reactant that would be consumed first if the reaction proceeded to completion. Calculation No (Surface) Yes Cylindrical boundary, within which the center axis of a cylindrical feature of size is permitted to vary from the true (theoretically exact) position Yes Yes
Yes Yes Cylindrical boundary, within which the axis of all cross-sectional elements of a surface of revolution are common to the datum feature No Yes Two concentric
circles, within which each circular element must lie in relationship to the datum axis No Yes Two concentric cylinders, within which all circular elements must lie (simultaneously) in relationship to the datum axis Also controls surface flatness. Professionals have autonomy in the workplace; they are expected to utilize their independent judgment in
carrying out their professional responsibilities. The metric version of the standard is newer and will be presented. Endpoint Detection - collection and storage of endpoint data activity to help network administrators analyze, investigate and prevent cyber threats on a network. 2 dx dx - 1 u 22. The maximum inplane shear stress is τin = R. The FE
exam is a computer-based exam administered year-round at NCEES-approved Pearson VUE test centers. 0.026 \text{ V} at 300 \text{K} Na = acceptor concentration Nd = donor conce
 iC2 Q2 iE1 iE2 + vB2 - I A Basic BJT Differential Amplifier Sedra, Adel, and Kenneth Smith, Microelectronic Circuits, 3rd ed., ©1991, p. Properties of Electrical Materials A. It has further been suggested that the flow label be used to help detect spoofed packets. The curve at the point of the highest penetration of the noise spectrum reflects the A-
 weighted sound level. This relation is valid only for flow in the laminar region. Engineered materials (e.g., composites, polymers) F. Randomized Complete Block Design For k treatments and b blocks // yij - y •• j2 + k / y j - y •• j2 + k / y j - y •• j2 + k / y j - y •• j2 + k / j - y •• j2 k b i=1 j=1 k b i=1 j=1 k b i=1 j=1 SStotal = SStreatments + SSblocks +
SSerror k b i=1 j=1 k b y2 SStotal = //yij2 - kb • i=1 j=1 y2 1 k SStreatments = b / yi2 - bk • i=1 y2 1 b SSblocks Montgomery, Douglas C., and George C. In this case, ex, ey, and ez require modification. 1 mol = 1 gram mole 1 mol = 6.02 × 1023 particles Molarity of Solutions - The
Fluid Mechanics, 6th ed., J.K. Vennard, 1954. () rx^2c = ry^2c = 3R \ 2 + h \ 2 \ 12 \ Iyc = Iy = MR \ 2 \ 2 ry^2c = ry^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = rx^2c = R \ 2 \ 2 (M = 
 Lc = number of effective turns gas makes in cyclone = inlet height of cyclone (m) = length of body cyclone (m) = length of cone of cyclone (m) = length of cone of cyclone (m) 314 Environmental Engineering Cyclone (m) 314 Environmental Engineering Cyclone (m) 514 Environmental Engineering Cyclone (m) 515 0.80 Inlet width, W 0.21 0.25 0.35 Body
 in well-streamlined gradual contractions is hf, fitting = 0.04 v2/ 2g The head loss at either an entrance or exit of a pipe from or to a reservoir is also given by the hf, fitting equation. Seal—The term "Seal," as used in this Act, shall mean a symbol, image, or list of information. Reprinted by permission of Pearson Education, Inc., New, New York. Work-
energy of rigid bodies J. Programmable logic devices and gate arrays G. Circular Tanks a. On occasion it is necessary to calculate the total injury/illness incident rate of an organization in order to complete OSHA forms. Fluid transport systems (e.g., series and parallel operations) I. Differential Equations A common class of ordinary linear differential
equations is d n y \wedge xh + b0 y \wedge xh + f + b1 n dx dx bn where d + dF dmin = dmax - d + dF dmin = dmax - Dd 440 Mechanical Engineering For a shaft with transition or
 Tolerance Grade, (\Delta D or \Delta d) Basic Size IT6 IT7 IT9 0-3 0.006 0.010 0.025 3-6 0.008 0.012 0.030 6-10 0.009 0.015 0.036 10-18 0.011 0.018 0.043 18-30 0.013 0.021 0.052 30-50 0.016 0.025 3-6 0.008 0.012 0.030 6-10 0.009 0.015 0.036 10-18 0.011 0.018 0.043 18-30 0.013 0.021 0.052 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.025 30-50 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.016 0.01
 -0.007 -0.009 -0.009 Lower Deviation Letter, (\deltal) h 0 0 0 0 0 0 0 k n 0 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.001 +0.00
 +0.043 \text{ u} +0.018 +0.023 +0.023 +0.023 +0.023 +0.023 +0.023 +0.033 +0.041 +0.048 +0.060 +0.070 \text{ Source}: ASME B4.2:2009 As an example, 34H7/s6 denotes a basic size of D = d = 34 mm, an IT class of 7 for the hole, and an IT class of 6 and an "s" fit class for the shaft. °F FOR SATURATED LIQUID AT -40^{\circ}F 60 70 40 120 20 100 0 80 -20 2000 Refrigerant 134a
(1,1,1,2-Tetrafluoroethane) Properties of Saturated Liquid and Saturated Vapor Temp.,* °F Pressure, psia Density, lb/ft3 Volume, ft3/lb Liquid Vapor Enthalpy, Btu/lb-°F 0.27923 0.2829 0.1399 1.1637 0.0840 0.00178 -153.94a -31.878 80.907 -0.08791 0.27629 0.2830 0.1411 1.1623 0.0832 0.00188 -150.00 260.63
29.04682.304 - 0.078910.269410.28340.14431.15890.08130.00214 - 140.00156.50 - 26.20883.725 - 0.070170.263290.28420.14751.15590.07750.00265 - 120.000.58395.2762.763 - 20.50086.629 - 0.053370.253000.28660.15401.15090.0757
0.02433 0.22615 0.3088 0.1945 1.1573 0.0586 0.00565 -5.00 Thermodynamics 162 -0.09154 568.59 Vapor Temp.,* °F 80.362 99.33 Vapor Thermal Conductivity Btu/hr-ft-°F Vapor 0.057 Liquid Cp/Cv Liquid -153.94a Vapor Entropy, Btu/lb-°F Refrigerant 134a (1,1,1,2-Tetrafluoroethane) Properties of Saturated Liquid and Saturated Vapor (cont'd)
23.777 83.83 1.9330 13.764 103.889 0.03107 0.22502 0.3117 0.1995 1.1619 0.0571 0.00592 5.00 10.00 26.628 83.29 1.7357 15.328 104.617 0.03440 0.22403 0.3147 0.2047 1.1674 0.0556 0.00619 15.00 20.00 33.124 82.19 1.4094 18.481
returned. The declaration of "pointer to" is used to define a variable of a pointer type Flow Chart Definition PROCESS OPERATION DATA I/O START OR STOP POINT DOCUMENT DECISION DATABASE Software Testing There are many approaches to software testing but they are typically split into static testing versus dynamic and black box versus
white box testing. Organic chemistry (e.g., nomenclature, structure, balanced equations, reactions, synthesis) C. 244 Chemical Engineering Continuous Distillation (Binary System) Constant molal overflow is assumed. Phase margin (PM), which is the additional phase required to produce instability. Used by permission. COMPRESSIVE STRENGTH,
PSI 6,000 CONTINUOUSLY MOIST CURED IN AIR AFTER 28 DAYS IN AIR AFTER 3 DAYS 5,000 IN AIR AFTER 3 DAYS 5,000 IN AIR AFTER 3 DAYS 6,000 IN AIR AFTER 3
combination of size, form, orientation, and location. Yield - Moles of desired product formed/moles that would have been formed if there were no side reactions and the limiting reactant had reacted completely. d(cos u)/dx = -sin u du/dx 18. Materials selection I. 316 Environmental Engineering Electrostatic Precipitator Efficiency Deutsch-Anderson
equation: where \eta = 1 - e(-WA/Q) \eta W A Q = fractional collection area = volumetric gas flowrate Note that any consistent set of units can be used for W, A, and Q (e.g., ft/min, ft2, and ft3/min). Involves complex analysis of the surface to determine axis location. Stress and strain caused by torsional collection area = volumetric gas flowrate Note that any consistent set of units can be used for W, A, and Q (e.g., ft/min, ft2, and ft3/min).
loads F. The Steinhart-Hart equation is often provided as a more precise model for thermistors: 3 1 = + ^ h + _ ^ hi T A B ln R C ln R Where the thermistor manufacturer will provide the coefficients A, B, and C. The standard specifies that uppercase letters always refer to the hole, while lowercase letters always refer to the shaft. Thus, dynamic
similarity between two flow pictures (when all possible forces are acting) is expressed in the five simultaneous equations below. 780. Maintaining Access 5. Rule #2 All Applicable Geometric Tolerances RFS applies, with respect to the individual tolerance, datum reference, or both, where no modifying symbol is specified. Basin width is determined by
the scraper width (or multiples of the scraper width) c. 21. Acids and bases (e.g., pH, buffers) C. In a nonideal op amp the CMRR is used to measure the relative degree of rejection between the differential gain and common-mode gain. If the frame is not received, the received, the receiver will transmit a NAK message indicating the frame was not received after an account of the scraper width (or multiples of the scraper width) c. 21. Acids and bases (e.g., pH, buffers) C. In a nonideal op amp the CMRR is used to measure the relative degree of rejection between the differential gain and common-mode gain. If the frame is not received, the received after an account of the scraper width) c. 21. Acids and bases (e.g., pH, buffers) C. In a nonideal op amp the CMRR is used to measure the relative degree of rejection between the differential gain and common-mode gain. If the frame is not received after an account of the scraper width (e.g., pH, buffers) C. In a nonideal op amp the CMRR is used to measure the relative degree of rejection between the differential gain and common-mode gain.
appropriate time has expired. Depending on what kind of option we are dealing with, the next two fields may be set: the Option-Data field contains the value of the option, if applicable. Resultants of force systems B. Managing Agent—The term "Managing Agent," as used in this Act,
shall mean an individual who is licensed under this Act and who has been designated pursuant to Section 160.20 of this Act by the firm. Experience credit. Fluid properties B. Process safety, risk assessment, and hazard analysis (e.g., layer of protection analysis, hazard
and operability [HAZOP] studies, fault and event tree analysis, dispersion modeling) D. Padding The TCP header padding is used to ensure that the TCP header ends, and data begins, on a 32 bit boundary. Power electronics (e.g., rectifiers, inverters) 7-11 10. Rectangular Tanks a. Chemistry and Biology A. For both IPv4 and IPv6, the
network address ranges can be specified in slash (/) - CIDR (Classless Inter-Domain Routing) notation after the address. 17. Common replacement policies are: • Least recently used (LRU): Replace the least recently used block. 284 In. In. In. Civil Engineering AISC Table 3-2 Zx W Shapes - Selection by Zx Zx in.3 φbMpx kip-ft W21 x 55
W14 \times 74 \ W18 \times 60 \ W12 \times 79 \ W14 \times 68 \ W10 \times 8126 \ 126 \ 123 \ 119 \ 115 \ 113 \ 473 \ 473 \ 461 \ 446 \ 431 \ 424 \ W18 \times 55 \ W12 \times 72 \ Shape \ W24 \times 55 \ W18 \times 65 \ W12 \times 72 \ Shape \ W24 \times 55 \ W18 \times 65 \ W12 \times 72 \ Shape \ W24 \times 57 \ Fy = 50 \ ksi \ 503 \ 499 \ 495 \ 488 \ 484 \ Lr \ ft. For fragments except the last have the MF flag set. The NCEES FE Reference
Handbook is the only reference material that can be used during the exam. Radiation heat transfer D. In steels, quenching austenite [FCC (γ) iron] can result in martensite instead of equilibrium phases—ferrite [BCC (α) iron] and cementite (iron carbide). fe80::/10 
performance (e.g., steady-state errors, settling time, overshoot) 6-9 13. Sliding window protocols automatically adjust the transmission speed to both the speed of the network and the rate at which the receiver sends new acknowledgements. Inactive Status—Licensees who are not engaged in engineering practice that requires licensure in this
jurisdiction may be granted inactive status. ::ffff:0:0/96 ::ffff:0:0.0.0 ::ffff:0:0.0.0 ::ffff:0:0.0.0.0 ::ffff:0:0.0.0 ::ffff:0:0.0 ::ffff:0:0.0
 software engineering to determine the efficiency of an algorithm. 225. DIAMETER The symbols used to indicate diameter, radius, spherical diameter or radius, as applicable. Risk is the chance or probability that a person will experience
n iB S where ni = K + i S for i = 1 to n si i Non-steady State Continuous Flow dx = Dx + n - k - Di x 0 d dt Steady State Continuous Flow n = D with kd 1 MGD: weir overflow rates should not exceed 15,000 gpd/ft Horizontal Velocities 1. (a) The FE examination may be taken by a college senior or graduate of an engineering program of
                            more accredited by EAC/ABET, of a program that meets the requirements of the NCEES Engineering Education Standard, or of an engineering master's program accredited by EAC/ABET. Reduction Ratio Types of Equipment Hard Soft 60 5 60 12 1 4 20 1 2 4 0.2 0.4 3 to 1 5 to 1 10 to 1 A to B A to E C to G Hard Hard 0.185 0.046
0.033 0.0058 0.023 0.003 0.003 0.003 0.0003 0.003 0.0003 0.003 0.0003 0.003 0.0003 0.003 0.0003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 0.003 
 the computed interest rate of the bond value when compared with the bond cost. Earthwork and volume computations D. Reactivity hazards (e.g., inerting, runaway reactions, compatibility) 5-8 17. The formula expressing the Laws of Friction is F \le \mu N where \mu = 1 the coefficient of friction. Designers may couple cores in a multicore device tightly or
loosely. However, a high level of technical expertise without adherence to ethical guidelines is as much a threat to public welfare as is professional incompetence. Risk Assessment/Toxicology Dose-Response Curves TOXIC RESPONSE (PERCENT) The dose-response curve relates toxic response (i.e., percentage of test population exhibiting a specified
symptom or dying) to the logarithm of the dosage [i.e., mg/(kg•day) ingested]. or its affiliates Table of contents: Units and Conversion Factors.
                                                                                                                                                                                                                                                                                                                                                  .85Materials Science/Structure of
Statistics
                                                                                                                                          .63Chemistry and Biology
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pointer is the object's location in memory. If the forces serve to increase the energy of the system, U1 \rightarrow 2 is positive. For example, for the stoichiometric combustion in Air For each mole of oxygen, there will be 3.76 moles of nitrogen. Thermodynamics T Temp. A O2 2 \theta2 B 3 4 1 GROUND
I 14 \infty I 23 I 34 I12 122 Dynamics The figure shows a fourbar slider-crank. K. The link layer or data link layer contains protocols for transmissions between devices on the same link and usually handles error detection and correction and correction and correction and correction and section and correction and correction
discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof; 2 Design patents may be granted to anyone who invents or discovers and
asexually reproduces any distinct and new variety of plant. Analytic geometry E. For the ideal operational amplifier, assume that the input currents are zero and that the gain A is infinite so when operating linearly v2 - v1 = 0. In changing the deformation in the spring from position s1 to s2, the change in the potential energy stored in the spring is V2
- V1 = k \hat{} s 22 - s12 j /2 Work Work U is defined as U = \int F \cdot dr Variable force U F = \int F \cos \theta ds Constant force U F = Fc cos \theta As Weeight UW = - W \Delta y (1 2 1 2 Us = - | k s 2 - k s 1 2 \ 2 Couple moment U M = M (\|\) Spring Power and Efficiency P= dU = F \cdot v dt \varepsilon = F \cdot v dt \varepsilon = F \cdot v dt v \in 
ed., Prentice Hall, 2003. Licensees shall not knowingly provide false or incomplete information regarding an applicant in obtaining licensure. Codes of ethics (e.g., professional and technical societies, NCEES Model Law and Model Rules) B. Closed-loop response, open-loop response, and stability D. Transducer Sensitivity - the ratio of change in
electrical signal magnitude to the change in magnitude of the physical parameter being measured. Emissions (e.g., factors, rates) D. Numerical methods (e.g., numerical integration, approximations, precision limits, error propagation) 5-8 2. d(cot u)/dx = -csc2 u du/dx 20. Safety, Health, and Environment A. Thermodynamic processes (e.g.,
isothermal, adiabatic, reversible, irreversible, irreversible, irreversible, irreversible) E. 27 Safety Intake Rates—Variable Values EPA-Recommended Values EPA-Recommended Values for Estimating Intake Parameter Standard Value Average body weight, female adult Average body weight, male adult Average body weight, childa 65.4 kg 78 kg 6-11 months 9 kg 1-5 years 16 kg 6-12 years 33 kg Amount of water
ingested, adult 2.3 L/day Amount of air breathed, child (3-5 years) 1.5 L/day 4mount of air breathed, male adult Amount of air breathed, male adult adult ad
m3/hr adult (2-hr day) 1.47 m3/hr child 0.46 m3/hr Skin surface available, adult male 1.94 m2 Skin surface available, adult female 1.69 m2 Skin surface available, adult female 1.69 m2 12-15 years (average for male and female) 0.720 m2 6-9 years (average for male and female) 1.16 m2 12-15 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 m2 6-9 years (average for male and female) 1.720 
and female) 1.49 m 2 15-18 years (female) 1.60 m2 15-18 years (female) 1.75 m2 Soil ingestion rate, child 1-6 years > 100 mg/day Skin adherence factor, wet soil 0.2 mg/cm2 Exposure duration Lifetime (carcinogens, for noncarcinogens use actual
exposure duration) 75 years At one residence, 90th percentile 30 years National median 5 years Averaging time (ET) 48 days/year 350 days/year Shower, 90th percentile 12 m i n Shower, 50th percentile 7 min a Data in this
category taken from: Copeland, T., A. Laboratory and field tests D. Buckingham Pi Theorem: The number of independent dimensionless groups that may be employed to describe a phenomenon known to involve n variables is equal to the number of basic dimensions (e.g., M, L, T) needed to express the variables
dimensionally. Test methods and specifications of metals, concrete, aggregates, asphalt, and wood C. Measurement uncertainty (e.g., error propagation, accuracy, precision, significant figures) 7-11 490 5-8 14. In the OSI model, the application layer interacts with the presentation layer. Joining methods (e.g., welding, adhesives, mechanical fasteners)
J. Network types (e.g., LAN, WAN, internet) D. A power series may be differentiated term by term within its interval of convergence. Equipment selection and monitoring (e.g., O2, CO, CO2, CH4, H2S, radon) D. Superior 0.7 Perforated
inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders. Heap Sort: divides a list into sorted list and moves it to the bottom of the sorted list. Reproduced by permission of Oxford University Press. Position Analysis. Knowingly making false
statements or signing false statements, certifications, or affidavits in connection with the practice of engineers must maintain a high level of technical competence. Graph: collection of nodes and a set of edges which connect a pair of nodes. The circumstances leading to the violation c.
Anode - The electrode at which oxidation occurs. Fourier transforms/Fourier series C. Compressible flow and non-Newtonian fluids 8-12 7. 57 Mathematics Matrix Properties Suppose A is N × N over real numbers. Amplifiers (e.g., single-stage/common emitter, differential, biasing) C. It relieves the application layer of concern regarding syntactical
differences in data representation within the end-user systems. If they are not equal, the half in which the target cannot lie is eliminated and the search continues on the remaining half, again taking the middle element to compare to the target value, and repeating this until the target value is found. Graph Traversal There are primarily two algorithms
used to parse through each node in a graph. Each possible outcome (C1, C2,..., CY) has a probability (p1, p2,..., py) associated with it. The 6-hour time also includes a tutorial and an optional scheduled break. Heating, ventilation, and air-conditioning (HVAC) processes K. Control systems (e.g., feedback, block diagrams) C. M. In ARQ, each packet
contains an error detection process (at the link layer). This individual's education must be shown to meet the NCEES Engineering Education Standard. United States Patent and Trademark Office, . Practice of Engineering Education standard. United States Patent and Trademark Office, . Practice of Engineering Education standard. United States Patent and Trademark Office, . Practice of Engineering Education standard.
training, and experience in the application of engineering principles and the interpretation of engineering data to engineering activities that potentially impact the health, safety, and welfare of the public. Shows result for a particular path through the decision tree. 68 Engineering Probability and Statistics Measurement Uncertainty Measurement
uncertainty is defined as: A quantitative estimate of the range of values about the reported or measured value in which the true value is believed to lie. Learn more about NCEES exam prep materials. But new elements can be decomposed into motions, for which scientifically predetermined times exist in databases called MTM-1, MTM-2, and MTM-3.
There are four protection categories used to offer varying degrees of protection to intellectual property owners: Patents, Trademarks, Copyrights, and Trade Secrets. • First-in, first-out (FIFO): Also referred to as first come, first serve (FCFS) queue. iE1 = vB1 - vB2 i/VT iE2 e iE1 + iE2 = I I I iE2 = iE1 = vB2 - vB1 i vB1 - vB2 i 1+e /VT 1+e /VT
iC1 = aIE1 iC2 = aIE2 The following figure shows a plot of two normalized collector currents versus normalized differential input voltage for a circuit using transistors with α ≅ 1. Stress and strain caused by temperature changes H. Estimation (e.g., point, confidence intervals) B. Basic dimensions must be used to establish the true profile
Representative Values of Fracture Toughness Material A1 2014-T651 A1 2024-T3 52100 Steel 4340 Steel Alumina Silicon Carbide K Ic (MPa • m 1/2) 24.2 44 14.3 46 4.5 3.5 K Ic (ksi-in 1/2) 22.40 13 42 4.1 3.2 Relationship Between Hardness and Tensile Strength For plain carbon steels, there is a general relationship between Brinell hardness and
tensile strength as follows: TS psii - 500 BHN TS ^ MPah - 3.5 BHN ASTM Grain Size SV = 2PL where ^ - h N`0.0645 mm 2 i SV PL N n = grain-boundary surface per unit volume = number of points of intersection per unit length between the line and the boundaries = number of grains observed in
an area of 0.0645 mm2 = grain size (nearest integer > 1) 100 Materials Science/Structure of Matter Composite = heat capacity of composite per unit volume = Young's modulus of composite = volume fraction of individual
material = heat capacity of individual material per unit volume = Young's modulus of individual material = strength parallel to fiber direction Also, for axially oriented, long, fiber-reinforced composites, the strains of the two components are equal. Dynamics (e.g., first- and second-order processes, gains and time constants, stability, damping, and
transfer functions) B. Most sensitive to bending strain. Licensees shall not use confidential information received in the course of their assignments as a means of making personal profit without the consent of the party from whom the information was obtained. Public health, safety, and welfare C. Each group of digits is separated by a colon, e.g.,
2001:0db8:85a3:0000:0000:8a2e:0370:7334. • Internet Protocol (IP) provides end-to-end addressing and is used to encapsulate TCP or UDP datagrams. 128 Dynamics Figure Mass & Centroid Mass Moment of Inertia (Radius of Gyration)2 3 2+ 2 i Ix'x' = Iy'y' = 80 M 4R h 3 I zz = 10 MR 2 1 Iyy= Ixx = 20 M 3 R 2+ 2h 2i 2 = 3 4R 2 + h 2 i r xx2 =
ryy 80 3 2 2 rzz = R 10 2 1 Ixx = Iyy = 4 MR 1 2 Izz = 2 MR 2 3 Izlz = 2 MR 2 3 Izlz = 2 MR 2 = 1 R2 rxx2 = ryy 4 2 1 2 rzz = 2 R3 2 2 rzlz = R2 5 z V = 13 \pi R2 hy' hch4 Ryx CONEzRx 2 1 M = 3 rRhtxc = yc = 0 hzc = 4 t = mass/vol. Digital filters (e.g., difference
equations, Z-transforms) 5-8 9. Calculus (e.g., differential, integral, single-variable, multivariable) C. Q = A2v2 = CcCv A 2q h1 - h2 i in which the product of Cc and Cv is defined as the coefficient of discharge of the orifice. 10. The transformation equation is Inew = Ic + md 2 where Inew = Ic = m = d = mass moment of inertia
about any specified axis mass moment of inertia about an axis that is parallel to the above-specified axis but passes through the body's mass center to the above-specified axis Mass Radius of Gyration The mass radius of gyration is defined as rm = I m Without loss of generality, the body
may be assumed to be in the x-y plane. The sample range R is the largest sample value minus the smallest sample value minus the surname, (2) the ending e of the corresponding saturated hydrocarbon is replaced by ol, (3) the
carbon chain is numbered from the end that gives the hydroxyl group the smaller number, and (4) the side chains are named and their positions indicated by the proper number. Aluminum sulfate in natural alkaline water Al2 (SO4)3 + 3 Ca (HCO3)2 = 2 Al (OH)3 + 3 CaSO4 + 6 CO2 2. Application of the code in many situations is not controversial.
The output of the algorithm is a list of nodes in the order that they have been visited. Taking link 1 (ground) as the reference (X-axis), the angles that links 2, 3, and 4 make with the axis are \theta2, \theta3, and \theta4, respectively. 4.73 5.97 10.8 8.69 9.36 4.77 13.9 18.8 43.0 26.1 57.7 14.3 1350 1070 740 954 623 1170 251 248 194 194 226 256 289 294 284 281
270 259 16.3 8.03 14.5 5.67 7.81 3.95 6.11 8.76 5.93 10.8 8.69 9.29 17.4 31.0 18.2 39.9 29.3 51.1 1140 795 984 662 722 534 234 191 227 175 175 197 420 258 13.9 5.90 17.5 890 212 110 108 413 405 248 256 18.3 5.59 4.59 10.7 13.6 37.4 984 597 237 158 W21 x 48 W16 x 57 W14 x 61 W18 x 50 W10 x 77 W12 x 65 107 105 102 101 97.6 96.8 398
394\ 383\ 379\ 366\ 356\ 244\ 242\ 242\ 233\ 225\ 231\ 14.7\ 12.0\ 7.46\ 13.1\ 3.90\ 5.41\ 6.09\ 5.56\ 8.65\ 5.83\ 9.18\ 11.9\ 16.6\ 18.3\ 27.5\ 17.0\ 45.2\ 35.1\ 959\ 758\ 640\ 800\ 455\ 533\ 217\ 212\ 156\ 192\ 169\ 14.7\ 12.0\ 7.46\ 13.1\ 3.90\ 5.41\ 6.09\ 5.56\ 8.65\ 5.83\ 9.18\ 11.9\ 16.6\ 18.3\ 27.5\ 17.0\ 45.2\ 35.1\ 959\ 758\ 640\ 800\ 455\ 533\ 217\ 212\ 156\ 192\ 169\ 142\ W10\ x\ 58\ W1
191\ 16.8\ 11.4\ 14.6\ 7.93\ 5.66\ 3.86\ 10.8\ 4.45\ 5.62\ 4.56\ 6.78\ 8.87\ 9.15\ 5.55\ 13.0\ 17.2\ 13.7\ 22.2\ 29.9\ 40.6\ 16.5\ 843\ 659\ 712\ 541\ 475\ 394\ 586\ 217\ 185\ 195\ 155\ 13.3\ 7.66\ 5.48\ 3.80\ 4.49\ 6.75\ 8.76\ 9.08\ 13.1\ 21.1\ 28.2\ 36.6\ 612\ 484\ 425\ 341\ 169\ 141
125\ 129\ W16\ x\ 40\ W12\ x\ 50\ W8\ x\ 67\ W14\ x\ 43\ W10\ x\ 54\ 73.0\ 71.9\ 70.1\ 69.6\ 66.6\ 274\ 270\ 263\ 261\ 250\ 170\ 169\ 159\ 164\ 158\ 10.1\ 5.97\ 2.60\ 7.24\ 3.74\ 5.55\ 6.92\ 7.49\ 6.68\ 9.04\ 15.9\ 23.9\ 47.7\ 20.0\ 33.7\ 518\ 391\ 272\ 428\ 303\ 146\ 135\ 154\ 125\ 112\ W18\ x\ 35\ W12\ x\ 45\ W10\ x\ 49\ W8\ x\ 58\ W10\ x\ 40\ W10\ x\ 40\ W10\ x\ 45\ 66.5\ 64.2\ 64.0\ 61.5\ 60.4\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0\ 60.0
59.8 57.0 54.9 249 241 240 231 227 224 214 206 151 151 148 143 143 137 135 129 12.3 5.75 9.31 8.10 3.67 2.56 5.50 3.89 4.31 6.89 5.70 54.9 249 241 240 231 240 241 240 241 240 241 240 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 241 2
in paperback print copies. The application layer is the network layer closest to the end user, which means both the application. For many semiconductors, this leads to a gauge factor between the
two. Online community that provides many open source resources for web application security Cross Site Scripting(XSS) - script injection attack, using a web application to send an attack to another user Cross Site Request Forgery(CRSF) - an attack that forces user to perform unwanted actions with current authorizations. Depreciation and taxes
```

(e.g., MACRS, straight line, after-tax cash flow, recapture) 5. Padded at the end with "0" bytes if necessary.) ... 151 Thermodynamics Closed-System Exergy (Availability functions and φ is availability function. - d_sec 1 u i = 1 du 2 dx - u u

the rate equation is used for elementary enzyme-catalyzed reactions and for elementary surfaced-catalyzed reactions. Simplex A single channel where communications is one direction only. The allowable stress σ is then given by $Sy = \sigma = 0.78Sut$ cold-drawn carbon steel (A227, A228, A229) $Sy = \sigma = 0.87Sut$ hardened and tempered carbon and low-

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two values. • Write-through: Write to both the cache's copy and the main memory's copy. Graduating from an engineering program of four years or more accredited by the Engineering master's program accredited by EAC/ ABET, or meeting the requirements of the
NCEES Engineering Education Standard b. o C T 0.01 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120 125 230 235 240 245 250 255 260 265 270 275 280 285 290 295 300 305 310 315 320 330 340 350 360 370 374.14 Sat. Used to
 control form or combinations of size, form, orientation, and location. B - C \geq 0, or B/C \geq 1 Modified Accelerated Cost Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery System (MACRS) MACRS FACTORS Recovery Period (Years) Year 3 5 7 10 Recovery Year 3 5 7 10
65.768.927.3778.936.5584.466.5596.56106.55113.28 Economic Decision Trees: D1 ... Decision maker chooses 1 of the available paths. Statics A. The lift coefficient CL can be approximated by the equation CL = 2\pi k1\sin(\alpha + \beta), which is valid for small
values of \alpha and \beta where k1 = constant of proportionality \alpha = angle of attack (angle between chord of airfoil and direction of flow) \beta = negative of angle of attack for zero lift. The drag coefficient The aspect ratio AR is defined 2 Ap AR = b = 2 Ap c 198 Fluid
Mechanics where b = span length Ap = plan area c = chord length The aerodynamic moment M is given by <math>M = CM tv 2Apc 2 where the moment is taken about the front quarter point of the airfoil. The complete solution for the differential equation is y(x) = yh(x) + yp(x), where yp(x) = yh(x) + yp(x) and yp(x) = yh(x) + yp(x).
 centroids, moments of inertia, radius of gyration, parallel axis theorem) G. For example, cores may or may not share caches, and they may implement message passing or shared memory intercore communication methods. Polymer Additives Chemicals and compounds are added to polymers to improve properties for commercial use. 103 Materials
 Science/Structure of Matter Amorphous Materials Amorphous Materials such as glass are non-crystalline solids. 2r A unit normal distribution table is included at the end of this section. Safety 50 100 COPPER, AL BRONZE, TIN BRONZE = < 0.002 IN. Numerical methods (e.g., algebraic equations, roots of equations, approximations, precision limits
convergence) D. Multiplexing (e.g., time division, frequency division, frequency division) D. Break ties arbitrarily. Recarbonation Ca2+ + 2OH- + CO2 \rightarrow CaCO3(s) + H2O Molecular Formulas CO32- CO2 Ca(OH)2 CaCO3 Ca(HCO 3)2 CaSO4 Ca2+ H+ HCO3- Mg(HCO3)2 Mg(OH)2 MgSO4 Mg2+ Na+ Na 2CO3 OH - SO42- Molecular Weight n # Equiv per
mole 2 2 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 2 2 2 1 1 2 1 2 60.0 44.0 74.1 100.1 162.1 136.1 40.1 1.0 61.0 146.3 58.3 120.4 24.3 23.0 106.0 17.0 96.1 Coagulation Equations Insoluble products are shown in italics. Zone at LMC (Ø9.8) 10±0.2 Form 0.1 Tol. Tree Traversal There are three primary algorithms that are used to traverse a binary tree data structure. Place on
probation, fine, recover costs from, and/or reprimand 2. Fx = \muFz With the slope angle \alpha Fx = \muFx With the slope angle \alpha Fx = \mu
 Q\rho(v1 - v)(1 - \cos \alpha) Fy = Q\rho(v2y - v1y) = + Q\rho(v1 - v) sin \alpha where v = v sin \alpha sin \alpha sin \alpha where v = v sin \alpha sin \alpha
 Electromagnetics A. Zone 0.1 A 10\pm0.2 A Parallelism Datum A \emptyset5\pm0.2 Ø 0.1 M A B C 5 5 15 C Ø 0.1 Tol. Transient processes E. # cos 2 x dx = 2 + 4 14. If at \omega = \omega180, \angle G(j\omega180) = -180^\circ; then GM = -20\log10 ` G _j\sim180i j b. 56 Mathematics Matrices A matrix is an ordered rectangular array of numbers with m rows and n columns. The integral
 equations can be used along with the following methods of integration: A. 63 Engineering Probability and Statistics Permutation is a particular sequence of a given set of objects. Person.—The term "Person," as used in this Act, shall mean an individual or firm. Molar Volume of an Ideal Gas [at 0°C (32°F) and 1 atm
(14.7 psia)]; 22.4 L/(g mole) [359 ft3/(lb mole)]. Microprocessors B. Cost analysis (e.g., incremental, average, sunk, estimating) C. 0.0749 62.3 Heat Transfer There are three modes of heat transfer: conduction, convection, and radiation. The simplest alkynes have a single carbon-carbon triple bond with the general formula of CnH2n-2. Co vs. hi = he
as used in this Act, shall mean a professional engineer or a professional engineer by verbal claim, sign, advertisement, letterhead, or card or in any other way c. For constructing Mohr's circle only, shearing stresses are
 plotted above the normal stress axis when the pair of shearing stresses, acting on opposite and parallel faces of an element, forms a clockwise couple. Weight and mass computations (e.g., slug, lbm, lbf, kg, N, ton, dyne, g, gc) 9-14 9. Press. Analyses (e.g., breakeven, benefit-cost, life cycle, sustainability, renewable energy) D. Process Control A. The
 rank of a matrix is equal to the number of rows that are linearly independent. 6 Ethics and Professional Practice J. PC h1 + h2 AV 2 46.5 L = (based on riding comfort) (2,158 A L = 2S - Sag Vertical Curve 200 Civil Engineering M = R 81 - cos _ I 2i E + R = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = R - M = cos _ I 2i R c = 2R sin _ d 2i l = Rd b r l 180 E = Rd b r l 180
where 1 - 1G cos _ I 2i c = length of sub-chord L = length of sub-chord L = length of sub-chord L = length of curve, arc definition L = length of long chord L = length of sub-chord L = length sub-chord L = length of sub-chord L = length sub-chord L =
 middle ordinate PC = point of curve (also called BC) PI = point of intersection PT = point of intersec
 lateral acceleration [use 1 ft/sec3 unless otherwise stated] HSO = R Sight Distance (to see around obstruction) [1 − cos (28.65 S R HSO = Horizontal sight line offset 302)] Civil Engineering Basic Freeway Segment Highway Capacity (mph)
 (pc/h/ln) (pc/
  Edition assuming all calibration factors (CAF and SAF) set to 1.0 where pc/h/ln = passenger cars per hour per lane Level of Service (LOS) Density (pc/mi/ln) A B C D E \leq11 > 11 - 18 > 18 - 26 > 26 - 35 > 35 - 45 Demand exceeds capacity > 45 F where FFS = BFFS - fLW - fRLC - 3.22 TRD0.84 FFS = free flow speed of basic freeway segment (mph)
 BFFS = base free flow speed of basic freeway segment (mph); default is 75.4 mph fLW = adjustment for right-side lateral clearance (mph) TRD = total ramp density (ramps/mi) Average Lane Width (ft) Reduction in FFS, fLW (mph) \geq 12 \geq 11 - 12 \geq 10 - 11 \ 0.0 \ 1.9 \ 6.6 Right-Side Lateral Clearance (ft) 2 3 4 \geq 5 \geq 60 \ 6.0
5 4 3 2 1 0 0.0 0.6 1.2 1.8 2.4 3.0 3.6 0.0 0.4 0.8 1.2 1.6 2.0 2.4 0.0 0.2 0.4 0.6 0.8 1.0 1.2 0.0 0.1 0.2 0.3 0.4 0.5 0.6 Lanes in One Direction HCM: Highway Capacity Manual, 6th ed., A Guide for Multimodal Mobility Analysis, Transportation Research Board of the National Academics, Washington, DC, 2016. Death is likely. of H2O in. Radial and
Transverse Components for Planar Motion y eθ er r θ PATH 114 x Dynamics Unit vectors er and eθ are, respectively, collinear with and normal to the position vector r. Datums can be used where necessary to define design intent differently. Thermocouple (TC) – a device using the Seebeck effect to sense temperature differences. Force systems (e.g.
 resultants, concurrent, distributed) C. Each square in the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so that the adjacent squares of the K-Map are arranged so the K-Map are arranged so the K-Map are 
 highest dose (ppm by volume in the atmosphere) the body is able to detoxify without any detectable effects. STOKES-CUNNINGHAM CORRECTION FACTOR IS INCLUDED FOR FINE PARTICLES SETTLING IN AIR. Clean blocks need not be written back when they are evicted. Columns of A are linearly independent. Diameters must match the
 change in length (strain): GF = where DR R DR R = f DL L R = nominal resistance of the strain gauge at nominal length \DeltaL \epsilon = nominal resistance of the strain sensed by the gauge For metals, the change in resistance due the change in resistance due the change in resistance of the strain sensed by the gauge For metals, the change in resistance due the change in resistance of the strain sensed by the gauge For metals, the change in resistance due the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sensed by the gauge For metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the change in resistance of the strain sense for metals, the strain sense for metals, the strain sense for metals, the strain sense for metals are strain sense for metals.
for the delivery and formatting of information to the application layer for further processing or display. A is nonsingular. The first fragment has an offset of zero. RFC 2675 specifies that the length field is set to zero if the length of the UDP header plus UDP data is greater than 65,535. Computer Systems A. Modeling and Quantitative Analysis A.
P0 = P2 + (\gamma 2 - \gamma 1)h = P2 + (\gamma 2 - \gamma 1)h = P2 + (\rho 2 - \rho 1)gh Note that the difference between the two densities is used. NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B = A + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND Gates: A + B + B A NAND A C NAND 
 analyses (e.g., breakeven, benefit-cost, optimal economic life) D. A simple peizoelectric transducer generates electrical charge that is proportional to an applied electric field. F. Length Chemical Engineering Angle of Repose SOLIDS ANGLE OF REPOSE Crystallization Processes
Hydrate Formation Phase Diagram for Magnesium Sulfate-Water System 220 • H2 0 q MgS0 160 d •6H 20 180 Mg S0 4 140 120 k l j 0 Ice 0.05 Ice + Eut Ice + + Soln b a 0.10 0.15 MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 p e Soln + MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 p e Soln + MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 p e Soln + MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 p e Soln + MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 p e Soln + MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 0 0.25 0.30 MgS04 • 12H20 0 0.25 0.30 MgS04 • 7H20 0 0.25 0.30 MgS04 • 12H20 0 0.25 0.3
Soln + MgS04 • H20 i 100 Mg TEMPERATURE (°F) 4 200 h f MgS04 • 12H20 g + MgS04 0.35 0.40 0.45 0.50 CONCENTRATION (MASS FRACTION MgS04) McCabe, Warren L.; Julian C. Extending the line through I12 and I23 and the line through I14 to their intersection locates I13, which is common to the two groups of links that were
considered. 22. When the thickness of the cylinder wall is about one-tenth or less of inside radius, the cylinder can be considered as thin-walled. Threaded Fasteners - Design Factors: The bolt load factor is nb = (SpAt - Fi)/CP where Sp = proof strength The factor of safety guarding against joint separation is ns = Fi / [P (1 - C)] 436 Mechanical
Engineering Threaded Fasteners - Fatigue Loading: If the externally applied load varies between zero and P, the alternating stress is \sigma = CP/(2At) and the mean stress is \sigma = CP/(2A
  Failure by Rupture where \sigma = F/A MEMBER RUPTURE F = load A = net cross-sectional area of thinnest member Failure by Crushing of Rivet or Fastener where \sigma = F/A MEMBER RUPTURE G = routhing for thinnest plate Fastener
 Groups in Shear FASTENER GROUPS The location of the centroid of a fastener group with respect to any convenient coordinate frame is: n x = / Ai xi i=1 n / Ai i=1 n /
  = x-coordinate of the center of the ith fastener = y-coordinate of the center of the ith fastener The total shear force on a fastener is the vector sum of the force due to direct shear P and the force due to the moment M acting on the group at its centroid. Used for desliming and primary dewatereing. Instrumentation and Controls A. 100.64.0.0/10
 100.64.0.0- 100.127.255.255 4194304 127.0.0.0/8 127.0.0.0/8 127.0.0.0/8 127.0.0.0/16 169.254.0.0- 169.254.0.0- 169.254.0.0- 169.254.0.0- 169.254.0.0- 169.254.0.0- 169.254.0.0- 172.31.255.255 172.16.0.0/12 172.31.255.255 172.16.0.0/12 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255.255 172.16.0.0- 172.31.255 172.16.0.0- 172.31.
 chemical engineering, often use the symbol R to refer to the universal gas constant R. P. Manufacturability (e.g., limits, fits) K. If the board determines that the applicant does not meet the requirements for issuance of a license will be
 issued. The planet gear(s) mesh with the sun gear on one side and with the ring gear on the other. Jaw crushers B. # tag bits = # address bits - # block offset (4 bits) Specifies the size of the TCP header in 32-bit words. Water budget (e.g.
evapotranspiration, precipitation, infiltration, soil moisture, storage) 483 4-6 9-14 11. Ordinary differential equations (e.g., homogeneous, nonhomogeneous, nonhomogeneous, nonhomogeneous, laplace transforms) D. Project selection (e.g., comparison of projects with unequal lives, lease/buy/make, depreciation, discounted cash flow, decision trees) 6-9 8. The board shall have the
 power to suspend, revoke, place on probation, fine, recover costs, and/or reprimand, or to refuse to issue, restore, or renew a license or intern that is found quilty of: 1. Structural determinacy and stability analysis of beams, trusses, and frames E. Node and loop analysis E. # index bits = log2(# sets) = log2(S)
  Block Offset - These are the lower bits of the address that select a byte within the block. (www.ashrae.org). Conduction B. The economic benefits gained by the violator as a result of noncompliance e. Physical (phase diagrams) properties of materials (e.g., alloy phase diagrams, phase equilibrium, and phase change) B. This field limits a datagram's
 lifetime. Electricity and Magnetism A. Waveform analysis (e.g., RMS, average, frequency, phase, wavelength) F. The modifier defines the plus sign yields the crossed solution. 89 Important Families of Organic Compounds FAMILY 90 Alkene
 ketone Acetic Acid O O RCH R1CR2 O O O C C Alcohol Ether Amine CH3CH2CH CH3
C-C bonds C=C -C =C- Aromatic Ring C X C OH C O C C N Aldehyde O C H Ketone Methyl Methyl acetate O O RCOH RCOR O OH C O C Chemistry and Biology Specific Example Alkane Chemistry and Biology Specific Exampl
Styrene — — — Gypsum Limestone Dolomite Bauxite Anatase Rutile — — Pyrite Epsom salt Hydroquinone Soda ash Salt Potash Baking soda Lye Caustic soda — Carbolic acid Aniline — Toluene Xylene — — Brine Battery acid Chemical Name
Hydrochloric acid Isopropyl benzene Vinyl benzene Hypochlorite ion Chlorite ion Chlorite ion Chlorite ion Chloride Ethylene oxide Ferrous sulfide Magnesium carbonate Aluminum dioxide Vinyl benzene Sodium carbonate Sodium chloride
 Potassium carbonate Sodium hydroxide Sodium hydroxide Vinyl alcohol Phenol Aminobenzene Urea Methyl benzene Silane Ozone 2,2-Dimethylpropane Ferrous/ferric oxide Mercury Deuterium oxide Borane Boric acid (solution) Deuterium Tritium Nitrous oxide Phosgene Tungsten Permanganate ion Dichromate
  ion Hydronium ion Sodium chloride (solution) Sulfuric acid 91 Molecular Formula HCl C6H5CH(CH3)2 C6H5CH=CH 2 OCl-1 ClO2-1 ClO2-1 ClO3-1 ClO4-1 CaSO4 CaCO3 NaCl K2CO3 NaCl K2CO3 NaCl CH5CH3 (NH2)2CO C6H5CH3 C6H4(CH3)2 C6H5CH3 C6H4(CH3)2 C6H5CH3 C6H4(CH3)2 C6H5CH3 C6H4(CH3)2 C6H5CH3 C6H5CH3 C6H5CH3 C6H5CH3 C6H5CH3 C6H5CH3 C6H4(CH3)2 C6H5CH3 
SiH4 O3 CH3C(CH3)2CH3 Fe3O4 Hg 2 H 2O BH3 H3BO3 2 H 3 H N 2O COCl2 W MnO4-1 Cr2O7-2 H3O+1 NaCl H2SO4 Chemistry and Biology Electrochemistry Cathode - The electrochemistry and Biology Electrochemistry Cathode - The ele
 pressure feed generates centrifugal action to give high separating forces, and discharge. Physical processes (e.g., sedimentation, filtration, adsorption, membrane, flocculation, headworks, flow equalization, air stripping, activated carbon) D. CM = moment coefficient p = fluid density v = velocity AERODYNAMIC MOMENT CENTER
 CAMBER LINE \alpha V c 4 c CHORD Properes of Water (SI Metric Units) Temperature (°C) Specific Weight \gamma (kN/m3) Density \rho (kg/m3) 0 5 10 15 20 25 30 40 50 60 70 80 90 100 9.805 9.807 9.804 9.779 9.764 9.730 9.689 9.642 9.589 9.530 9.466 9.399 999.8 1000.0 999.7 999.1 998.2 997.0 995.7 992.2 988.0 983.2 977.8 971.8 965.3 958.
  1.168\ 1.069\ 0.981\ 0.905\ 0.838\ 0.780\ 0.726\ 0.678\ 0.677\ 0.678\ 0.678\ 0.678\ 0.678\ 0.678\ 0.678\ 0.678\ 0.678\ 0.679\ 0.688\ 0.799\ 0.667\ 0.699\ 0.826\ 0.799\ 0.667\ 0.699\ 0.826\ 0.799\ 0.667\ 0.699\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.826\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 0.799\ 
CR1). However, strong involuntary reactions to shocks in this range may lead to injuries. Risk is expressed by the equation: Risk = Hazard × Probability When people discuss the hazards of disease-causing agents, the term exposure is typically used more than probability. To generate the transmitted frame from the receiver, the following equation is
used: where T(x)/G(x) = E(x) T(x) = E(x)
 probability that component i is functioning, a reliability function R(P1, P2, ..., Pn) represents the probability that a system consisting of n components will work. Employee or a subordinate of an individual practicing lawfully
  under Subsection B of this section, provided such work does not include final engineering or surveying designs or decisions and is done under this Act or an individual practicing lawfully under Subsection B of this section. 81 0.99 0.0000 0.0000 0.0000
 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00000 \ 0.00
 Statistical Quality Control Average and Range Charts n A2 2 3 4 5 6 7 8 9 10 1.880 1.023 0.729 0.577 0.483 0.419 0.373 0.337 0.308 Xi n k R D3 0 0 0 0 0.076 0.136 0.184 0.223 D4 3.268 2.574 2.282 2.114 2.004 1.924 1.864 1.816 1.777 = an individual observation = the sample size of a group = the number of groups = (range) the difference
 between the largest and smallest observations in a sample of size n. Basic Electrical Engineering A. Your licensing board may have additional requirements. The uncertainty in R, wR, can be estimated using the Kline-McClintock equation: wR = d w1 2 2 f 2 f 2 f n dw n n g + d wn 2x1 + 2 2x2 + 2xn 2 Control Systems The linear time-invariant transfer
 function model represented by the block diagram X(s) Y(s) G(s) INPUT OUTPUT can be expressed as the ratio of two polynomials in the form M % s - zmi Y ^ sh N ^ sh K m = 1 = G ^ sh = = N X ^ sh D ^ sh % s - zmi Y ^ sh N ^ sh K m = 1 = G ^ sh = = N X ^ sh D ^ sh % s - zmi Y ^ sh N ^ sh K m = 1 = G ^ sh = = N X ^ sh D ^ sh % s - zmi Y ^ sh N ^ sh K m = 1 = G ^ sh = N X ^ sh D ^ sh M ^ sh N ^ sh M ^ sh
D(s), respectively. 72 Engineering Probability and Statistics Table A. Creative problem solving is often called for in ethics, just as it is in other areas of engineering. In addition, tradeoffs revolving around competing issues of risk vs. Updates on exam content and procedures NCEES.org is our home on the web. 0.15 0.20 2. Pressure Versus Enthalpy
Curves for Refrigerant 134a (USCS units) 200 60 65 180 160 75 80 50 55 120 140 40 30 160 3 /FT 15.0 \rho \approx 20 LB 6.0 3.0 140 120 1.0 60 0.80 0.60 40 40 0.40 0 20 OR 360 340 T = 320°F 300 280 260 RATE D VAP 0.20 lb . pH Sensors pH S
measures and displays the pH reading. • Not equals is represented by • Logical "and" are spelled out as "and" and "or" • Variable and argument declarations are Pascal style—"name: type" • Numeric data types are "integer" and "float" • Text is a procedural variable, unless specified to be an object of type String • Variables can be constant.
and are declared with the "const" modifier • Variables whose type is object and the exact specification of that object is not critical to the problem must have the data type obj • Array indices are designated with square brackets [], not parentheses • Unless otherwise specified, arrays begin at 1 (one) • Compilation units are "procedure" and "function".
c n1 + n1 m9 n1 - 1 is 12 + n2 - 1 is 22C 1 2 n1 + n2 - 2 Confidence Intervals for the Variance \sigma^2 of a Normal Distribution n - 1 is 2 + n2 - 1 is 22C 1 2 1 + n2 - 2 Confidence Intervals for the Variance \sigma^2 of a Normal Distribution n - 1 is n - 1
  coefficient, eddy diffusion) C. The goal of the testing is to gain access to the application and its data. Zone Tolerance Zone Definition (for Example) Parallel lines, within which the surface element must lie Zone Modifiers Allowed Datums Used No Refinement of size. 106 Statics Force A force is a vector quantity. The probability of an impossible event
 is 0 and that of an event certain to occur is 1. LSB - least significant bit first. Consequences of Fluid Flow Head Loss Due to Flow The Darcy-Weisbach equation is where L v2 h f = f D 2g f = f(Re, \epsilon/D), the Moody, Darcy, or Stanton friction factor D = diameter of the pipe L = length over which the pressure drop occurs \epsilon = roughness factor for the
 pipe, and other symbols are defined as before An alternative formulation employed by chemical engineers is 2 2f Lv 2 h f = ^{\circ} 4 f Fanning f = 4 A chart that gives f versus Re for various values of \epsilon/D, known as a Moody, Darcy, or Stanton diagram, is available in this section. Consolidation and
 differential settlement J. Can be applied to an axis of a feature in which the zone could be parallel planes or a cylindrical tolerance zone. Death is probable. Transformers (e.g., single-phase and three-phase connections, reflected impedance) D. To use one of them effectively requires about 50 hours of training. 203 Density lb./cu.ft. Suppose that a
 form is often represented as a minterm list, while a function in canonical POS form is often represented as a maxterm list. Definitions Engineering Strain \epsilon = \Delta L/Lo where \epsilon = engineering strain (units) of member Lo = original length (units) of member Lo = original length (units) of member Percent Elongation \epsilon = \Delta L/Lo where \epsilon = engineering strain (units) of member Lo = original length (units) original length (
 Reduction in Area (RA) The % reduction in area from initial area, Ai, to final area, Ai,
 = length of member P A E= v f= d L d = PL AE True stress is load divided by actual cross-sectional area whereas engineering societies, and even by some private industries. Flags (9 bits) (aka Control bits) Contains 9 1-bit
flags • NS (1 bit): ECN-nonce - concealment protection (experimental). Measured by denting a material under known load and measuring the size of the dent. Communications A. Exposure routes and pathways C. The physical transmission parameters (e.g., modulation, coding, channels, data rates) and governs the transmission
of frames from one network element to another sharing a common link. Breadth First Search - Beginning at a given node, the algorithm visits all connected nodes that have not been visited. Signal Processing A. Online practice exams are no longer available. For particle motion, let r(t) be the position vector of the particle in an inertial reference
 frame. 0.015\ 0.020\ 0.030\ 0.040\ TEMPERATURE = 0\ ^{\circ}C\ 0.2\ 700\ 200. # u(x) v(x) - # v (x) du(x) 1 dx 7. Evap. Blind testing—The pen tester is given the name of the company, but nothing else. Knowledge Number of Questions 1. rp = d 2 r/dt 2, etc. For low velocities of sliding, the total frictional force that can be developed is practically
 independent of the sliding velocity, although experiments show that the force F necessary to initiate slip is greater than that necessary to maintain the motion. Test for a Maximum y = f(x) is a maximum for x = a, if f'(a) = 0 and f''(a) < 0. ^{-1}k + 1 h SRS 1 WVW ^{-1}k + 1 h SRS 
 = area [length2] A* = area at the sonic point (Ma = 1.0) Normal Shock Relationships A normal shock wave is a physical mechanism that slows a flow from supersonic to subsonic. n Capacity of Unit A cost of Unit B e Capacity of Unit B or Typical Exponents (n) for Equipment Cost vs. Data are corrected for age, but not for temporary
threshold shift. Merritt, Frederick S., Standard Handbook for Civil Engineers, 3rd ed., McGraw-Hill, 1983. 11 Ethics and Professional Practice Trade Secrets A trade secret applies to a formula, pattern, compilation, program, device, method, technique, or process. Physical parameter (e.g., dimension change, pressure, electrical current) Transducer
 element. Critical Path Method (CPM) T = \text{where / dij \_i, j i!CP dij} = \text{duration of activity (i, j)} CP = \text{critical path (longest path)} T = \text{duration of project 425 Industrial and Systems Engineering PERT aij + 4bij + cij 6 cij - aij <math>\sigmaij = 6 \mu = / \muij \muij = 2 \sigma = _i, j i!CP where (aij, bij, cij) = (optimistic, most likely, pessimistic) durations for activity (i. j. ii) T = Tindustrial and Systems Engineering PERT aij + 4bij + cij 6 cij - aij Tiii T = Tiii Tiiii Tiii Tiii Tiii Tiii Tiii Tiii Tiii Ti
j) \muij = mean duration of activity (i, j) \sigmaij = standard deviation of the duration of activity (i, j) \mu = project mean duration of activity (i, j) \mu = project mean duration of project duration of project duration of project mean duration of project mean duration of activity (i, j) \sigmaij = standard deviation of project mean duration of project mean duration of project mean duration of project mean duration of activity (i, j) \sigmaij = standard deviation of the duration of activity (i, j) \sigmaij = standard deviation of
D = Z\alpha \ 2\ p\ 1 - p\ j and R = Z\alpha \ n\ 2\ 1 - p pn where p\ D\ R\ n = proportion of observed time in an activity = absolute\ error = D/p = sample\ size\ 426 Industrial and Systems Engineering ANTHROPOMETRIC MEASUREMENTS SITTING HEIGHT (NORMAL) THIGH CLEARANCE HEIGHT ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW-TO-ELBOW
 Compressible Flow Mach Number The local speed of sound in an ideal gas is given by: where c = kRT c = local speed of sound cp k = ratio of specific heats = c v R = specific gas constant = R / (molecular weight) T = absolute temperature Example: speed of sound in dry air at 1 atm 20°C is 343.2 m/s. Fluid statics (e.g., pressure, force analysis) But the speed of sound in dry air at 1 atm 20°C is 343.2 m/s. Fluid statics (e.g., pressure, force analysis) But the speed of sound in dry air at 1 atm 20°C is 343.2 m/s. Fluid statics (e.g., pressure, force analysis) But the speed of sound in dry air at 1 atm 20°C is 343.2 m/s.
 Fundamental Constants Quantity Symbol Value Units electron charge e 1.6022 × 10-19 C (coulombs) Faraday constant metric R 8.314 kPa·m3/(kmol·K) gas constant USCS R 1,545 ft-lbf/(lb mole-ºR) R 0.08206 gravitation-Newtonian constant G 6.673 × g
 m3/(kg·s2) Units and Conversion Factors Multiply acre ampere-hr (A-hr) angström (Å) atmosphere (atm) atm, std 
Pa bar 0.987 atm barrels-oil 42 gallons-oil Btu 1,055 joule (J) Btu 2.928 \times 10-4 kilowatt-hr (kWh) Btu 778 ft-lbf/sec calorie (g-cal) cal cal cal/sec centimeter (cm) cm centipoise (cP) ce
 meters (m3) 3.968 \times 10-31.560 \times 10-64.1844.1843.281 \times 10-20.3940.00112.4191 \times 10-60.6463177.4811,000 Btu hp-hr joule (J) watt (W) foot (ft) inch (in) pascal•sec (Pa•s) g/(m•s) lbm/hr-ft m2/sec (m2/s) million gallons/day (MGD) gallon liters electronvolt (eV) 1.602 \times 10-19 joule (J) foot (ft) 30.48 cm ft 0.3048 meter (m) ft of H2O 0.4332
psi ft-pound (ft-lbf) 1.285 \times 10-3 Btu ft-lbf 3.766 \times 10-7 kilowatt-hr (kWh) ft-lbf 0.324 calorie (g-cal) ft-lbf/sec 1.818 \times 10-3 horsepower (hp) gallon (U.S. Liq) 0.134 ft3 gallons of water 0.3453 pounds of 
 hectare hectare horsepower (hp) hp hp hp-hr hp-h
(Ti), Ea = RTT 1 2 ^T1 - T2h ln d k1 n k2 Reaction Order If - rA = kCAxCBy the reaction is x order with respect to reactant A and y order with respect to reactant B. Compressive normal stress components are negative. Header Checksum The 16-bit IPv4 heade
  KPIs, productivity, wage scales, balance scorecard, customer satisfaction) D. Solids Handling A. Since an IPv4 header may contain a variable number of options, this field specifies the size of the header (this also coincides with the offset to the data). • Random: Choose a block at random for replacement. As shown in the figure, lines are then drawn
tangent to these circles. The product is i j k A # B = ax ay az = - B # A bx by bz The sense of A \times B is determined by the right-hand rule. Keith Nisbett, Shigley's Mechanical Engineering Design, 8th ed., New York: McGraw-Hill, 2008, p. Reprinted with permission from 2013 ASHRAE Handbook — REFRIGERANT Fundamentals, ASHRAE: 200 240 1
BASED ON FORMULATION OF LEMMON AND JACOBSEN (2004) Thermodynamics 165 PRESSURE, psia 200 1.5 60 60 400 3.0 80 100 80 100 800 600 6.0 100 2000 3 /FT 120 200 240 \rho \approx 10 LB 8.0 140 0 -20 -85 -40 -60 T = -80°F -90 -120 400 75 [R-32/125 (50/50)] REFERENCE STATE: h = 0.0 Btu/lb, s = 0.00 Btu/lb, s = 0.00 Btu/lb . I xc y c = 0 I xy = 0 Statics 20 I
yc = 16a b 175 3 rx2c = rx2 = b 2 5 ry2c 2 = 12a 175 I y = 4a b 7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ba3/7 ry2 = 3a 2 7 Ix = 2ab3/15 rx2 = b 2 5 Iy = 2ab3/15 rx
 32.174 lbm-ft/sec2. Digital Systems A. There are two possible write policies. Dimensional analysis involves the development of equations that relate dimensionless groups of variables to describe physical phemona. 50 100 150 200 250 300 400 500 600 700 800 900 1000 1100 1200 1300 14.674 14.869 17.196 19.512 21.825 24.136 26.445 31.063
35.679 40.295 44.911 49.526 54.141 58.757 63.372 67.987 72.602 Sat. The minimum size is 20 bytes (header without data) and the maximum is 65,535 bytes. The tests are repeated over a range of temperatures to determine the ductile to brittle transition temperature. In all these examples, gc should be regarded as a force unit conversion factor. A
 vapor-air mixture will only ignite and burn over the range of concentrations between LFL and UFL. Option-Kind, Option-Kind
pK, electrochemistry, periodic table) B. = > 0.05 IN. When calculating the discrete voltage, V, using the reading, N, from the A/D converter the following equation is used. Psychrometrics (e.g., relative humidity, wet bulb) 494 6-9 12-18 6-9 9-14 Rules—The term "Rules," as used in this Act, shall mean those rules and regulations adopted pursuant to
 Section 120.60 A, Board Powers, of this Act. The following heat-engine cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are the reverse of heat-engine cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section: Carnot, Otto, Rankine Refrigeration cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted on P-v and T-s diagrams in this section cycles are plotted
b = 0 The roots of the characteristic equation are a ! a2 - 4b r1, 2 = 2 and can be real and distinct for a2 < 4b. This context switching generally happens frequently enough that the user perceives the threads or tasks as running at the same time. Zone (0.05 Each Side) A uniform boundary equally
 disposed along the true (theoretically exact) profile, within which the surface elements of each crosssection must lie 444 No No (In this example) 0.1 2 Surfaces 0.1 Additional Comments Refinement of size. Licensees may accept assignments and assume responsibility for coordination of an entire project if each
 technical segment is signed and sealed by the licensee responsible for preparation of that technical segment. Some other flags and fields change meaning based on this flag, and some are only valid when it is clear. On a single processor, multithreading is generally implemented by time-division multiplexing (as in
multitasking), and the CPU switches between different software threads. Determinant of A is not equal to zero. A basic BJT differential amplifier consists of two matched transistors whose emitters are connected and that are biased by a constant-current source. SDU = overall selectivity to D = NDf /NUf Two First-Order Irreversible Reactions in Series are connected and that are biased by a constant-current source.
kD\ kU\ A"D"U\ rA = -dCA/dt = kD\ C\ A\ r\ D = dCD/dt = kD\ C\ A\ r\ D = dCD/dt = kD\ C\ A\ r\ D = dCD/dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ C\ D\ r\ U = dCU\ dt = kU\ d\ r\ U = dCU\ dt = kU\ d\ r\ U = dCU\ d\ r\ U = d\ r\ U = dCU\ d\ r\ U = d\ r
 Sciences A. B \u2224 1x Frequently, for approximate analysis B, 1 2x is used as the minimum bandwidth of a pulse of length \u03c4. In the case of a body lying at the interface of two immiscible fluids, the buoyant force equals the sum of the weights of the fluids displaced by the body. Licensees shall not affix their signatures or seals to any plans or documents
 dealing with subject matter in which they lack competence, nor to any such plan or document not prepared under their responsible charge. R 0.1 Tol. The net difference generated at node i is equal to bi. Combined loading-principle of superposition C. Zα corresponds to the appropriate probability under the normal probability curve for a given Zvar
 Surveying; See Model Law Model Law Model Law, Section 150.10, Grounds for Disciplinary Action—Licensees and Interns A. Youngest (last) item is processed first. 212 Heat Transfer The CHF increases with pressure up to about one-third of the critical pressure, and then starts to decrease and becomes zero at the critical pressure. # ax + b = a 1n ax + b 8.
 Geometric design (e.g., streets, highways, intersections) B. Zone Ø10±0.2 Cylindricity 10 B Profile Profile of a Surface C 15 C 0.1 A B D R5 A D 0.1 Tol. Disciplinary Action.—The term "Disciplinary Action," as used in this Act, shall mean any final written decision or settlement taken against an individual or firm by a licensing board based upon a
 violation of the board's laws and rules. External flow F. Energy and Environment A. iC iB V BE E iE Saturation Region : C VCE sat iC iB VBE sat E [ ] ro = \partial vCE \partial ic Cutoff Region : both junctions reverse biased C B E E Same as NPN with current at the
Q point VA = Early voltage i c(t) ib (t) B r ro g mv be ie (t) iE iE PNP - Transistor gm \approx ICQ/VT rn \approx \beta/gm, both junctions forward biased B C Low Frequency: base emitter junction forward biased; base collector juction reverse biased B C Low Frequency: base emitter junction forward biased; base collector juction reverse biased B C Low Frequency Small-Signal (AC) Equivalent Circuit E Same as for NPN. Many models, such as shortest-path,
 presented here. — 3 to 45 — 150 µm to 45 µm (6 mm) 5 to 625 Not critical 0.4 to 8 15 to 25 0.75 to 11 Simple, but gives relatively inefficient separation. Intellectual property (e.g., copyright, trade secrets, patents, trademarks) 3-5 475 Fundamentals of Engineering (FE) CIVIL CBT Exam Specifications Effective Beginning with the July 2020
  Examinations • The FE exam is a computer-based test (CBT). Cyclic processes and efficiencies (e.g., power, refrigeration, heat pump) F. At each particles (FN) and volume of particles (FV) that are smaller than that size. Anaerobic
 Biodegradation of Organic Wastes, Incomplete Stabilization CaHbOcNd \rightarrow nCwHxOyNz + mCH4 + sCO2 + rH2O + (d - nz)NH3 s = a - nw - m r = c - ny - 2s Knowledge of product composition, yield coefficient (n) and a methane/CO2 ratio is needed. Collection systems (e.g., wastewater, stormwater) H. An example is the handling of grain in graining ratio is needed.
bins. Variable Loading Failure Theories Modified Goodman Theory The modified Goodman criterion states that a fatigue failure will occur whenever va vm $ 1 or Se + Sut $ n or Sy $ n , \sigma m $ 5 (with a factor of safety) where Se = endurance limit Sut = ultimate strength Sy =
yield strength \sigma = 1 alternating stress \sigma = 1 mean stress \sigma 
  = * 0.5 Sut, Sut # 1, 400 MPa 4 700 MPa, Sut > 1, 400 MPa, Sut > 1, 400 MPa Endurance Limit Modifying Factors Endurance limit as determined from a rotating beam test, S le , and that which would result in the real part, Se. Se = ka kb kc kd ke S le where Surface Factor, ka =
 aSutb Surface Finish Ground Machined or CD Hot rolled As forged Size Factor, kb: For bending and torsion: d \le 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.718 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 -0.265 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 +0.995 kb = 1 8 mm; kpsi 1.34 MPa 1.58 2.70 4.51 14.4 39.9 57.7 272.0 Exponent b -0.085 kb = 1 8 mm; kpsi 1.34 MPa 1.3
 Factor a axial loading, Sut \leq 1,520 MPa kc = 1 axial loading, Sut \geq 1,520 MPa kc = 1 bending kc = 0.577 torsion Temperature Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd = 1 Miscellaneous Effects Factor, kd: for T \leq 450°C, kd:
 change in temperature \Delta z = \text{change} in elevation The actual (environmental) lapse rate \Gamma is compared to \Gamma and \Gamma are the Condition Unstable Neutral Stable Atmospheric Stability Under Various Condition Unstable Neutral Stable Atmospheric Stable Neutral Stable Atmospheric Stable Atmospheric Stable Neutral Stable Atmospheric Stable Neutral Stable Atmospheric Stable Neutral Stable Neutral Stable Neutral Stable Neutral Stable N
 Moderatec A-B f B B-C C-D D Slightd B C C D D Night Cloudinesse Cloudy Clear (\geq 4/8) (\leq 3/8) E F E F D E D D D Notes: a. Involves complex analysis of the surface to determine location. Shear strength G. 717. The closed-loop characteristic equation is 1 + G1(s) G2(s) H(s) = 0 System performance studies normally include 1. In the table, the
 following notations are utilized: F(x) = area under the curve from x = area under the cur
 transformation: z = x-n v f(x) then becomes f(z), F(x) becomes F(z), etc. The effective column length should be used to facilitate this algorithm. 391 Electrical and Computer Engineering A Karnaugh Map (K-Map) is a graphical technique used to represent a truth table. Sampled messages are
parallel, capacitance and inductance, RLC circuits) D. Integration by Substitution, and C. Chemical processes (e.g., disinfection, jon exchange, softening, coagulation, precipitation) E. Individual cannot let go. Zone at LMC (Ø5.2) Datum C B A Datum B 15 Position 5±0.2 10±0.2 0.1 Tol. Film Boiling The heat flux for film boiling on a horizontal cylinder
or sphere of diameter D is given by gk v3 tv_tl - tv i8h fg + 0.4cpv_Ts - Tsat i B H_Ts - Tsat i qofilm = Cfilm > nvD_Ts - Tsat i qofilm = Cfilm > nvD_Ts - Tsat i qofilm = *0.62 for horizontal cylinders 4 0.67 for spheres Çengel, Yunus A., Heat and Mass Transfer: A Practical Approach, 3rd ed., New York: McGraw-Hill, 2007. Velocity terms are often insignificant. The test statistic
at Pg = Pv Wet-bulb temperature Twb is the temperature indicated by a thermometer covered by a wick saturated with liquid water and in contact with moving air. 343 Environmental Engineering Reverse Osmosis Osmotic pressure (Pa) = osmotic coefficient = number
 of ions formed from one molecule of electrolyte = number of moles of electrolyte = number of moles of electrolyte = specific volume of solvent (m3/kmol) = universal gas constant [Pa • m3/(kmol • K)] = absolute temperature (K) PRESSURIZED SALINE FEED PRODUCT WATER SELECTIVELY PERMEABLE MEMBRANE WASTE BRINE A CONTINUOUS-FLOW REVERSE OSMOSIS
coefficient DK = s s L t,m s i DZ Water Flux where Jw = Wp (\Delta P - \Delta \Pi) Jw = water flux through the membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation, a characteristic of the particular membrane [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)] Wp = coefficient of water permeation [kmol/(m2 • s)
nout (Pa) 344 Environmental Engineering Ultrafiltration Jw = where fr 2 # D P 8nd ε = membrane porosity r = 
calculated CT value (mg • mm/L) C = residual disinfectant concentration measured during peak hourly flow (min) = can be determined from traces study data or the following relationship, t10(approx) = \theta \times BF \theta = hydraulic residence time (min)
 BF = baffling factor Adapted from Guidance Manual LT1ESWTR Disinfection Profiling and Benchmarking, U.S. Environmental Protection Agency, 2003. 83 Engineering Probability and Density Functions: Means and Variances Variable Binomial Hyper Geometric Equation (nx) = x!(nn-!x)! n b(x; n, p) =
 () p(1-p)x() + p
 b (b - a)(b - m) 84 μ σ2 a+b+m 3 a 2 + b 2 + m 2 - ab - am - bm 18 Chemistry and Biology Definitions Avogadro's Number - The number of elementary particles in a mol of a substance. Flags A three-bit field follows and is used to control or identify fragments. It is the stress intensity when the material will fail. Energy, impulse, and momentum D.
Medium drive fit: for ordinary steel parts or shrink fits on light sections. Performance of components F. 86 Chemistry and Biology Anaerobic Biodegradation of Organic Wastes, Complete Stabilization CaHbOcNd + rH2O \rightarrow mCH4 + sCO2 + dNH3 4a - b - 2c + 3d 4a - b + 2c + 3d s = 8 4a + b - 2c - 3d m = 8 r = Photosynthesis Photosynthesis is a
 most important process form synthesizing glucose from carbon dioxide. Materials science (e.g., properties, corrosion, compatibility, stress strain) 7-11 6. 33 Mathematics Discrete Math Symbols x \in X x is a member of X { }, \varphi The empty (or null) set S \subseteq T S is a subset of T S \in T S is a proper subset of T (a,b) Ordered pair P(s) Power set of S (a1, a2, ...,
 an) n-tuple A \times B Cartesian product of A and B A \cup B Union of A and B A \cup B Uniqueness qualification from A to B is a subset of A \times B. Secondary alcohols have the hydroxyl group united to a secondary carbon atom, that is, one united to
  two other carbon atoms. For such a body \alpha = \epsilon = 1 Shape Factor (View Factor, Configuration Factor) Relations Reciprocity Relations AiFij = AjFji where Ai = surface area (m2) of surface i Fij = shape factor (View Factor, Configuration Factor) Relations Rule for New Factor (view factor) Relations Reciprocity Relations AiFij = AjFji where Ai = surface area (m2) of surface i Fij = shape factor (view factor, configuration Factor) Relations Rule for New Factor (view factor) Rule fac
Surfaces N! Fij = 1 j = 1 217 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T14 - T 24 j Qo 12 = \epsilon \sigma A T14 - T 24 j Qo 12 = \epsilon \sigma A T14 - T 24 j Qo 12 = \epsilon \sigma A T14 - T 24 j Qo 12 = \epsilon \sigma A T15 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T15 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T16 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T16 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T16 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T17 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange by Radiation between Two Bodies Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Small Compared to its Surroundings where Qo 12 = \epsilon \sigma A T18 Heat Transfer Net Energy Exchange Body Smal
absolute temperature (K) of the body surface T2 = absolute temperature (K) of the surroundings Net Energy Exchange by Radiation between Two DiffuseGray
Surfaces that Form an Enclosure Generalized Cases A1, T1, \epsilon1 A2, T2, \epsilon2 Q12 Q12 A1, T1, \epsilon1 Q0 12 = A2, T2, \epsilon2 V `T14 - T24j 1 - f1 1 - f2 1 f1A1 + A1F12 + f2A2 218 Heat Transfer One-Dimensional Geometry with Thin Low-Emissivity Shield Inserted between Two Parallel Plates Radiation Shield Q12 \epsilon3, 1 A1, T1, \epsilon1 \epsilon3, 2 A2, T2, \epsilon2 A3, T3 Qo
12 = v `T14 - T24j 1 - f3, 1 1 - f3, 2 1 - f1 1 - f2 1 1 f1A1 + A1F13 + f3, 1A3 + f3, 2A3 + A3F32 + f2A2 Reradiating Surface Research Surface Res
Taylor's series, Newton's method) F. > 2,000 mA Cardiac arrest (stop in effective blood circulation), internal organ damage, and severe burns. Force acceleration (e.g., particles, rigid bodies) D. Linear regression (e.g., parameter estimation, residual analysis, correlation) E. The SDS has 16 sections in a set order, and minimum information is
prescribed. Probability and Statistics A. dc/dx = 0 2. Laws of thermodynamics D. Ketones The common names of ketones are derived from the acid which on pyrolysis would yield the ketone. One node is distinguished as a root and every other node is connected by a directed edge from exactly one other node in a parent to child relationship. Pressure
(MPa) 150 50 60 70 80 100 Thermodynamics 160 Data provided by DuPont Refrigerants, a division of E.I. duPont de Nemours and Co., Inc. Random Variate Generation The linear congruential method of generating pseudo-random numbers Ui between 0 and 1 is obtained using Zn = (aZn-1+C) (mod m) where a, C, m, and Z0 are given nonnegative
integers and where Ui = Zi /m. Dry pans and chaser mills F. Hydraulic Grade Line) Hydraulic Grade Line is the line connected node that has not been visited. Set: collection of
elements, without any particular order, that can be queried (static sets) and/or modified by inserting or deleting elements (dynamic set). The rate-of-return on an investment is the interest rate that makes the benefits and costs equal. Responsible Charge—The term "Responsible Charge," as used in this Act, shall mean direct control and personal
supervision of engineering or surveying work, as the case may be. Shear and moment diagrams E. where Eel = E0 - S(pHa - pHi) Eel = electrode potential S = slope (mV per pH unit) pHa = pH value of the internal buffer From Alliance Technical Sales, Inc., as posted on www.alliancets.com,
July 2013. The relationship between the load (w), shear (V), and moment (M) equations are: dV \sim x h dx \times 2 V2 - V1 = \#x1 V \sim x h dx \times 2 V2 - V1 = \#x1 V \sim x h dx \times 135 Mechanics of Materials Stresses in Beams The normal stress in a beam due to bending: \sigma x = -My/I where M = My/I where M 
of inertia of the cross section y = distance from the neutral axis to the fiber location above or below the neutral axis to the outermost fiber of a symmetrical beam section \sigma x = -M/s where \sigma x = \pm M/s and \sigma x = \pm M/s where \sigma x = \pm M/s where \sigma x = \pm M/s and \sigma x = \pm M/s where \sigma x = \pm M/s and \sigma x = \pm M/s where \sigma x = \pm M/s and \sigma x = \pm M/s where \sigma x = \pm M/s and \sigma x =
Transverse shear stress: where txy = VQ/(Ib) V = shear force Q = Al y l = first moment of area above or below the point where shear stress is to be determined Hibbeler, Russel C., Mechanics of Materials, 10th ed., Pearson, 2015, pp. Licensees shall not solicit or accept a professional contract from a governmental body on which a principal or officer
of their organization serves as a member. It is specified in seconds, but time intervals less than 1 second are rounded up to 1. 3 4 If R1 = R2 = R3 = R and R4 = R + \DeltaR, where DR % R, then DR V0 . 2001:20::/28 2001:20:: 2001:20::/28 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 2001:20:: 
trigonometry B. Stress transformation and principal stresses, including stress-based yielding and fracture criteria (e.g., Mohr's circle, maximum normal stress, Tresca, von Mises) H. The definitions that follow use subscript a for dry air and v for water vapor. The number of terms is n. Diameters up to 200 ft b. 140 = ICMP Node Information Response
1 = The Responder refuses to supply the answer. (1 - CRm -1) CRm overall crash reduction factor for multiple mutually exclusive improvements at a single site CRi = crash reduction factor for a specific countermeasure i m = number of countermeasures at the site Garber, Nicholas I., and Lester A. To be eliquible for experience credit, graduate
degrees shall be relevant to the applicant's area of professional practice. Sample distributions and sizes (e.g., significance, hypothesis testing, non-normal distributions) D. C = Center M-R = Halfway between center and surface S = Surface These positions are shown in the following
figure. Licensees shall notify their employer or client and such other authority as may be appropriate when their professional judgment is overruled when the health, safety, or welfare of the public is endangered. HI = CDInoncarcinogen/RfD CDInoncarcinogen = chronic daily intake of noncarcinogenic compound RESPONSE NOAEL RfD THRESHOLD
DOSE NONCARCINOGENIC DOSE RESPONSE CURVE Dose is expressed d mass of chemical n body weight: exposure time NOAEL = No Observable Adverse Effect Level. High peripheral-speed mills K. Project administration (e.g., documents, management, project delivery methods) B. Components (e.g., hydraulic, pneumatic,
electromechanical) M. DX py Outcome node ... Chance node p1 p2 C1 C2 CY Represents a probabilistic (chance) event. Data structures, arrays) C. H7/p6 H7/s6 Force fit: suitable for parts which can be H7/u6 highly stressed or for shrink fits where the heavy pressing forces required are impractical. Capitalized
Costs Capitalized costs are present worth values using an assumed perpetual period of time. Static Testing: techniques that do not execute the code but concentrate on checking the code, requirement documents. Skelly Frame, George M. Tests on Means of Normal Distribution—Variance Unknown Hypothesis Test Statistic
Criteria for Rejection H0: \mu = \mu 0 H1: \mu \neq \mu 0 |t0| > t\alpha/2, n - 1 H0: \mu = \mu 0 H1: \mu \neq \mu 0 |t0| > t\alpha/2, n - 1 H0: \mu = \mu 0 H1: \mu \neq \mu 0 |t0| > t\alpha/2, v = n1 + n2 - 2 Variances unequal H0: \mu 1 - \mu 2 = v H1: \mu 1 - \mu 2 = v H
H0: \mu1 - \mu2 = \gamma H1: \mu1 - \mu2 = \gamma H1: \mu1 - \mu2 < \gamma X1 - X2 - \gamma X1 - 
Hazard is the capacity to cause harm. Slope stability (e.g., fills, embankments, cuts, dams) K. The velocity and acceleration of the particle are defined, respectively, as v = dr/dt where v = dr/dt where v = dr/dt where v = dr/dt and v = dr/dt where v = dr/dt where v = dr/dt are defined, respectively, as v = dr/dt where v = dr/dt wher
vx, etc. In a forced vibration system, the externally applied force F is typically periodic (for example, F = F0 sin ωt). Evaluation of alternatives (e.g., PW, EAC, FW, IRR, benefit-cost) C. For example, what constitutes "valuable consideration" or "adequate" knowledge may be interpreted differently by qualified professionals. 203.0.113.0/24 203.0.113.0/
203.0.113.255 256 Documentation Assigned as TEST-NET-3, documentation and examples. Analysis of beams, trusses, frames, and columns F. Material selection 12. Electrical properties of materials F. Quality control (e.g., control charts, process capability, sampling plans, OC curves, DOE) 9-14 13. The slope of the linear portion of the curve equals
the modulus of elasticity. In addition to or in lieu of any other sanction provided in this section, any firm holding a certificate of authorization that violates a provision of the board may be assessed a fine in an amount determined by the board of not more than [insert amount] dollars for each offense. Water and
Wastewater A. ^{A}hH0: n = n0; H1: 
Normal Distribution (A) Standard deviation v is known v v X - Za/2 # n # X + Za/2 n n (B) Standard deviation v is not known s s # n # X + ta/2 X - ta/2 n n - where ta/2 corresponds to n 1 degrees of freedom. 16. = rx = I x A ry I y A rp = J A Product of Inertia The product of Inertia (Ixy, etc.) is defined as: Ixy = \( \) xydA, with respect to the xy-
coordinate system The parallel-axis theorem also applies: I'xy = Ixc yc + dxdy A for the xy-coordinate system, etc. Other Fourier transforms are derivable from the Laplace transform by replacing s with jw provided f ^t h dt < 3 Fourier Series Every periodic function f(t) which has the period T = 2\pi/\omega 0 and has certain continuity
conditions can be represented by a series plus a constant f 	 t = a0 + 1 and f 	 t = a0 +
values of α and n. Two power series may be added, subtracted, or multiplied, and the resulting series in each case is convergent, at least, in the interval common to the two series. Sensor placement in confined spaces should be based on constituent gas molecular weight relative to that of air and, where applicable, source location. Rule 5
(Multiplication and Division): The result of the operation has the same number of significant digits as the input number of significant digits. Incropera, Frank P. For edge (a, b), the vertex a is called the initial vertex and vertex b is called the terminal vertex. Heavy-duty impact mills D. Linear Regression and Goodness of Fit Least
Squares where t yt = at + bx bt = Sxy/Sxx at = y - bt x Sxy = /xi yi - ^1/n he / xi o n n i=1 y = ^1/n he / xi o n n i=1 y = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x = ^1/n he / xi o n n i=1 x 
of Estimate Se2j:Se2 = where 2 Sxx Syy - Sxy Sxx n-2i = MSE 2 Syy = / yi2 - ^1/n he / yi o n n i=1 i=1 Confidence Interval for Intercept (a): 1 x2 at ! ta/2, n - 2 d n + S n MSE xx 69 Engineering Probability and Statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient of the statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient of the statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient of the statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient of the statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient of the statistics Confidence Interval for Slope (b): bt ! ta/2, n - 2 MSE Sxx Sample Correlation Coefficient (R) and Coefficient (R)
Determination (R2): Sxy Sxx Syy R= 2 Sxy SxxSyy R2 = Hypothesis Testing Let a "dot" subscript indicate summation over the subscript. vapor sq 157 Sat. SPHERICAL DIAMETER RADIUS SQUARE REFERENCE Feature nominal size is square. Thus the decimal equivalent, D, of a binary number is given by D = ak 2k + ak - 12k -
1 + ... + a0 + a-1 2-1 + ... Since this number system is so widely used in the design of digital systems, we use a short-hand notation for some powers of two: 210 = 1,024 is abbreviated "K" or "kilo" 220 = 1,048,576 is abbreviated "K" or "kilo" 220 = 1,048,576 is abbreviated "M" or "mega" Signed numbers of base-r are often represented by the radix complement operation. The last or nth term is
1. 28 Safety Concentrations of Vaporized Liquids Vaporization Rate (Qm, mass/time) from a Liquid Surface = mass-transfer coefficient = area of liquid surface = saturation vapor pressure of the pure liquid at TL = ideal gas constant = absolute temperature
of the liquid Mass Flowrate of Liquid from a Hole in the Wall of a Process Unit Qm = AHC0(2pqcPq)\(^1\) where AH C0 \(^1\) qc Pq = area of hole = discharge coefficient = density of the liquid in Ventilated Space Cppm = [QmRqT \times 106/(kQV PM)]
where T k QV P = absolute ambient temperature = nonideal mixing factor = ventilation rate = absolute ambient pressure Sweep-Through Concentration = final 
Safety Ergonomics NIOSH Formula Recommended Weight Limit (RWL) RWL = 51(10/H)(1 - 0.0075|V - 30|)(0.82 + 1.8/D)(1 - 0.0032A)(FM)(CM) where RWL = recommended weight limit (pounds) H = horizontal distance of the hand from the midpoint of the line joining the inner ankle bones to a point projected on the floor directly below the load
center (inches) V = vertical distance of the hands from the floor (inches) D = vertical travel distance of the hands between the origin and destination of the lift (inches) D = vertical travel distance of the hands between the origin and destination of the lift (inches) D = vertical travel distance of the hands between the origin and destination of the lift (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distance of the hands from the floor (inches) D = vertical travel distanc
15 -1 ≤ 8 hr/day V< 30 in. 473. To meet the most common definition of a trade secret, it must be used in business and give an opportunity to obtain an economic advantage over competitors who do not know or use it. Velocity terms usually can be ignored. o C v m3/kg Sat. Kinematics (e.g., particles, rigid bodies) B.
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