MOCK BOARD EXAMINATION IN
GENERAL ENGINEERING AND APPLIED SCIENCES (D)

June 9, 2009

1. The rendition of service by a duly licensed professional by virtue of his technical education, training, experience and competence.
    a. Professional practice
    b. Professional service
    c. Legal practice and service
    d. Professional consultation

2. A code is defined as:
    a. a fundamental belief that usually encompasses several rules
    b. a system of non-statutory, non-mandatory rules on personal conduct
    c. an oath taken by an individual in a ceremony
    d. a guide for conduct and action in a certain situation

3. A rule is defined as:
    a. a fundamental belief that usually encompasses several rules
    b. a system of non-statutory, non-mandatory rules on personal conduct
    c. an oath taken by an individual in a ceremony
    d. a guide for conduct and action in a certain situation

4. A canon is defined as:
    a. a fundamental belief that usually encompasses several rules
    b. a system of non-statutory, non-mandatory rules on personal conduct
    c. an oath taken by an individual in a ceremony
    d. a guide for conduct and action in a certain situation

5. Refers to a statement or an oath, often religious in nature, agreed by an individual in ceremonies.
    a. canon
    b. code
    c. creed
    d. rule

6. The tort law is concerned with _____.
    a. imprisonment
    b. fine
    c. compensation for injury
    d. punishment

7. A civil wrong committed by one person causing damage to another person of his property, emotional well-being, or reputation.
    a. consequential damage
    b. fraud
    c. punitive damage
    d. tort

8. The condition in a contract between two parties, that only the parties to a contract may sue under it and that any third party names in that contract or who benefit from that contract cannot sue or be sued under that contract.
    a. doctrine of contract
    b. party policy of contract
    c. equity of contract
    d. privity of contract

9. A non-performance that results in the injured party receiving something substantially less than or different from what the contract is intended.
    a. willful breach
    b. material breach
    c. unintentional breach
    d. intentional breach

10. Another term for “punitive damages”.
    a. liquidated damages
    b. exemplary damages
    c. compensatory damages
    d. nominal damages

11. One possible cause for an abrupt frequency variation in one self-excited transmitter oscillator circuit resulting to poor frequency stability to hold a constant oscillation.
    a. poor soldered connection
    b. heating of capacitor in an oscillator
    c. DC and RF AC heating of resistors which cause change in values

d. Aging, which causes change in the condition of the characteristics of parts

12. A device that diverts high transient voltage to the ground and away from the equipment being protected.
    a. alpeth
    b. anchor
    c. alarm
    d. arrester

13. The maximum number of lines for any building other than a one- or two-storey residential building to be required a service entrance facility under the ECE building code.
    a. two lines
    b. five lines
    c. three lines
    d. not required

14. Refers to the terminal where riser cable pairs are terminated to serve a portion or an entire floor of a building.
    a. Floor Terminal distribution area
    b. Raceway terminal
    c. Floor distribution terminal
    d. Riser Terminal

15. Part of the housing system in the ECE code that is a circular opening through the floor structure to allow the passage of a cable or wire.
    a. Insert
    b. Sleeve
    c. Raceway
    d. Slot

16. In cable facilities for a building communications service, this is referred to as the physical cable within a building or series of buildings which may include both main cable pairs and house cable pairs but not station wiring cable.
    a. entrance cable
    b. floor distribution cable
    c. house cable
    d. building cable

17. A telephone company's cable entering a building from telephone cable feeder to the main, cross-connecting a point within the building.
    a. Telephone cable
    b. Entrance cable
    c. Connecting cable
    d. Building cable

18. This is a non-combustible tubing which encases the riser cable between an enclosed type metallic terminal cabinets or boxes.
    a. Raceway
    b. Riser shaft
    c. Riser conduit
    d. Entrance cable

19. A series of closets connected by slots or short conduit sleeves between floors or open shaft of the building.
    a. Service fitting
    b. Raceway
    c. Riser conduit
    d. Riser shaft

20. This is referred to as a linkage by wire, radio, satellite, or other means, of two or more telecommunications carrier or operators with one another for the purpose of allowing or enabling the subscriber of one carrier or operator to access or reach the subscribers of other carriers or operators.
    a. interconnection
    b. toll patching
    c. gateway
    d. outside plant sharing

21. One of the major components required under the global maritime distress and safety system is the:
    a. provision of Morse Code
    b. provision of Radiotelegraph Operator
    c. provision of facsimile
    d. provision of radio personnel

22. Which one of the following is NOT the major components required on board ship under the global maritime distress and safety system?
    a. On board radio facilities
    b. Radio operator telegraphy onboard
    c. Shore base facilities
    d. Radio personnel onboard

23. At what position does a maritime ship main antenna have, when it is open circuited and

that auxiliary antenna is/are connected to the main receiver?
   a. AA
   b. Emergency transmitter
   c. Direction finder
   d. Ground

24. What position of maritime ship main antenna have, when the radio watch is secured or when the ship is in electrical storm?
   a. AA
   b. Main transmitter
   c. Grounded
   d. HF

25. What are the two legislative functions of the International Telecommunications Union in its international conference issues on orbital resources?
   a. Assign frequencies and organized conferences
   b. Allocates frequency bands for the services and determine the principle of distribution of the orbit/spectrum resources distribution and assignment of frequencies
   c. Determine principles of spectrum distribution and assignment of frequencies
   d. Conduct conferences and allocation of orbital slots

26. A person or entity intending to register as VoIP service provider is required to post a performance bond of _____.
   a. 1 million
   b. 3 million
   c. 5 million
   d. 10 million

27. One of the mnemonic management tool used is the SMEAC. What does the acronym SMEAC stands for?
   a. Situation, Mission, Execution, Administration, Coordination
   b. Situation, Mission, Execution, Application, Communication
   c. Situation, Mission, Execution, Administration, Communication
   d. Strategy, Mission, Execution, Administration, Communication

28. In the management tool, SMEAC, where A stands for administration, which question is appropriate for the to manager ask?
   a. What do we need to get it done?
   b. What are we aiming to do?
   c. How are we going to do it?
   d. What is the operation environment?

29. In project management, what is usually the first step underlying in the process of performing a project?
   a. Select appropriate performance measures.
   b. Define the goals of the project and their relative importance.
   c. Identify a need for a product or service.
   d. Develop a technological concept.

30. In the process of performing a project, after the need for a product or service is identified, what is usually the next step?
   a. Define the goals of the project and relative importance.
   b. Develop a budget.
   c. Develop schedule.
   d. Develop the technological concept.

31. What is usually the last step in the process of performing a project?
   a. Select appropriate performance measures
   b. Implement the plan
   c. Monitor and control the project.
   d. Evaluate project success.

32. To consider the consequence of uncertainty on project management, laws on project management are developed. One of which is “A careless planned project will take ___ times longer to complete than expected”.
   a. Three
   b. Four
   c. Two
   d. Two and a half

33. In the typical functional organization hierarchy, the chief engineer is under the ____.
   a. finance manager
   b. manufacturing manager
   c. general manager
   d. marketing manager

34. A diagram of the organization's official positions and formal lines of authority.
    a. Organizational chart
    b. Authority chart
    c. Policy chart
    d. Control chart

35. What is defined as the process of identifying and choosing alternative courses of action in a manner appropriate to the demands of the situations?
    a. Sampling Theory
    b. Alternative Analysis
    c. Problem-solving
    d. Decision-Making

36. What refers to the activity of incorporating the technical know how with the ability to organize and coordinate workforce, materials, equipment and all other resources including money?
    a. Engineering Management
    b. Engineering Technology
    c. Technical Management
    d. General Management

37. In a telephone switchboard, 100 pairs of cable can be made of either enameled wire or tinned wire. There will be 400 soldered connections. The cost of soldering a connection on the enameled wire will be P 1.65, while on the tinned wire, it will be P 1.15. A 100-pair cable made of enameled wire costs P 0.55 per linear foot and the one that is made of tinned wire costs P 0.75 per linear foot. Determine the length of the cable run, in feet, so that the cost of each installation would be the same.
    a. 1,000 ft
    b. 1,040 ft
    c. 1,100 ft
    d. 1,120 ft

38. A leading shoe manufacturer produces a pair of Lebron James signature shoes at a labor cost of P 900.00 a pair, at a material cost of P 800.00 a pair. The fixed charge on the business is P 5,000,000.00 a month and the variable cost is P 400.00 a pair. Royalty to Lebron James is P 1,000.00 per pair of shoes sold. If the shoes sell at P 5,000.00 a pair, how many pairs must be produced each month for the manufacturer to break-even?
    a. 2,590
    b. 2,632
    c. 2,712
    d. 2,890

39. Felicito wishes to bequeath to his son, Rey, the amount of P20,000 10 years from now. What amount should he invest now if it will earn interest of 8% compounded annually during the first 5 years and 12% compounded quarterly during the next 5 years.
    a) P7,635.45
    b) 7,653.45
    c) 7,365.45
    d) 7,536.45

40. Efren deposits P10,000 in a fund for his son when he starts college to provide him with a fixed income at the end of each month during his 5 years studying an engineering course. Find the monthly income of the boy if the money is invested at 12% compounded monthly.
    a) P222.44
    b) P224.24
    c) P242.42
    d) P422.22

41. Alfredo has a debt of P50,000. It is to be amortized by means of 20 uniform quarterly payments with an interest of 8% compounded quarterly. Determine periodic payment if first payment is made 15 months after loan is granted.
    a. P3,093.90
    b. P3,903.30
    c. 3,309.90
    d. 3,930.30
    e. 9,330.30

42. The product of mass and its velocity.
    a) Momentum
    b) Impulse
    c) Power
    d) Energy

43. Internal force that acts against distortion.
    a. Stress
    b. Strain
    c. Shear
    d. Elasticity

44. The capacity to satisfy human wants.

a. Luxuries
b. Discount
c. Utility
d. Necessity

45. What is the effective rate corresponding to 16% compounded daily if one year is considered at360 days?
    a. 17.84%
    b. 16.78%
    c. 17.35%
    d. 13.75%

46. It is a measure of the resistance that a body's mass and distribution of its mass about the axis of rotation. This property is known as_____.
    a. Moment of inertia
    b. Friction
    c. Torsion
    d. Angular acceleration

47. A man in a hot-air balloon drops an apple at a height of 150 meters. If the balloon is rising at 15 m/s, find the highest point reached by the apple.
    a. 141.15 m
    b. 171.15 m
    c. 151.15 m
    d. 161.15 m

48. The reciprocal of bulk modulus of any fluid is called _____.
    a. Volume stress
    b. Compressibility
    c. Shape elasticity
    d. Volume strain

49. The property by virtue of which a body tends to return to its original size and shape after a deformation and when the deforming forces have been removed.
    a. Elasticity
    b. Malleability
    c. Ductility
    d. Plasticity

50. It is the ability of a material to be elongated
    a. Plasticity
    b. Flexibility
    c. Elasticity
    d. Malleability

51. Find the elongation in a 3m long steel bar by subjecting it to 50 Mpa stress. E=200 Gpa
    a. 1mm
    b. 0.5 mm
    c. 0.75 mm
    d. 1.75 mm

52. A material has a modulus of elasticity of 200 Gpa. Find the minimum cross sectional area of the said material so as not to elongate by more than 5 mm for every 2 m length when subjected to a 10 kN tensile force.
    a. 20 mm^2
    b. 10 mm^2
    c. 30 mm^2
    d. 40 mm^2

53. The reciprocal of Bulk modulus of any fluid is called_____.
    a. Volume stress
    b. Compressibility
    c. Shape elasticity
    d. Volume strain

54. A stone is thrown outward, at an angle of 30 with the horizontal into the river from the cliff that is 120 meters above the water level at a velocity of 36 km/hr. At what height above the water level will the stone start to fall?
    a. 121.27 m
    b. 131.274 m
    c. 141.274 m
    d. 161.274 m

55. During installation, a section of an antenna tower was lifted to a height of 5 meters with a force of 400 kg moving through a distance of 20 meters by use of a pulley mounted on a frame. If the efficiency of a machine equals the output over the input multiplied by 100%, what is the efficiency of the pulley> the tower section weighs 1000 kg.
    a. 62.5%
    b. 52.5%
    c. 72.5%
    d. 82.5%

56. The SI unit of magnetic flux density equal to one weber per square meter is the
    a) Gauss
    b) Oersted
    c) Maxwell
    d) Tesla

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57. The ratio of reflected light to the incident light on a surface is called ___
    a) SWR
    b) Reflectance
    c) Reflectivity
    d) Irradiance

58. In the FPS system, a mass that moves with an acceleration of one foot per second squared when a force of one pound acts on it is expressed in terms of _____.
    a) Poundal
    b) Slugs
    c) Dynes
    d) Ergs

59. A car's brake system exerts 3000 Newtons. It will take _____ seconds before the car stops from a velocity of 30 meters per second.
    a) 10
    b) 15
    c) 5
    d) 2

60. A mothballed nuclear power plant at Chernobyll operates at an output of 100 megawatts daily. This reactor required a mass of_____ kilograms of nuclear fuel.
    a) 0.96×10^{-5}
    b) 9.6×10^{-5}
    c) 0.0096×10^{-5}
    d) 9.6×10^{-5}

61. A Landing Ship (LST) BRP LANAO DEL NORTE of the Philippine Navy used during the "Battle of Leyte GulP' Golden Anniversary was drifting at a speed of two knots away from the shoreline. The ship's drift speed in kilometers per hour is___
    a) 3.704
    b) 7.304
    c) 3.407
    d) 1.852

62. While chasing Cheetah and Jane, Tarzan was swinging in the vines somewhere in the remote jungles of Africa at a maximum height of seven (7) feet and a minimum height of three (3) feet above the ground. What was Tarzan's maximum velocity?
    a) 32 ft/sec
    b) 18 ft/sec
    c) 16 ft/sec
    d) 12 ft/sec

63. Pegasus, the most trusted horse of Zeus, exerts one Horse Power to pull his "Chariot of Fire" at a force equivalent to 300 Newtons. The chariot's speed in meters per second is ____
    a) 250
    b) 0.25
    c) 25
    d) 2.5

64. ____ is a unit of pressure or stress resulting from a force of one Newton acting uniformly over an
    area of one square meter.
    a) Pascal
    b) Torr
    c) Stoke
    d) Poise

65. The "The Long March" rocket used in launching the Philippine satellite "Aguila" whose expanding gases leaves the rocket at 3 kilometers per second sulting from oxidation of solid propellants at a rate of 30 kilograms per second. The thrust force developed by the launcher rocket is about ____ Newtons.
    a) $9x10^{8}$
    b) $9x10^{9}$
    c) $9x10^{3}$
    d) $9x10^{4}$

66. A unit of distance used in astronomy equivalent to 3.08572×10^{13} kilometers.
    a) Light -year
    b) Parsec
    c) Furlong
    d) Fathom

67. A member of the Philippine Navy Seals under the PN Special Warfare Group searching for survivors of the ill-fated vessel, MIV Dona Paz, directs a beam of light at the surface of the sea at an angle of incidence of 40 degrees. Assuming a refractive index of 1.33 for water, the angle of refraction is ___ degrees.
    a) 58.75
    b) 49.75
    c) 39.75
    d) 29.75

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68. _____ is a unit of length equal to 1,650,763.73 wavelengths of the orange-red light radiated by the isotope Krypton-86 atom, as measured in vacuum. Angstrom
    a. Barn
    b. Meter
    c. Fathom
    d. Furlong

69. ___ factor is mathematical expression also known as the present value of the annuity.
    a. Present Worth
    b. Load
    c. Power
    d. Demand

70. ____ is the distribution of the initial cost by periodic changes to operation as in depreciation or the reduction of a debt by either periodic or irregular prearranged program.
    a) Annuity
    b) Perpetuity
    c) Capital Recovery
    d) Amortization

71. During the 1989 “military exercise”, an F-16 jet fighter on “persuasion flight” while horizontally flying at.a low altitude of 1 kilometer above the ground slows down at 720 km/hour and drops a bomb on the suspected lair of rebel soldiers. Determine the acute angle (in degrees) between the vertical and the line joining the aircraft and target at the instant when the bomb was released at Libis, Quezon City.
    a) 70.73
    b) 29.33
    c) 39.23
    d) 70.37

72. A 20 kilogram mortar projectile has a velocity of 600 meters per second. The shell acquired the velocity in a mortar barrel 3 meters long. The average force against the shell as it was fired was ____ KiloNewtons.
    a) 2400
    b) 3600
    c) 1200
    d) 600

73. An aluminum cube, 10 centimeters on a side, is subjected to a shearing force of $(10)^6$ Newtons. The top of the cube is displaced 0.03 centimeters with respect to the bottom. Its shear modulus is ____ Gigapascals.
    a) 44
    b) 33
    c) 11
    d) 22

74. A unit of heat which is equal to 1.055 joule is the ___
    a. BTU
    b. Calorie
    c. Therm
    d. Torr

75. In measuring pressure, 1 millimeter of mercury is equivalent to a unit called __
    a) Pascal
    b) Psi
    c) Torr
    d) Therm

76. A 60 gram bullet moving with a speed of 500 meters per second strikes a 5 kilogram block moving in the same direction with a speed of 30 meters per second. The resultant speed of the bullet and the block is ____ meters/second, assuming the bullet to be embedded in the block.
    a) 53.6
    b) 63.5
    c) 35.6
    d) 65.3

77. A ball rebounds vertically from a horizontal floor to a height of 20 meters. On the next rebound, it reaches a height of 14 meters. The coefficient of restitution between the ball and the floor was___
    a. 0.483
    b. 0.837
    c. 19.8
    d. 16.565

78. How much heat energy will be required to heat 100 grams of copper from 10^0C to 100 ^{0}C if its specific heat is 385 Joule / kg-^{0}K?
    a) 4.37 kJoule
    b) 3.47 kJoule
    c) 7.34 kJoule
    d) 4.73 kJoule

79. What is the pressure if one found of air at

15 psia and 200°F is heated to 800°F while keeping the volume constant?
a) 34.6 psia
b) 28.6 psia
c) 51.2 psia
d) 102.8 psia

80. The ability of solid matter to combine with similar atoms.
a) Ductility
b) Malleability
c) Diffusion
d) Cohesion

81. The gravitational constant of attraction has a numerical value of _____
a. 96.6×10^{-11}
b. 1.45×10^{-11}
c. 6.67×10^{-11}
d. 9.8

82. The domain of coefficient of friction is
a. Less than zero
b. Between zero and 1 exclusive
c. Between 0 and 1 inclusive
d. Greater than 1

83. The force that keeps a body moving in a circular path is called ___
a. Centrifugal
b. Inertia
c. Centripetal
d. Kinetic Energy

84. An LRT train 5 m above the ground crosses a street at a speed of 20 m/s at the instant that a car running at a speed of 8 m/s is directly below the train. Find the rate at which the train and the car are separating one second later.
a) 20.98 in/s
b) 20.89 m/s
c) 20.78 in/s
d) 20.87 m/s

85. The basis for Bemoulli's law for fluid flow is _____
a. Conservation of mass
b. Fourier Law
c. Conservation of Energy
d. Sturm-Liouville Theory

86. The 3rd term of an AP is 4 and the 9th term is - 14. Find the sum of the first six terms.
a. 15
b. 17
c. 14
d. 16

87. Force that tends to pull apart is called_____.
a) Compression
b) Tension
c) Torsion
d) Distortion

88. When stress equals strain, the body is _____.
a) Distorted
b) Elastic
c) Rigid
d) Fixed

89. The point which indicates the sales volume at which the enterprise will be able to pay these dividend is _____.
a) Break-even Point
b) Break-even Cost
c) Unhealthy Point
d) Inflection Point

90. It is the amount which a willing buyer will pay to a willing seller for the property when neither one is tinder compulsion to buy or to sell.
a. Use Value
b. Market Value
c. Utility
d. Fair Value

91. It is the value assigned to the property for the purpose of establishing rates.
a. Scrap Value
b. Franchise Value
c. Rate Base Value
d. Salvage Value

92. A flat circular coil with 100 turns has a radius of 5 centimeters. If an 4 ampere current is made to pass at the center of the coil, the magnetic field developed at the center is ____ Tesla.
a. 5.02×10^{-3}
b. 5.02×10^{-5}
c. 5.02×10^{-7}
d. 5.02×10^{-9}

93. Jennifer Bulak. while playing "jackstone",

accidentally drops the rubber ball from a window about 63 centimeters high. Each time the ball hits the flat ground, it rebounds to two thirds (2/3) of the previous height from which it fell. The total distance traveled by the ball before coming to rest is ____ centimeters.

a) 315
b) 513
c) 135
d) 153

94. A pound of force is equivalent to _____ Newtons.

a) 2.25
b) 4.45
c) 3.45
d) 5.44

95. The vector operator on a vector function that, for a three-dimensional function, is equal to the sum of the vector cross product of the unit vectors and partial derivatives in each of the component directions.

a) Curl
b) D' Alembertian
c) Poynting Vector
d) Argand's Gradient

96. In nuclear physics, a / an _____ is a particle of antimatter corresponding to a given particle in every respect except that charge and certain other discrete properties change sign.

a. Antiparticle
b. Hadron
c. Lepton
d. Muon

97. ____ is a particle that exhibits a strong nuclear force.

a) Lepton
b) Muon
c) Hadron
d) Pion

98. Don Fausto wants to make 14% nominal interest compounded semi-annually on - a bond investment. How much should he be willing to pay now for 12%, P 10,000 bond that will mature in ten (10) years and pays interest semi-annually?

a) P 8,940.50
b) p 2,584.19
c) P 3,118.05
d) P 867.82

99. ___ is the value of the equipment with use over a period of time, it could mean the difference
in value between a new asset and the used asset currently in service.

a) Loss
b) Depreciation
c) Gain
d) Sunk Cost

100. The amplitudes of a certain waveform are: 11, 23 and 25. The value of the root mean square is_____

a. 24
b. 25
c. 26
d. 27

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ANSWERS:

1. A
2. C
3. D
4. A
5. C
6. C
7. D
8. D
9. B
10. B
11. A
12. D
13. C
14. D
15. B
16. D
17. B
18. C
19. D
20. A
21. B
22. B
23. C
24. C
25. B
26. C
27. C
28. A
29. C
30. A
31. D
32. A
33. C
34. A
35. D
36. A
37. A
38. B
39. D
40. A
41. C
42. A
43. B
44. C
45. C
46. A
47. D
48. B
49. A
50. A
51. C
    y = PL/AE = SL/E
    = (50Mpa)(3)/(200000Mpa)
    = 0.00075 m
    = 0.75 mm
52. A
    $y_{actual} \leq 5$ mm
    y = PL/AE
    (10000N)(2000mm)/A(200000Mpa) $\leq$ 5mm
    $A \geq 20\ mm^2$
    Thus, $A_{minimum} = 20\ mm^2$
53. B
54. A
55. A
    Output = 1000kg (5)
    = 500 kg.m
    input = 400kg.(20) = 8000 kg.m
    efficiency = 5000/8000 x 100%
    efficiency = 62.5%
56. D Tesla
57. B Reflectance
58. B Slugs
59. A 10
    Impulse = Momentum; 3000(t) = 1000(30) or t = 10 seconds
60. D 9.6×10^{-5}
    According to Einstein's energy equation: $E = m(c)^2$ or $m = E/(c)^2$ and 1 watt = 1 joule/ sec
    m = [(100 x 10^6 Joule /sec/day) (86400 sec/day)] / [3 x 108 m/sec^2]
    m = 9.6×10^{-5} kilograms
61. A 3.704
62. C 16 ft/sec
    By law of conservation of energy:
    Potential Energy = Kinetic Energy
    $(m)(g)(\Delta h) = (1/2)\ (m)(v)^2$ or v = $\sqrt{(2)(g)(h)} = \sqrt{(2)(32)(4)}$ = 16 feet /second
63. D 2.5
    1 HP = 746 watts or joule/ sec;
    * Power = Work / Time = [Force x Distance] / (Time) = Force x Velocity;
64. A Pascal
65. D $9x10^4$
    Force = (Mass)(Acceleration) = (Mass) (Velocity) / (Time)
    Thrust Force = (30 kg/sec)(3 x 10^{3m} / sec) = 9 x 10^4 Newtons
66. B Parsec
    NOTE: 1 light-year = 9.46055 x 10^{12} kilometers
67. A 58.75
    By Snell's Law: $(n_1)\ (Sin\theta_1) = (n_2)\ (Sin\theta_2)$
    1.33 $Sin40^o$ = (1) Sin θ_2; or Sin θ_2 0.855; Therefore: θ_2 = Arcsin 0.855 = 58.75 degrees
68. C Fathom
69. A Present Worth

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70. D Amortization

71. A 70.73

Let α = Angle of Depression, x = Horizontal Displacement; y = Altitude. The bomb falls with vertical acceleration g = 9.8 m/sec^2 and at the same time moves horizontally at v = 720 km/hr or 200 m/sec.

* Consider the vertical motion alone. Let t = time for the bomb to hit the ground. Then:

y = (1/2) (g) (t)^2; 1000 = (1 / (9.8)(t)^2 or t = $\sqrt{}$ (1000) / (4.9) = 100 /7 = 14.3 seconds.

* Consider the horizontal motion alone. The horizontal distance x covered by the bomb in 14.3 seconds is x = (200 m/sec)(14.3 sec) = 2860 meters. Since Tan α = (x/y) = (2860) / (1000) = 2.86, then α = 70.7 degrees

72. C 1200

The work expended by the powder on the shell in the mortar equals the Kinetic energy of the moving shell. Since W = (F)(s) = (1/2)(m)(v)^2 then (F)(3) = (1/2)(20)(600)^2 or F = 1200 kilonewtons.

73. B 33

Shearing Stress = Tangential Force / Face Area = 10^6 N / (0.1m)^2 = 10^8 Pascals

Shearing Strain = Displacement / Altitude = 0.03 cm / 10 cm = 0.003

Shearing Modulus = Stress / Strain = 10^8 Pascal /0.003 = 33 x 10^9 Pascals

74. C Therm

75. C Torr

76. C 35.6

Momentum Before Impact = Momentum After Impact (0.06 kg)(500 m/sec) + (5 kg)(30 m/sec) = (0.06 5)(v); or V= 180 / 5.06 = 35.6 meters / sec

77. B 0.837

METHOD 1: $u_1 = \sqrt{(2)(g)(h)} = \sqrt{(2)(9.8)(20)}$ = 19.8 m/sec and v_1 = (2)(9.8)(14) = 16.6 m/sec

* The coefficient of restitution is given by the equation:

e = $(v_2 - v_1) / (u_1 - u_2)$ = [0 - (-16.6)] / [19.8 - 0] = 0.838

METHOD 2: e = $(h_2) / (h_1) = \sqrt{(14) / (20)}$ = 0.837

78. B 3.47 kJoule

Heat Required = (Mass)(Specific Heat)(Temperature Change)

Q = (0.1 kg)(385 J/kg-^{o}K)(100-10) = 3.47 kiloJoule

79. B

$P_1 T_2 = P_2 T_1$

$P_2 = (P_1)(T_2) 1(T_1)$ = [(15)(1260)]/660 = 28.6 Psia

80. D

81. C

82. B

83. C

84. A

85. C

86. A

The series is defined by the sample space: S = (10, 7, 4, 1, -2, -5, -11, -14}; with d = 3; The summations is ∑ x = 10+7+4+l-2-5 = 15

87. B

88. B

89. C

90. B

91. C

92. A

According to Biot-Savart's Law; B = [(μ o)(N)(I)] / [(2)(R)]

B = [(4π x 10^{-7} Henry /meter) (100 Turns) (4 Amperes)] / [(2)(5x10^{-2} meters)]

B = 5.02 x 10^3 Tesla

93. A

Let D = Total distance traveled and a = 63; a_1 = (2/3) (63) = 42; a_2 = (2/3) (42) = 28, etc.

* The succeeding distances traveled will be twice the value of a geometric progression with a common ratio of 2/3. * Therefore, the total distance traveled is D = 63 + 2 [$(a_1) / (1 - r)$] = 63 + 2{(42) / [1 - (2/3)]} = 63 + 252 = 315 centimeters.

94. B

95. A

96. A

97. C

NOTE: * A Lepton is a particle that does not exhibit a strong nuclear force.

* A Muon is a particle having a mass of 207 electron masses. It is formed in the decay of a π^+ meson or π

meson and can either be positive or negative.

* A π-Meson or Pion is a particle that can be positive, negative or neutral. A π^+ meson or a π meson has a mass 273 electron masses. A neutral π-meson has a mass of 264 electron masses.

* A Neutrino is a neutral particle of almost zero rest mass that is emitted in beta and in π^+ or π^- meson decays.

98. A

n = 2; R = (0.12 / 2)(P10,000) = P600 and I = 0.14 / 2 = 0.07.

Therefore:

$P = \{600\}\{[(1.07)^{20} - 1] / [(0.07)(1.07)^{20}]\} + [10,000 / (1.07)^{20}]$

P = P 8,940.60

99. B

100. B

$RMS = \sqrt{[(11)^2 + (23)^2 + (35)^2]} / (3) = 25$