KANTIPUR ENGINEERING COLLEGE

Model Questions for B.E. Entrance Test (2073)

Set: I (B)   **Time: 2 hours**   **Date: 2073/04/08**

Section: I Select the Best Alternative on the answer sheet given   **60×1 = 60**

1. If the unit of length, mass and time each be doubled, the unit of work is increased by
   (A) four times   (B) two times   (C) six times   (D) no change

2. In gravity free space, the liquid in a capillary tube will rise to
   (A) same height as on earth   (B) less height as on earth
   (C) infinite height   (D) slightly more height than that on earth

3. Two bars of copper having same length but unequal diameter are heated to the same temperature. The change in length will be
   (A) same for both bars   (B) more than thicker bar
   (C) more than thinner bar
   (D) determined by the ratio of length and diameter of the bars

4. When light passes from one medium to another medium, the physical quantity which remains unchanged is
   (A) velocity   (B) wavelength   (C) refractive index   (D) frequency

5. Which of the following is conserved when light waves interfere?
   (A) intensity   (B) momentum   (C) amplitude   (D) energy

6. A charge q_1 exerts some force on a second charge q_2. If third charge q_3 is brought near, the force of q_1 exerted on q_2
   (A) decreases   (B) increases
   (C) increases if q_3 is of same sign of q_1 and decreases if q_3 is of opposite sign
   (D) remains unchanged

7. At the temperature of inversion, the emf in a thermocouple is
   (A) zero   (B) maximum
   (C) minimum   (D) half its maximum value

8. The magnetism of the magnet is due to
   (A) the spin motion of electron   (B) cosmic ray
   (C) the earth   (D) pressure of big magnet inside the earth

9. As an empty vessel is filled with water, frequency
   (A) increases   (B) decreases   (C) remains the same   (D) none of above

10. Cathode rays can be deflected by
    (A) magnetic field only   (B) electric field only
    (C) both type of field   (D) none

11. The mechanical efficiency of a two stroke cycle engine is…………..the mechanical efficiency of a four stroke cycle engine.
    (A) half of   (B) two times less than   (C) more than   (D) equal to

12. The pressure at the end of compression process in diesel engines compared to that of petrol engines would be.
    (A) half   (B) same   (C) higher   (D) less

13. The source of energy from biomass is considered as a ...... type of source of energy.
(A) Non renewable   (B) Renewable   (C) both   (D) all of the above

14. The maximum percentage of ingredients in cement is that of ....
(A) magnesia   (B) lime   (C) alumina   (D) silica

15. In concrete 1:2:4 indicates the ratio between cement, sand and .....
(A) water   (B) coarse aggregate   (C) reinforcement   (D) gypsum

16. In brick masonry the frog of the brick is generally kept on ....
(A) bottom face   (B) top face   (C) exposed face   (D) interior face

17. Which of the following sign denotes that pedestrian are prohibited from crossing the road.
(A) Red Standing Man   (B) Green Walking Man
(C) Flashing Green Man   (D) none

18. In circuits, a capacitor allows .... to pass through it.
(A) Both AC &DC   (B) DC only   (C) AC only   (D) neither DC nor AC

19. Which of the following is non-renewable type source of energy?
(A) Solar energy   (B) geothermal energy (C) ocean energy   (D) Coal energy

20. A step-down transformer increases
(A)   voltage   (B) frequency   (C) power   (D) current

21. A Wattmeter is a device to measures real .....
(A) power   (B) AC current   (C) voltage   (D) DC current

22. In n-p-n transistor the p-type crystal act as ....
(A) emitter only   (B) collector only   (C) base only   (D) either emitter or collector

23. ISP stands for .... Provider
(A) intranet service   (B) internet service   (C) internet security   (D) intranet security

24. Magnetic disk contains ....
(A) tracks and colony (B) tracks and sectors (C) lane and sectors (D) none

25. Which strength does not change with temperature?
(A) Normality   (B) gm / liter   (C) Molarity   (D) Molarity

26. The amount of H_2SO_4 present in 200 ml of 2N H_2SO_4 is
(A) 39.2 g   (B) 49 g   (C) 19.6 g   (D) 98 g

27. pH of 0.2 N H_2SO_4 is
(A) 0.69   (B) 1.2   (C) 0.76   (D) 0.56

28. During electrolysis, electrons are
(A) gained   (B) lost
(C) lost by cations and gained by anions   (D) gained by cations and lost by anions

29. How many litres of O_2 at NTP are required to burn completely 2.2 g of propane?
(A) 22.4 L   (B) 5.6L   (C) 44 L   (D) 84 L

30. Aqueous solution of sodium carbonate is
(A) alkaline   (B) neutral   (C) acidic   (D) amphoteric

31. Catalytic oxidation of ammonia in air forms
(A) NO_2 (B) N_2O (C) NO   (D) N_2O_5

32. Producer gas is a mixture of
(A) $CO + H_2$ (B) $NH_3 + N_2$ (C) $CO + N_2$ (D) $CO + N_2 + CO_2$

33. Malachite is the ore of
(A) Zn   (B) Cu   (C) Fe   (D) Na

34. Ammonia reacts with copper sulphate solution to form
(A) Deep blue precipitate   (B) Yellow precipitate
(C) Black precipitate   (D) Blueish white precipitate

35. Benzene is less reactive due to
(A) delocalization of Pi electrons   (B) three pi bonds
(C) six C-atoms & six H-atoms   (D) twelve sigma bonds

36. A hydrocarbon having molecular formula C_3H_6 forms isomers equal to
(A) 4   (B) 2   (C) 6   (D) 5

37. If $a > b > 0$ and a, b $\in$ R then which of the following is not true?
(A) $\frac{1}{b} - \frac{1}{a} > 0$ (B) $\frac{1}{a} < \frac{1}{b}$ (C) $a - b > 0$ (D) $b - a > 0$

38. If one root of the equation $x^2 - ax + 1 = 0$ is α then the other root is
(A) $1 - \alpha$ (B) $-\frac{1}{\alpha}$ (C) $\frac{1}{\alpha}$ (D) $1 + \alpha$

39. If $\csc^2 x = \csc^2 \alpha$ then general value of x is
(A) $n\pi \pm \alpha$ (B) $n\pi + \alpha$ (C) $2n\pi \pm \alpha$ (D) $n\pi + (-1)^n \alpha$

40. If $A^2 - A + I = 0$ then A^{-1} equals
(A) A   (B) $I - A$ (C) $A + I$ (D) A^{-2}

41. $\lim_{x \to 0} \dfrac{\sin 2x + \sin 6x}{\sin 5x - \sin 3x}$
(A) 1   (B) 1/2   (C) 2   (D) 4

42. The second derivative of $f(x) = 1/x$ at point (1,1) is equal to
(A) 2   (B) -1   (C) 1   (D) -2

43. $\int \frac{dx}{\sqrt{1-x^2}}$ equals
(A) $\tan^{-1} x + c$ (B) $\frac{\pi}{2} + \cos^{-1} x + c$ (C) $\frac{\pi}{2} - \cos^{-1} x + c$ (D) $\frac{\pi}{2} - \sin^{-1} x + c$

44. The number of unit vectors perpendicular to $\vec{a}$ and $\vec{b}$ are
(A) 2   (B) 1   (C) 3   (D) 4

45. If the line $2x + 3y + 4 + k(-x+y+5) = 0$ is horizontal then the value of k is
(A) 2   (B) 1   (C) 0   (D) 3

46. If two vectors whose direction ratios are 1, 2, 3 and –k, 2, 1 are perpendicular to each other then
(A) k = 6   (B) k = 4   (C) k = 7   (D) k = 3

47. He was acquitted of the crime. The synonym of 'acquitted' is
(A) accused   (B) released   (C) killed   (D) humiliated

48. Which of the following words has /η/ sound in the final position?
(A) think   (B) sink   (C) wing   (D) sign

49. The word 'engineer' has its primary stress on its ………… syllable.
(A) first   (B) third   (C) second   (D) fourth

50. Which of the following words ends at a vowel sound?
(A) fine   (B) find   (C) wine   (D) flow

51. Two and two ………… four.
(A) make   (B) will be made   (C) have made   (D) makes

52. She got him ………… hard.
(A) work   (B) to work   (C) working   (D) worked

53. She said to me, "Hellow!" The reported speech form of this sentence is …………
(A) She said hellow to me   (B) She remarked hellow
(C) She greeted me   (D) She wished me hellow

54. Unless you work hard, you …………
(A) can't succeed   (B) can't succeed   (C) could succeed   (D) could have succeeded

55. I feel the room …………
(A) move   (B) moved   (C) have been moving   (D) moving

56. He thanked me for what …………
(A) I have done for him   (B) I had done for him   (C) I do for him   (D) I did for him

57. I congratulated her ………… her success.
(A) for   (B) in   (C) on   (D) at

58. The passive voice of 'The farmers are planting rice' is
(A) rice was being planted by the farmers   (B) rice is planted by the farmers
(C) rice has been planted by the farmers   (D) rice is being planted by the farmers

59. No one helps her, …………?
(A) does he   (B) do they   (C) does she   (D) don't they

60. Which of the following is a simple sentence?
(A) He finished watching television and went to bed.
(B) The students worked hard in order that they might pass.
(C) He is not only famous but also intelligent.   (D) The earth revolves round the sun.

**Section: II Select the Best Alternative on the answer sheet given**   **40×2 = 80**

61. Given that $\vec{A} \cdot \vec{B} = 0$. Also, $\vec{A} \times \vec{C} = 0$. What is the angle between $\vec{B}$ and $\vec{C}$?
(A) 90°   (B) 0°   (C) 135°   (D) 145°

62. A car is moving along a straight line whose equation of motion is $s = 12t + 3f^2 - 2t^3$, where s is in meter and t is in seconds. The velocity of the car at start will be
(A) 7 m/s   (B) 9 m/s   (C) 12 m/s   (D) 13 m/s

63. A marble block of mass 2 kg lying on ice when given a velocity of 6 m/s is stopped by friction in 10 s. Then the coefficient of fiction is
(A) 0.01   (B) 0.02   (C) 0.06   (D) 0.03

64. Angular momentum of a wheel changes from 2L to 5L in 3 seconds. The magnitude of torque acting on it is
(A) L   (B) L/3   (C) L/2   (D) L/5

65. A big drop of radius R in formed by 1000 small droplets of water, then radius of small drop is
(A) R/2   (B) R/10   (C) R/6   (D) R/5

66. The temperature coefficient of resistance of the material of wire is 0.00125 per°C. Its resistance at 300K is 1 Ω. At what temperature will the resistance of the wire will be 2Ω?
(A) 1100K   (B) 1154K   (C) 1400K   (D) 1127K

67. A perfect body emits radiation at temperature $T_1°K$. If it is to radiate 16 times this power, its temperature T_2 will be
(A) $T_2 = 2\ T_1$
(B) $T_2 = 8\ T_1$
(C) $T_2 = 4\ T_1$
(D) $T_2 = 16\ T_1$

68. A sound wave of frequency 500Hz covers a distance of 1 km in 5 second between points x and y. The number of waves between x and y are
(A) 2500
(B) 1000
(C) 500
(D) 5000

69. The distance between object and image in a displacement method is D. The distance through which the lens is displaced is d. The ratio of the magnifications of the two images is
(A) $\frac{D-d}{2}$
(B) $\frac{D-d}{D+d}$
(C) $\left(\frac{D-d}{D+d}\right)^2$
(D) $\frac{D+d}{2}$

70. A ray of light incident on a 60° angled prism of refractive index $\sqrt{2}$ suffers minimum deviation. The angle of incidence is
(A) 70°
(B) 0°
(C) 45°
(D) 60°

71. The periods of oscillation of two magnets in the same field are in the ratio 2:1. If their moments of inertia are equal, ratio of their magnetic moment is
(A) 1:2
(B) 2:1
(C) 4:1
(D) 1:4

72. A 10 μF capacitor is charged to a potential difference of 50V and is connected to another uncharged capacitor in parallel. Now, the common potential difference between 20volts. The capacitance of second capacitor is
(A) 10μF
(B) 30μF
(C) 20μF
(D) 15μF

73. In step-up transformer, the turn ratio is 1:2. A Leclanche cell (emf 1.5V) is connected across the primary. The voltage developed in the secondary would be
(A) 3.0V
(B) zero
(C) 1.5V
(D) 1.75V

74. In a photo-electric cell, the wavelength of incident light is charged from 4000Å to 3000Å then change in stopping potential will be
(A) 0.66V
(B) 1.03V
(C) 0.33V
(D) 0.49V

75. The radio-active substance has a half life of four months. Three-fourths of the substance will decay in
(A) 3 months
(B) 4 months
(C) 12 months
(D) 8 months

76. For the object shown select the correct top view.

(A)
(B)
(C)
(D)
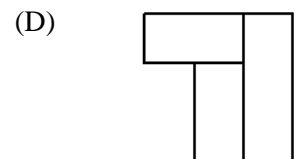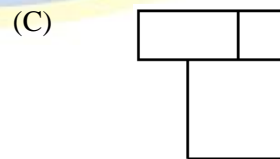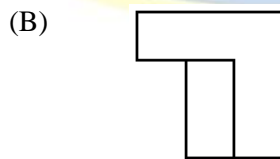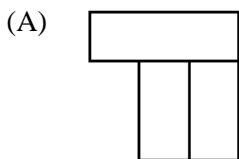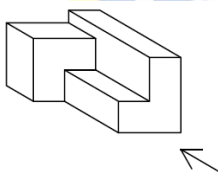
77. For the object shown here select the correct left side view

(A)   (B)   (C)   (D)
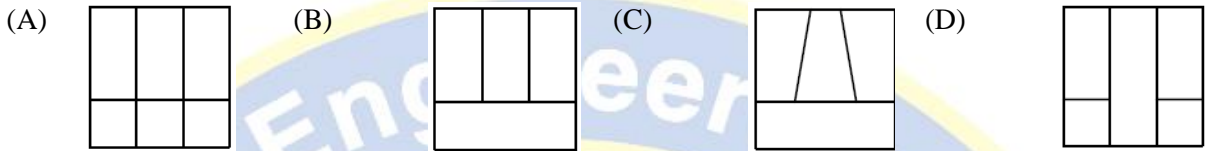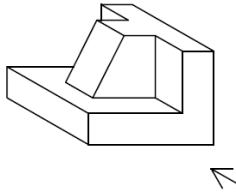
78. The pH of 0.001 M HCl solution will be
(A) 0.001 (B) 10^{-3} (C) 3 (D) 2

79. A current of 0.75 ampere is passed through a solution of a salt of a metal for 45 min, and the increase in wt. of cathode is 0.6662 g, the eq.wt. of metal is
(A) 31.75 g (B) 32.5g (C) 37.5 g (D) 53

80. IUPAC name of $CH_3\text{-}CH_2\text{ - }CH_2\_CH(OCH_3)\text{ - }CO\,Br$ is
(A) 2- methoxylpentanoyl bromide (B) 3- methoxylpentanoyl bromide
(C) 3-methoxyhexanoyl bromide (D) 2-methoxyhexanoyl bromide

81. A gas formed by treating iron sulphide and dilute sulphuric acid on reaction with copper sulphate in acidic medium forms
(A) White ppt. (B) Black ppt. (C) Red ppt. (D) yellow ppt.

82. If $f(x) = 1+ \alpha x$, $\alpha \neq 0$ and $(fof)(x) = x$ then α is equal to
(A) 2 (B) 1 (C) – 1 (D) -2

83. If A_1, A_2, A_3 are the areas of excircles and A be the area of incircle then $\frac{1}{\sqrt{A_1}} + \frac{1}{\sqrt{A_2}} + \frac{1}{\sqrt{A_3}}$ equals

(A) $\frac{A_2}{\sqrt{A}}$ (B) $\frac{A_1}{\sqrt{A}}$ (C) $\frac{1}{\sqrt{A_1 A_2 A_3}}$ (D) $\frac{1}{\sqrt{A}}$

84. The number of triangles that can be formed with 10 points as vertices, n of them being collinear is 110 then n is equal to
(A) 3 (B) 5 (C) 4 (D) 6

85. If a, 4, b are in A.P. ; a, 2, b are in G.P. then a, 1, b are in
(A) A.P. (B) G.P. (C) A.G.P. (D) H.P.

86. If $z = \cos\theta + i\sin\theta$ then $z^n + \frac{1}{z^n}$ equals
(A) $2\cos n\theta$ (B) $2\sin n\theta\ i$ (C) $-2\cos n\theta$ (D) $-2\sin n\theta\ i$

87. If $a = \sum_{n=1}^{\infty} \frac{2n}{(2n-1)!}$ and $b = \sum_{n=1}^{\infty} \frac{2n}{(2n+1)!}$ then ab equals
(A) e^2 -1 (B) e^2 (C) 1 (D) $e^2 + 1$

88. If θ be the angle between the vectors $\vec{a}$ and $\vec{b}$ and $|\vec{a} \times \vec{b}| = \vec{a} \cdot \vec{b}$ then θ equals
(A) π (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{4}$ (D) 0

89. If sum of the slopes of the lines $x^2 + \lambda xy - 3y^2 = 0$ is twice the product of the slopes then λ is equal to
(A) – 2 (B) 1 (C) 2 (D) 0

90. If the line lx+my=1 be a tangent to the circle $x^2+y^2=a^2$ then the locus of the point (l, m) is
(A) a straight line   (B) a circle   (C) a parabola   (D) an ellipse

91. The equation of directrix of the parabola $x^2 + 8y - 2x = 7$ is
(A) y = - 3   (B) y = 0   (C) y = 2   (D) y = 3

92. The plane $6x + 4y + 3z = 12$ cuts the axes in A, B, C ; then the area of the $\triangle$ABC is
(A) $\sqrt{61}$ sq. units   (B) $\sqrt{41}$ sq. units   (C) $\sqrt{29}$ sq. units   (D) $\sqrt{45}$ sq. Units

93. If $y = x^{x^{x^{\dots \text{to } \infty}}}$ then $\frac{dy}{dx}$ equals
(A) $\frac{y^2}{x(1-y\log_e x)}$ (B) $\frac{y^2}{x(1+y\log_e x)}$ (C) $\frac{y}{x(1+y\log_e x)}$ (D) $\frac{y}{x(1-y\log_e x)}$

94. If the rate of change of volume of a sphere is equal to the rate of change of its radius then its radius is equal to
(A) 1   (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{2\sqrt{\pi}}$ (D) $\frac{1}{2\pi}$

95. $\int \frac{(x+1)e^x}{\cos^2(xe^x)} dx$ equals
(A) $\cos(xe^x) + c$ (B) $\sin e^x + c$ (C) $\tan(xe^x) + c$ (D) $\tan e^x + c$

96. The area of the region between the curve $y = x^3$ and the line $y = x$ lying in the first quadrant is
(A) 2 sq. units   (B) $\frac{1}{2}$ sq. units   (C) 1 sq. unit   (D) $\frac{1}{4}$ sq. units

Read the passage and answer the questions from 97 to 100.

In the twentieth century, architects in large cities designed structures in a way that reduced noise and yet made living as comfortable as possible. They used such techniques as making walls hollow and filling this wall space with materials that absorb noise. Thick carpets and heavy curtains were used to cover floors and windows. Air conditioners and furnaces were designed to filter air through sound proofing materials. However, after much time and effort had been spent in making building less noisy, it was discovered that people also reacted adversely to the lack of sound. Now, architects are designing structures that reduce undesirable noise, but retain the kind of noise that people seem to need.

97. In the second sentence, the word 'they' refers to
(A) techniques   (B) cities   (C) structures   (D) architects

98. Which of the following is <u>not</u> mentioned as absorbing sound?
(A) filled hollow walls   (B) air filter   (C) air conditioners and fillers
(D) thick carpets and heavy curtains

99. Architects are now designing
(A) new techniques sound proofing   (B) structure with some noise
(C) the ideal noise   (D) adverse buildings

100. According to the passage, people live most comfortably with
(A) noisy furnaces   (B) silence   (C) reduced noise   (D) certain noises

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