TRIBHUVANUNIVERSITY
INSTITUTE OF ENGINEERING
Model Questions for B.E. Entrance Test (2075)

Set: II (B)   Time: 2 hours   Date: 2075/04/05

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

1.   What is the derivative of $\frac{d}{dx}\log|x|$?
      (A) $\frac{1}{|x|}$ (B) $\frac{-1}{|x|}$ (C) $|x|$ (D) $\frac{1}{x}$

2.   What is the stationary point of the curve $y = x^2 - 2x - 5$?
      (A) (1, 6)   (B) (1, -6)   (C) (-1, 6)   (D) (-1, -6)

3. $\begin{bmatrix} 2 & 2k-2 \\ 1-k & 3 \end{bmatrix}$ is a symmetric matrix, what is the value of k?
      (A) 0   (B) - 1   (C) 1   (D) 2

4.   If $|\vec{a}+\vec{b}| = |\vec{a}-\vec{b}|$ and θ is the angle between $\vec{a}$ and $\vec{b}$ then what is the value of θ?
      (A) $\frac{\pi}{4}$ (B) $\frac{\pi}{3}$ (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{6}$

5.   Which of the following is the graph of $y = -|x|$?
      (A)   (B)
      (C)   (D)
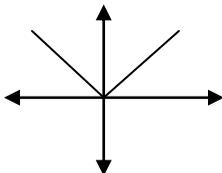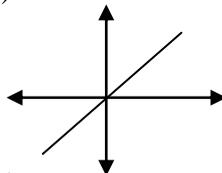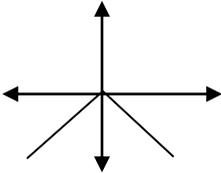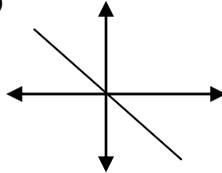
6.   If $f(x+2) = x^2 + 4x + 8$ what is the value of $f(-2)$?
      (A) -2   (B) 0   (C) 5   (D) 8

7.   If $tan3\theta = -1$, what is the value of θ?
      (A) $n\pi - \frac{\pi}{4}$ (B) $n\pi - \frac{\pi}{12}$ (C) $\frac{n\pi}{3} - \frac{\pi}{4}$ (D) $\frac{n\pi}{3} - \frac{\pi}{12}$

8.   What is the angle between the lines whose direction ratios are 2, -1, 4 and - 3, 2, 2?
      (A) $\pi/2$ (B) $\pi/3$ (C) $\pi/6$ (D) $\pi/4$

9.   What is the second derivative of $\frac{2}{1-x}$ at $x = -1$?
      (A) 1/2   (B) 3   (C) 0   (D) 1

10. In how many different ways can 3 men and 3 women be seated in a row if two persons of the same sex do not sit together?

(A) 24   (B) 72   (C) 36   (D) 96

11. Which of the following is sequential device?

(A) mouse   (B) magnetic tape

(C) pen drive   (D) printer The OR gate

12. VOIP is used for………..

(A) video call in internet   (B) video call in portal

(C) voice call in portal   (D) voice call in internet

13. Which of the following is other than operating system?

(A) Linux   (B) windows   (C) Google chrome (D) Mac OS

14. The full form of ISP is ………..

(A) Internet Service Provider   (B) Internet Security Provider

(C) Internet Server Provider   (D) Internet Server Procedure

15. In binary system, 4 bits is called………..

(A) byte   (B) nibble   (C) kilo bytes   (D) none

16. Due to ……….side management, we almost do not have load shedding these days.

(A) supply   (B) balance   (C) power   (D) demand

17. Highest coal resources are in ………..

(A) China   (B) Brazil   (C) Nepal   (D) USA

18. Using transformer following component remains same.

Frequency   (B) Voltage   (C) Power   (D) Frequency and Power

19. The electrical energy stored in micro hydropower project is stored in………..

(A) kinetic energy   (B) potential energy

(C) geothermal   (D) none of the above

20. Marble is a ………..

(A) igneous rock   (B) metamorphic rock

(C) sedimentary rock   (D) granul rock

21. The continuous white line in between lanes indicate ………. the lane.

(A) carefully cross (B) do-not cross   (C) may cross   (D) don't turn

22. Which of the following is carried out in anaerobic condition?

(A) bio gas plant   (B) solar heater   (C) hydroelectricity (D) wind plants

23. Solar PV panel efficiency is ………. proportional to temperature.

(A) inversely   (B) directly   (C) equally   (D) all of the above

24. Ignition quality of Diesel oil is expressed by ……….

(A) Cetane no (B) Octane no   (C) carborator   (D) Renold no

25. n-pentane and neo-pentane are
    (A) functional isomers   (B) metamers
    (C) Chain isomers   (D) position isomers

26. Benzene has
    (A) six pi and six sigma bonds
    (B) twelve sigma bonds and six pi bonds
    (C) three pi bonds and twelve sigma bonds
    (D) three pi and six sigma bonds

27. Excess of Cl_2 reacts with ammonia to form
    (A) $N_2 + NH_3$ (B) $N_2 + NCl_3$ (C) $NCl_3 + HCl$ (D) $N_2 + NH_4Cl$

28. Important ore of zinc
    (A) Felspar   (B) Azurite   (C) Malachite   (D) Calamine

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

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

31. In Contact process the arsenic impurity is removed by
    (A) $Fe(OH)_3$ (B) Pt   (C) V_2O_5 (D) FeO

32. How many litres of O_2 at NTP are required to burn completely 4.4 g of propane?
    (A) 84 L   (B) 22.4 L   (C) 44 L   (D) 11.2 L

33. Atomic No. 27 belongs to which block element?
    (A) s   (B) p   (C) d   (D) f

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

35. Molecular weight of a gas if 280 ml of it at NTP weigh 2 gm is
    (A) 180   (B) 160   (C) 260   (D) 170

36. Number of moles of solute dissolved in 1Kg of solvent is called
    (A) Normality   (B) Molarity   (C) Molality   (D) Molecularity

37. Which of the following is acceptable?
    (A) He said. Oh! We are caught.   (B) He said, "Oh we are caught".
    (C) He said, "Oh! We are caught".   (D) He said, "Oh! We are caught."

38. The passive voice sentence for "Nobody spoke to me" is ………..
    (A) I was not spoken to me   (B) Nobody was spoken to me
    (C) I had not spoken   (D) I had not been spoken to

39. The king said, "I'm sorry my child."
    (A) The king calling him a child apologized.
    (B) The king told the child to be sorry.
    (C) The king requested him to be sorry. (D) The king told that he was sorry.

40. He will not listen to me, ……….?
(A) won't he   (B) does he   (C) doesn't he   (D) will he

41. Pick out correct option.
(A) What sort of a businessman is he?
(B) What sort of the businessman is he?
(C) What sort of businessman is he?
(D) What sort of an businessman is he?

42. I do not regard ……….
(A) him like my friend.
(B) him as my friend.
(C) him my friend.
(D) him for my friend.

43. We have a new machine but nobody knows what for it is meant.
(A) What it is supposed to do.   (B) What it was supposed to do.
(C) What it is meant.   (D) What for it meant is.

44. Which of the following is acceptable?
(A) I as well as he am to speak.
(B) Neither he nor his brother is happy.
(C) Not only John but also his brother has also gone out of station.
(D) None of them has arrived yet.

45. Have you heard the bell……….?
(A) rings   (B) rang   (C) ring   (D) ringing

46. 'This is too good to be expected'- has the same meaning as 'This is ……….
be expected'.
(A) as good as can   (B) very good to
(C) so good that it could   (D) so very good to.

47. The word 'atom' is now being used extensively in advertising: it has
captured man's ………..
(A) opportunities (B) world   (C) fortitude   (D) imagination

48. Her ……….. manner embarrassed the other on the party.
(A) tractable   (B) affable   (C) sapid   (D) gauche

49. A house which is painted white is called a 'White house'. What is the stress
pattern for it?
(A) first element gets stressed
(B) both elements get stressed
(C) second element gets stressed
(D) stress does not fall on any element

50. Which of the following pairs is uttered similarly?
(A) get, gate   (B) heir, air   (C) wait, wet   (D) ear, heir

51. In photo electric effect the number of photo-electrons emitted is proportional to
    (A) intensity of incident beam   (B) frequency of incident beam
    (C) velocity of incident beam   (D) work function of photo cathode

52. A particle moving in a magnetic field has increase in its velocity then its radius of the circle
    (A) decreases   (B) increases   (C) remains the same   (D) becomes half

53. Two small spheres each carrying a charge q are placed 1 m apart. The electric force between them is F. If one sphere is taken around the other, the work down is
    (A) F   (B) $2\pi F$ (C) zero   (D) $\dfrac{F}{2\pi}$

54. In an astronomical telescope, the image formed is
    (A) erect and virtual   (B) real and erect
    (C) real and virtual both   (D) inverted and virtual

55. A virtual image larger than the object can be produced by
    (A) convex mirror   (B) concave lens
    (C) plan mirror   (D) concave mirror

56. What is the main cause of the shining of diamond?
    (A) reflection   (B) refraction
    (C) total internal reflection   (D) dispersion of light

57. To hear beats, it is essential that the two sound waves in air should
    (A) be travelling in opposite direction
    (B) have slight different wavelengths
    (C) be travelling in the same direction
    (D) have slightly different amplitude

58. The means of energy transfer in vacuum is
    (A) radiation   (B) irradiation   (C) convection   (D) conduction

59. A particle moves with uniform velocity, which of the following statements about the motion of the particle is true?
    (A) its acceleration is zero   (B) its speed is zero
    (C) its acceleration is opposite to the velocity
    (D) its speed may be variable

60. The minimum number of vectors of equal magnitude required to produce zero resultant is
   (A) two   (B) three   (C) four   (D) more than four

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

61. What is the value of x if $3\cos^{-1}x + \sin^{-1}x = \pi$?

(A) $\frac{1}{2}$ (B) 1   (C) $\frac{1}{\sqrt{2}}$ (D) 0

62. If the curve $y = ax^2 - 2x + b$ passes through (1,2) and the tangent is parallel to x axis at $x = -1$, what are the values of a and b?

(A) (1,5)   (B) (-1,-5)   (C) (-1,5)   (D) (1,-5)

63. What is the area bounded by the curve $y = \ln x$, the x- axis and the straight line $x = e$?

(A) e   (B) 1/e   (C) 0   (D) 1

64. Which of the following exists for the function $f(x) = x + \sin x$?

(A) A maximum nut no minimum   (B) A minimum but no maximum
(C) Both maximum and minimum (D) Neither maximum nor minimum

65. What is the angle between the lines represented by $xy + 2x - y - 2 = 0$?

(A) 0   (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

66. For the conic $x^2 - 4x - 12y - 32 = 0$, (i) Vertex is (2, -3) (ii) length of the latus rectum is 12, then which of the following is true?

(A) (i) is correct and (ii) incorrect   (B) both (i) & (ii) are correct
(C) (i) is incorrect and (ii) correct   (D) both (i) & (ii) are incorrect

67. What is the value of $f(x)$ if $\int \frac{1}{f(x)} dx = \log[f(x)]^2 + c$?

(A) $x + k$ (B) $2x + k$ (C) $3x + k$ (D) $\frac{1}{2}x + k$

68. What is the range of the function $f(x) = \frac{x}{|x|}$?

(A) R   (B) R-{0}   (C) {-1,1}   (D) R - {-1,1}

69. What are the three arithmetic means between x and y?

(A) $\frac{y-x}{4}, \frac{y-x}{3}, \frac{y-x}{2}$ (B) $\frac{3x+y}{4}, \frac{x+y}{2}, \frac{x+3y}{4}$

(C) $\frac{y-x}{4}, \frac{y-x}{3}, \frac{x+y}{4}$ (D) $-\frac{3x+y}{4}, \frac{x+y}{2}, -\frac{x+3y}{4}$

70. Which of the following is the solution of $|3x - 2| < 5$?

(A) $-1 < x < \frac{7}{3}$ (B) $2 < x < 5$ (C) $1 < x < \frac{7}{3}$ (D) $-\frac{7}{3} < x < \frac{7}{3}$

71. What are the values of a and b if $x^2 - 10x + 17$ is expressed in the form of $(x - a)^2 + b$?

(A) 5 and -8   (B) 5 and 8   (C) - 5 and 8   (D) -5 and -8

72. What is the modulus and argument of the complex number $- 1 + \sqrt{3}$ i?

(A) 2 and $\frac{\pi}{3}$ (B) 2 and $-\frac{\pi}{3}$ (C) 2 and $\frac{2\pi}{3}$ (D) -2 and $\frac{\pi}{3}$
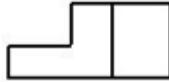
73. In the expansion of $(1 + ax)^4$ the coefficient of x^3 is 1372. What is the value of a?

(A) 6   (B) 8   (C) 9   (D) 7

74. What is the value of $\int(1 - \cos x + \cos^2 x - \cos^3 x + \cos^4 x - \cdots)\,dx$?

(A) $\frac{1}{2}\tan\frac{x}{2} + c$ (B) $\tan\frac{x}{2} + c$ (C) $\frac{1}{2}\tan x + c$ (D) $\frac{1}{2}\cot\frac{x}{2} + c$

75. If $\vec{a}$ and $\vec{b}$ are two vectors of unit length and θ is the angle between them then the value of $|\vec{a} - \vec{b}|$ is

(A) $2\sin\frac{\theta}{2}$ (B) $\sin\theta$ (C) $2\cos\frac{\theta}{2}$ (D) $\cos\frac{\theta}{2}$
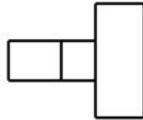
76. Which orthographic projection is incorrect?
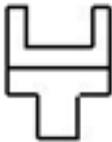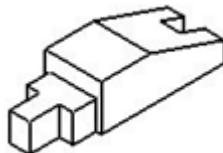

(A)

(B)

FV

LSV

(C)

(D) None

TV
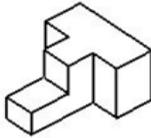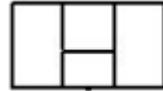
77. Which is the correct solid object for the given orthographic projection?

(A)

(B)

(C)

(D)
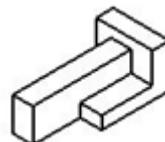
78. A gas formed by heating copper turnings with concentrated sulphuric acid when passed through acidified $KMnO_4$ solution,

(A) $KMnO_4$ is turned yellow   (B) $KMnO_4$ is oxidised

(C) $KMnO_4$ solution is turned green   (D) SO_2 is oxidised

79. IUPAC name of CH_3- CH_2- CH_2 - CH_2 -CH (OCH_3) - CO Cl is

(A) 2- methoxylhexanoyl chloride   (B) 5- methoxylhexanoyl chloride

(C) 3-methoxypentanoyl chloride   (D) 2-methoxypentanoyl chloride

80. A current of 0.75 ampere is passed through a solution of a salt of a metal for 45 min, and the increase in weight of cathode is 0.6662 g, the equivalent weight of the metal is

(A) 32.5g   (B) 37.5 g   (C) 31.75 g   (D) 53

81. 25ml of 0.1N caustic soda solution exactly neutralize 20 ml of an acid solution containing 7.875 g of acid per litre. The equivalent weight of the acid is

(A) 53.0   (B) 63.0   (C) 98.0   (D) 49.0

Read the passage and answer the questions from 82 to 85.

The young man has hidden his face and fast asleep again. The old man called Iona sighs and scratches his head. It will soon be a week since his son died, and he has not been able to speak properly about it to anyone. One must tell it slowly and carefully, how he died. One must describe every detail of the funeral and journey to the hospital to fetch the defunct clothes. His daughter Lena remained in the village. One must talk about her, too. Was it nothing he has to tell? Surely, the listener would gasp and sigh, and sympathize with him? It is better, to talk to women; although they are stupid, two worlds are enough to make them sob.

82. Why does the writer think that women are appropriate subject to share feeling?

(A) They are stupid.   (B) They weep easily.

(C) They have patience.   (D) They are tender-hearted.

83. Iona was trying to tell every detail of his son's death because he wanted………..

(A) to have sympathy

(B) to inform others about his son's death

 (C) others too fell like himself

(D) others to know about his son's death

84. The young man did not listen to Iona because ………..

(A) he was feeling sleepy   (B) It was not his duty

(C) he was trying to be indifferent   (D) Iona was not his relative

85. What might be the topic of the above paragraph?
    (A) Description of old man's life full of struggle.
    (B) One more attempt of Iona to tell about his grief.
    (C) Description of old man's sick son and his death.
    (D) Old man's family and relatives.

86. A block slides from an inclination of 45°. If it takes time twice with friction that to that without friction, then coefficient of friction for surface is given by
    (A) 0.25   (B) 0.5   (C) 1   (D) 0.75

87. If the change in the value of g at the height h above the surface of the earth is the same as at a depth x below it, then (both x and h being much smaller than the radius of the earth)
    (A) x = 2h   (B) x = h   (C) 2x = h   (D) $x = h^2$

88. Two equal drops are falling through air with a steady velocity of 5 cm/sec. If the drops coalesce, the new terminal velocity will be
    (A) 5×2 cm/s   (B) $5 \times \sqrt{2}$ cm/s   (C) $5 \times (4)^{1/3}$ cm /s   (D) $5 / \sqrt{2}$ cm/s

89. A rectangular block is heated from 0°C to 100°C. The percentage increase in its length is 0.10%. What will be the percentage increase in its volume?
    (A) 0.10 %   (B) 0.30 %   (C) 0.03%   (D) 0.45%

90. The temperature of the sink of a carnot engine is 27^0 C. If the efficiency of the engine is 25%, the temperature of the source is
    (A) 227°C   (B) 327°C   (C) 127°C   (D) 27°C

91. A man with defective eyes cannot see distinctly object at the distance more than 60 cm from his eyes. The power of the lens to be used will be
    (A) + 60 D   (B) – 1.66 D   (C) -60   (D) $\left(\dfrac{1}{1.66} \right)$ D

92. The critical angle of a certain medium is $\sin^{-1}$ (3/5). The polarizing angle of the medium is
    (A) $\sin^{-1}$ (4/5)   (B) $\tan^{-1}$ (3/4)   (C) $\tan^{-1}$ (5/3)   (D) $\tan^{-1}$ (4/3)

93. An electron is accelerated through a potential difference of 200 volt. If e/m for the electron be 1.6×10^{11} C/kg, the velocity acquired by the electron will be
    (A) 8×10^5 m/s   (B) 8×10^6 m/s   (C) 5×10^6 m/s   (D) 5.9×10^5 m/s

94. At a certain given place on the earth's surface, the horizontal component of earth's magnetic field is 3×10^{-5} T and resultant magnetic field is 6×10^{-5}T. The angle of dip at this place is
    (A) 30°   (B) 40°   (C) 50°   (D) 60°

95. The ratio of the secondary to the primary turns in a transformer is 3:2 and the output power is P. Neglecting all power losses, the input power will be

(A) $\dfrac{2}{3}$ P   (B) $\dfrac{3}{2}$ P   (C) $\dfrac{P}{2}$ (D) P

96. A stone falls from rest. The total distance covered by it in the last second of its motion is equal to the distance covered in the first three seconds of its motion. What is the height from which the stone was dropped? ($g = 10 m/s^2$)

(A) 25 m   (B) 100 m   (C) 200 m   (D) 125 m

97. In a simple pendulum, if kinetic energy is one-fourth of total energy, then displacement (x) is related to amplitude (R) as

(A) $x = \dfrac{\sqrt{3}}{2} R$ (B) $x = R$ (C) $x = 2R$ (D) $x = \dfrac{\sqrt{3}}{4} R$

98. The energy of the ground electronic state of hydrogen atom is –13.6 eV. The energy of the first existed state will be

(A) – 3.4 eV   (B) -6.8 eV   (C) -27.2 eV   (D) -54.4 eV

99. The half-life of radium is 1620 years and its atomic weight is 226 kg per kilomol. The number of atoms that will decay from its 1 gm sample per second will be (Avogadro's number $N = 6.02 \times 10^{26}$ atom/kilomol)

(A) 31.1×10^{15} (B) 3.11×10^{15} (C) 3.6×10^{12} (D) 3.61×10^{10}

100. "Pascal-second" has the dimensions of

(A) force   (B) coefficient of viscosity

(C) energy   (D) pressure

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