IOE Entrance Mock Test Question

Set I

1. A body constrained to move along z-axis is subjected to a constant force given by $\vec{F} = -\hat{\imath} + 2\hat{\jmath} + 3\hat{k}$. The work done by this force in moving the body by a distance of 4m is

[1 Marks]

a. 4J

b. 8J

c. 12J

d. 16J

2. The radius of gyration of a circular disc of radius R is

[1 Marks]

a. $\frac{R}{2}$

b. $\frac{R}{\sqrt{2}}$

c. R

d. $2R$

3. The temperature at which centigrade and Fahrenheit scale are equal is

[1 Marks]

a. -40°C

b. 273°C

c. -273.15°C

d. *impossible*

4. An ideal heat engine working between temperature T_1 and T_2 has efficiency η. If both the temperatures are raised by 100K each, the new efficiency of the engine will be

[1 Marks]

a. η

b. More than η

c. Less than η

d. Depends upon the nature of working substance

5. The amplitude of wave is represented by $= \frac{c}{a+b-c}$. Resonance will occur when

[1 Marks]

a. $b = -\frac{c}{2}$

b. $b = 0 \ \& \ a = c$

c. $b = -\frac{a}{2}$

d. $a = c$

6. No fringes are seen in a single slit diffraction if

[1 Marks]

a. The screen is far away

b. The wavelength is less than slit width

c. The wavelength is greater than slit width

d. The wavelength is less than the distance to the screen

7. Two lenses of powers P_1 *and* P_2 are placed in contact form an achromatic doublet. The ratio of their dispersive powers is

[1 Marks]

a. $\frac{P_1}{P_2}$

b. $\frac{P_2}{P_1}$

c. $\sqrt{\frac{P_1}{P_2}}$

d. $\sqrt{\frac{P_2}{P_1}}$

8. Which of the following is a true statement

[1 Marks]

a. The total entropy of thermally interacting system is conserved

b. Carnot engine has 100% efficiency

c. Total entropy does not change in reversible process

d. Total entropy in an irreversible process can either increase or decrease.

9. A parallel plate capacitor has a capacitance of 50μF in air and 110 μF when immerged in an oil. The dielectric constant of the oil is:

[1 Marks]

a. 0.45

b. 0.55

c. 1.10

d. 2.20

10. A 800μF capacitor is charged at a steady rate of 40μC/sec. Time it takes to raise its potential to 10V is

[1 Marks]

a. 150sec

b. 125sec

c. 100sec

d. 200sec

11. A current loop placed in a magnetic field behaves like a

[1 Marks]

a. Magnetic dipole

b. Magnetic substance

c. Magnetic pole

d. All are true

12. The induced emf produced when a magnet is inserted into a coil does not depend on the
[1 Marks]

a. Number of turns in the coil

b. Resistance of the coil

c. Magnetic moment of the magnet

d. Speed of approach of magnet

13. A photon of frequency f has a momentum associated with it. If c is the velocity of light, this momentum is
[1 Marks]

a. $\frac{hf}{c^2}$

b. $\frac{hf}{c}$

c. $\frac{h}{c}$

d. $\frac{f}{c}$

14. For the production of x-rays, the target should be made of
[1 Marks]

a. Steel

b. Copper

c. Tungsten

d. Aluminum

15. The expected energy of electrons at absolute zero is called
[1 Marks]

a. Fermi energy

b. Emission energy

c. Work function

d. Potential energy

16. The number of seismograph stations needed to locate the epicenter of an earthquake are

[1 Marks]

a. 1

b. 2

c. 3

d. 4

17. The velocity of a particle is $v = (3t + 1)$ m/s. When the particle starts from rest, the distance travelled by the particle when $t = 4s$ is

[2 Marks]

a. 7m

b. 14m

c. 21m

d. 28m

18. A particle of mass m that moves along x-axis has potential energy $Ux = a + bx^2$. It will execute simple harmonic motion with frequency

[2 Marks]

a. $\frac{1}{2\pi}\sqrt{\frac{2b}{m}}$

b. $\frac{1}{2\pi}\sqrt{\frac{b}{m}}$

c. $\frac{1}{2\pi}\sqrt{\frac{b}{2m}}$

d. $\frac{1}{2\pi}\sqrt{\frac{m}{b}}$

19. Two wires A and B are of same material and same lengths but the ratio of diameters is 1:2. If they are pulled by the same force, the potential energy per unit volume will be in the ratio

[2 Marks]

a. 16:1

b. 4:1

c. 1:4

d. 2:1

20. 1gm of water at 100℃ is converted into steam at the same temperature. If the volume of steam is 1671cm^3 and latent heat of steam is 2256Jgm^{-1}, the change in internal energy of the system is

[2 Marks]

a. 2086.8J

b. 2432.3J

c. 2687.5J

d. 3126.2J

21. A wire under tension vibrates with a frequency of 450Hz. The fundamental frequency of the wire were half as long, twice as thick and under one fourth tension is

[2 Marks]

a. 190Hz

b. 225Hz

c. 150Hz

d. 900Hz

22. In Young's double slit experiment, the intensity ratio at a point of observation due to two coherent waves is 4:9. The ratio of the intensity at maxima to the intensity at minima is

[2 Marks]

a. 25:1

b. 81:16

c. 13:4

d. 9:4

23. The wavelength of light used in optical instruments are $\lambda_1 = 400nm$ and $\lambda_2 = 500nm$ then ratio of their resolving powers corresponding to λ_1 & λ_2 is

[2 Marks]

a. 16:25

b. 25:16

c. 4:5

d. 5:4

24. An electron at rest has mass m and charge e. It is accelerated by a constant electric field E. The velocity of the electron after covering a distance S is

[2 Marks]

a. $\sqrt{\frac{eE}{S}}$

b. $\sqrt{\frac{eEm}{S}}$

c. $\sqrt{\frac{2eES}{m}}$

d. $\sqrt{\frac{2eEm}{S}}$

25. A parallel combination of three resistances takes a current of 7.5A from a 30V battery. If the two resistances are 10Ω and 12Ω, the third resistance is

[2 Marks]

a. 4 Ω

b. 9 Ω

c. 15 Ω

d. 21 Ω

26. Two identical coils carry equal currents and have a common center, but their planes are perpendicular to each other. If the field due to one coil is B, then resultant field at their center is

[2 Marks]

a. Zero

b. $\frac{B}{\sqrt{2}}$

c. $\sqrt{2}\ B$

d. $2B$

27. A perfectly reflecting mirror has an area 1 cm^2. Light is allowed to fall on it for 1 hour at the rate of 10W/cm^2. The force that acts on the mirror is

[2 Marks]

a. $1.11 \times 10^{-6}N$

b. $3.33 \times 10^{-7}N$

c. $6.66 \times 10^{-7}N$

d. $3.33 \times 10^{-6}N$

28. The half life of radium is 1600 years. The fraction of sample undecayed after 6400 years is
[2 Marks]

a. ½

b. 1/16

c. 1/32

d. 1/64

29. Andy knocked on the door ..... nobody answered.
[1 Marks]

a. And

b. But

c. Therefore

d. While

30. _____he really a thief?
[1 Marks]

a. Are

b. Is or Was

c. Were

d. None of these

31. It is time you ..... home.
[1 Marks]

a. Go

b. Have gone

c. Went

d. Are going

32. You _____tired tomorrow if you don't go to bed soon.
[1 Marks]

a. Would be

b. Were

c. Will be

d. Are going

33. The passive voice for "We have warned you" is:
[1 Marks]

a. You have been warned.

b. We have you warned.

c. Warned you have been.

d. Have you been warned.

34. Find out the subject in the following sentence: "On the top of the hill, there lives a hermit."
[1 Marks]

a. The hill

b. A hermit

c. On the top

d. On the top of the hill

35. Each of the wards in the emergency room _____full.
[1 Marks]

a. is

b. are

c. were

d. were being

36. She suffers _____a heart disease.

[1 Marks]

a. about

b. in

c. from

d. on

37. Honesty is the _____policy.

[1 Marks]

a. Best

b. Worst

c. Better

d. Bad

38. What is the antonym for Foreign?

[1 Marks]

a. Local

b. Modern

c. Popular

d. Native

39. Which of the following does not have / ia / sound?

[1 Marks]

a. Near

b. Deer

c. Ear

d. Pray

40. Which syllable is stressed in the following word? “Photography”
[1 Marks]

a. Graph

b. To

c. Pho

d. Ic

41. 26 cc of CO_2 are passed over red hot coke. The volume of CO evolved is
[1 Marks]

a. 15 cc

b. 10 cc

c. 32 cc

d. None of these

42. Which of the following species has max. no. of unpaired electron?
[1 Marks]

a. Cr^{+++}

b. Fe^{+++}

c. Ni

d. Cr

43. Identify the indicator used to titrate Na_2CO_3 solution with HCl.
[1 Marks]

a. Phenolphthalein

b. Dil. H_2SO_4

c. Methyl orange

d. None of these

44. Which of these is called anamolous pair in Mendeleev's periodic table?

[1 Marks]

a. N & O

b. Li & Na

c. Te & I

d. Hg & Cu

45. Which of these have smallest size?

[1 Marks]

a. Na^{+}

b. Mg^{++}

c. F

d. O^{--}

46. Which of these is used to remove arsenic from SO_2 during manufacture of sulphuric acid?

[1 Marks]

a. $FeSO_4$

b. $Al(OH)_3$

c. $Fe(OH)_3$

d. $Fe_2(SO_4)_3$

47. Water gas is:

[1 Marks]

a. $CO + N_2$

b. $CO_2 + H_2O$

c. $CO + H_2O$

d. $CO + H_2$

48. An alloy of Cu and Sn is known as
[1 Marks]

a. Brass

b. Bronze

c. Solder

d. Horn silver

49. The IUPAC name of glyoxal is
[1 Marks]

a. Ethane dioic acid

b. Ethane dial

c. Ethane dione

d. Ethanediol

50. How many isomers of C_3H_2O are possible?
[1 Marks]

a. 2

b. 3

c. 4

d. 5

51. Which of these can be used to prepare methane gas?
[1 Marks]

a. Wurtz rxn

b. Kolbe's electrolysis

c. Decarboxylation of fatty acid

d. All of these

52. What is the equivalent mass of H_3PO_3 in the reaction, 2 NaOH + H_3PO_3 Na_2HPO_3 + 2 H_2O
[2 Marks]

a. 2M

b. M/1

c. M/2

d. M/3

53. The current required to liberate 1 cc of H_2 gas at STP per second by the electrolysis of acidified water is:
[2 Marks]

a. 0.86 A

b. 1.72 A

c. 8.6 A

d. 17.2 A

54. 0.5 g of NaOH is added to 100ml of 0.25N HCl solution. The pH of the resulting solution is
[2 Marks]

a. 0.3

b. 0.9

c. 1.3

d. 1.9

55. The solubility of silver chromate in pressure of centimolar potassium chromate is (Ksp for Ag_2CrO_4 = 2.4 X 10^{-13})
[2 Marks]

a. 6.21 X 10^{-5} moles/litre

b. 4.89 X 10^{-6} moles/litre

c. 4.89 X 10^{-7} moles/litre

d. 4.89 X 10^{-5} moles/litre

56. Which of this forms a ppt with a gas formed by reacting FeS with dilute H_2SO_4?
[2 Marks]

a. Acidified $ZnSO_4$

b. Acidified $MnSO_4$

c. Acidified $FeCl_3$

d. Acidified $CdSO_4$

57. Fire extinguishers contain H_2SO_4 and
[2 Marks]

a. $NaHCO_3$ and Na_2CO_3

b. $NaHCO_3$

c. Na_2CO_3

d. $CaCO_3$

58. Which isomerism is present in n-butyl alcohol and iso-butyl alcohol?
[2 Marks]

a. positional

b. chain

c. optical

d. geometrical

59. What are the coefficients of the first and the last term of $(a + b)^n$?
[1 Marks]

a. 2

b. 1

c. Coefficients depend on n

d. 3

60. The sum of the roots of the equation $ax^2 + bx + c = 0, a \neq 0$ is

[1 Marks]

a. $\frac{b}{a}$

b. $-\frac{b}{a}$

c. $\frac{\frac{c}{a}}{a}$

d. $\frac{a}{\frac{b}{b}}$

61. If A and B are non singular matrices then $(AB)^{-1} =$

[1 Marks]

a. A^{-1}

b. B^{-1}

c. $A^{-1}B^{-1}$

d. $B^{-1}A^{-1}$

62. When a selection of objects is made without paying regard to the order of selection, it is called

[1 Marks]

a. sequence

b. series

c. combination

d. permutation

63. $1 + 2 + 3 + 4 + \ldots + n =$

[1 Marks]

a. $\frac{n(n+1)}{4}$

b. $\frac{n(n+1)}{6}$

c. $\frac{n(n+1)}{2}$

d. $\frac{n(n-1)}{2}$

64. The area bounded by the curves $y = \sqrt{x}, 2y + 3 = x$ and the x-axis in the first quadrant is
[1 Marks]

a. 9

b. 18

c. 36

d. none of these

65. Area of the region bounded by the curve $y = cos\, x$ between $x = 0\ and\ x = \pi$ is
[1 Marks]

a. 1 sq. units

b. 2 sq. units

c. 3 sq. units

d. 4 sq. units

66. Find the maximum profit that a company can make, if the profit function is given by $P(x) = 41 + 24x - 18x^2$
[1 Marks]

a. 56

b. 49

c. 23

d. 89

67. The change in variable x is called increment of x.It is denoted by δx which is
[1 Marks]

a. positive only

b. negative only

c. positive or negative

d. none of these

68. $\lim_{x \to \infty} x^2 \sin\frac{1}{x}$

[1 Marks]

a. is 1

b. is 0

c. is ∞

d. oscillates between-1 and 1

69. The equation of the chord of the circle, $x^2+y^2-4x = 0$ where mid-point is (1,0) is

[1 Marks]

a. y=2

b. y=1

c. x =2

d. x = 1

70. Equation of parabola which is symmetric about x-axis with vertex (0, 0) and pass through (3, 6).

[1 Marks]

a. $y^2 = 6x$

b. $x^2 = 12y$

c. $y^2 = 12x$

d. $x^2 = 6y$

71. Equation of horizontal line below x-axis at 5 units from x-axis is _____

[1 Marks]

a. x=5

b. x=-5

c. y=5

d. y=-5

72. If the line joining the points (2,y) and (4,6) has the slope =-3/2 then y=
[1 Marks]

a. 3

b. 6

c.-4

d. 9

73. Find the angle between 2x + 3y – 2z + 4 = 0 and 4x + 3y + 2z + 2 = 0.
[1 Marks]

a. 38.2

b. 19.64

c. 89.21

d. 54.54

74. If S = {a, b, c} then the number of distinct relations on S is
[1 Marks]

a. 9

b. 2^9

c. 2^3

d. 9^2

75. Range of $\cos x$ is
[1 Marks]

a. $[-1,1]$

b. R

c. negative real no.

d. $R - \{x \mid -1 < x < 1\}$

76. Events A, B, C are mutually exclusive events such that $P(A) = \frac{3x+1}{3}, P(B) = \frac{1-x}{4}$, and $P(C) = \frac{1-2x}{2}$. The set of possible values of x are in the interval

[1 Marks]

a. $\left[\frac{1}{3}, \frac{1}{2}\right]$

b. $\left[\frac{1}{3}, \frac{2}{3}\right]$

c. $\left[\frac{1}{3}, \frac{13}{3}\right]$

d. $[0,1]$

77. What is the median and standard deviation of a distribution are 50 and 5 respectively, if each item is increased by 4.

[1 Marks]

a. Median will increase and S.D. will increase

b. Both will remain same

c. median will go up by 2 but S.D. will remain same

d. median will increase and S.D. will decrease

78. Shoe size of most of the people in Kathmandu valley is no.42, which measure of central tendency does it represent?

[1 Marks]

a. Mean

b. Median

c. Mode

d. All of the above

79. $(1 + w - w^2)^8 =$

[2 Marks]

a. 256

b. $256w$

c.-256

d. $-256w$

80. If the matrix $\begin{bmatrix} k & 4 \\ 3 & 2 \end{bmatrix}$ is singular then $k =$

[2 Marks]

a. 2

b. 6

c. 4

d. 8

81. The number of the words that can be formed out of the letters of ASSASSINATION is

[2 Marks]

a. $\frac{13!}{4! \cdot 3! \cdot 2! \cdot 2!}$

b. $\frac{13}{4 \cdot 3 \cdot 2 \cdot 2}$

c. $\frac{13!}{4!}$

d. $\frac{4! \cdot 3! \cdot 2! \cdot 2!}{13!}$

82. $\frac{1}{2}, \frac{1}{7}, \frac{1}{12}$ is called

[2 Marks]

a. A.P.

b. G.P.

c. H.P.

d. none of these

83. $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$ equals

[2 Marks]

a. $-\cot e^x x + c$

b. $\tan(xe^x) + c$

c. $\tan e^x + c$

d. $\cot e^x + c$

84. If $f(x) = x^3 + 2x + 9$ then $f''(x) =$

[2 Marks]

a. $3x^2 + 2$

b. $3x^2$

c. $6x$

d. $2x$

85. $\frac{d}{dx}\log_{10(x)} =$

[2 Marks]

a. $\frac{1}{x}\log 10$

b. $\frac{1}{x\log 10}$

c. $\frac{\ln x}{x\ln x}$

d. $\frac{\ln 10}{x\ln x}$

86. $\lim_{x \to 3} \frac{x - 3}{x^2 - 2x - 3}$ is

[2 Marks]

a. 1

b. $\frac{1}{4}$

c. ∞

d. none of these

87. The equation of the tangent to the circle $x^2+y^2+4x-6y-13 = 0$ at point (3,4) is

[2 Marks]

a. 3x+4y =17

b. 5x+y = 9

c. 2x-7y = 9

d. 5x+3y = 1

88. The straight-line $y=2x+\lambda$ does not meet the parabola $y^2=2x$ if

[2 Marks]

a. $\lambda<1/4$

b. $\lambda=1/4$

c. $\lambda>1/4$

d. $\lambda = 4$

89. The equation of the straight line passing through (1,1) and parallel to $x^2-5xy+4y^2+x+2y-2=0$ is

[2 Marks]

a. $x^2-5xy+4y^2+3x-3y=0$

b. $x^2+5xy+4y^2+x+2y-2=0$

c. $x^2-3xy+7y^2=0$

d. $x^2+2xy+7y^2+7x+4y=0$

90. The equation of the plane passing through the intersection of the planes x+4y=0, 3y-z=0 and perpendicular to the plane 5x+3y-4z=8 is

[2 Marks]

a. x-4y+7=0

b. 12x+3y-4z+5=0

c. 7x-3y+z=0

d. 13x-y+17z=0

91. The solution of $3x^2 - 12x = 0$ when

[2 Marks]

a. $x \in N$ is $\{4\}$

b. $x \in I$ is $\{0, 4\}$

c. $x \in S = a + ib: b \neq 0, a, b \in R$ is ϕ

d. All of these

92. Period of $\cot\frac{x}{2}$ is

[2 Marks]

a. π

b. $\frac{\pi}{2}$

c. $\frac{\pi}{4}$

d. 2π

93. If $\vec{a} = 2\hat{i} - 3\hat{j} - \hat{k}$ and $\vec{b} = \hat{i} + 4\hat{j} - 2\hat{k}$ then $(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b}) =$

[2 Marks]

a. $\hat{i} - 6j + 22\hat{k}$

b. $-20\hat{i} - 6j - 22\hat{k}$

c. $20\hat{i} + 6j + 22\hat{k}$

d. None of these

94. Zwitter ion is formed when aniline is heated with

[2 Marks]

a. fuming H_2SO_4 at 200°C

b. conc. HNO_3

c. aq. Br_2

d. conc. H_2SO_4

95. Paris green, a common pesticide contains

[2 Marks]

a. basic copper acetate

b. arsenous oxide

c. acetic acid

d. all of above

96. When benzene diazonium chloride is heated with the Cu and HCl, chlorobenzene is formed. The reaction is :

[1 Marks]

a. Sandmeyer reaction

b. Sandmeyer Gatterman reaction

c. raschig's reaction

d. all of these

97.

Read the following passage and answer the four question that follow:

John did not think much about wealth or sources of inequality in life. It was his firm belief that if this world was not good then the Hereafter would be good and this belief sustained him. He was not like some of the other people he knew, who would sell their souls to the devil. He always thought of God before doing anything. He lived the life of an honest man. He did not marry but did not desire another man's wife. He believed that women make men weak as described in the story of Samson and Delilah.

Q. What was John's perspective on wealth and sources of inequality in life?

[2 Marks]

a. He thought a lot about it and believed it was important

b. He didn't think much about it and believed in the afterlife

c. He believed that wealth was the key to happiness

d. He believed that inequality was necessary for society to function

98. How did John feel about people who would sell their souls to the devil?

[2 Marks]

a. He admired them

b. He was indifferent to them

c. He disapproved of them

d. He was envious of them

99. What was John's approach to making decisions?

[2 Marks]

a. He always thought of God before doing anything

b. He always thought of the consequences before doing anything

c. He always thought of himself before doing anything

d. He always thought of others before doing anything

100. Was John married?

[2 Marks]

a. Yes

b. No

c. Not mentioned

d. Not sure