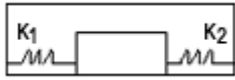1. A dipole is placed in a uniform electric field, its potential energy will be minimum when the angle between its axis and field is

A. 0        B. $\pi$        C. $\pi/2$        D. $2\pi$

2. Charge of 2 c is placed at the centre of a cube of volume 8 cc, what is electric flux passing through one face ?

A. $1/(3\varepsilon_0)$        B. $(1/2)\varepsilon_0$        C. $2/\varepsilon_0$        D. $3/\varepsilon_0$

**3.** 1 MeV is

A. $1.6 \times 10^{-19}$ J        B. $1.6 \times 10^{-13}$ J        C. $1.6 \times 10^{-16}$ J        D. $1.6 \times 10^{-9}$ J

**4.** Fundamental frequency of a sonometer wire is *n,* if the tension is made 3 times and length and diameter are also increased 3 times, what is the new frequency ?

A. $n/3\sqrt{3}$        B. 3n        C. $\sqrt{3}$ n        D. $3\sqrt{3}$ n

5. What is the number of beats heard by the driver of a taxi which is approaching a wall at a speed 30 km/hr and emitting a sound of frequency 300 Hz ? Velocity of sound = 330 m/s.

A. 10        B. 15

C. 20        D. 25

6. A person is standing on a railway platform and a train is approaching, what is the maximum wavelength of sound he can hear ? Given wavelength of whistle = 1 m; speed of sound in air = 330 m/s; speed of the train = 36 km/hr.

A. 1 m        B. 32/33 m        C. 33/32 m        D. 12/13 m

7. Velocity of sound in open-ended tube is 330 m/s, the frequency of waves is 1.1 kHz and the length of tube = 30 cm, which harmonic will it emit ?

A. 2nd        B. 3rd        C. 4th        D. 5th

8. If both sprong constants $K_1$ and $K_2$ are increased to $4K_1$ and $K_2$ respectively, what will be the new frequency, if *f* was the original frequency?

A. *f*        B. 2*f*

C. (1/2) *f*        D. 4*f*



9. The radii of two drops are in the ratio 3 : 2, their terminal velocities are

A. 9 : 4        B. 2 : 3        C. 3 : 2        D. 2 : 9

10. When a body is raised to a height $R$ (which is the radius of earth), the change in its P.E. will be

A. $mgR$ 　　　　 B. $2\,mgR$ 　　　　 C. $mgR/2$ 　　　　 D. $4\,mgR$

11. If the length of a simple pendulum is tripled, what will be its new time period? ($T$ = original time period)

A. $0.7\,T$ 　　　　 B. $1.7\,T$ 　　　　 C. $T/2$ 　　　　 D. $T$

12. A pendulum of length 2m left at $P$. When it reaches $Q$, it looses 10% of its total energy due to air resistance. The velocity at $Q$ is

A. 6m/s 　　　　 B. 1m/s

C. 2m/s 　　　　 D. 8m/s

13. A lift is falling freely under gravity, what is the time period of a pendulum attached to its ceiling ?

A. zero 　　　　 B. infinity 　　　　 C. one second 　　　　 D. two second

14. What is the ratio of the moment of inertia of two rings of radius $r$ and $nr$ respectively about an axis perpendicular to their plane and passing through their centres?

A. $1 : n^2$ 　　　　 B. $1 : n$ 　　　　 C. $1 : 2n$ 　　　　 D. $n^2 : 1$

15. Beta-particle is emitted from the nucleus of mass number A, with velocity V, what is the recoil speed of the nucleus?

A. $M_e\,V/(A - M_e)$ 　　　 B. $4V/(A + 4)$ 　　　 C. V 　　　 D. $V/(A - 4)$

16. If an alpha particle collides head-on with the nucleus, what is the impact parameter ?

A. zero 　　　　 B. infinity 　　　　 C. $10^{-10}$m 　　　　 D. $10^{10}$m

17. If momentum decreases by 20%, kinetic energy will decrease

A. 40% 　　　　 B. 36% 　　　　 C. 18% 　　　　 D. 8%

18. If two balls are projected at angles 60° and 45° and the total heights reached are same, what is the ratio of their initial velocities ?

A. $\sqrt{3} : \sqrt{2}$ 　　　 B. $\sqrt{2} : \sqrt{3}$ 　　　 C. $3 : 2$ 　　　 D. $2 : 3$

19. Which one is a vector quantity ?

A. heat 　　　　 B. couple 　　　　 C. energy 　　　　 D. volume

20. Gravel is dropped on to a conveyor belt at a rate of 0.5Kg s$^{-2}$. The extra force in Newton required to keep the belt moving at 2 ms$^{-2}$ is

A. 1            B. 2            C. 4            D. 5

21. Bohr's theory of hydrogen atom did not explain fully

A. diameter of H atom                     B. emission spectra

C. ionisation energy                       D. the fine structure of even hydrogen spectrum

22. A current loop placed in a non-uniform magnetic field experiences :

A. a force of repulsion                   B. a force of attraction

C. a torque but not force              D. a force and a torque

23. For a heavily doped *n*-type semi-conductor, Fermi-level lies

A. a little below the conduction band        B. a little above the valence band

C. a little inside the valence band            D. at the centre of the band gap

24. Which of the following indicates that the galaxies are receding from us ?

A. Neutron Star      B. White dwarf      C. Black hole      D. Red shift

25. What does it represents?

A. AND              B. NAND

C. OR                D. NOR



26. In a transistor, the relation between $\alpha$ and $\beta$ is

A. $\beta = \alpha /(1 - \alpha )$      B. $\beta = 1/(1 - \alpha )$      C. $\beta = \alpha /(1 + \alpha )$      D. $\beta = 1 - \alpha$

27. In a transistor

A. there is 1 *p-n* junction             B. there are 2 *p-n* junctions

C. there are 3 *p-n* junctions           D. none of these

28. Germanium is doped with arsenic, what will be the result ?

A. *p*-type semi-conductor             B. *n*-type semi-conductor

C. intrinsic semi-conductor           D. none of these

29. An electron is moving in 1st orbit. The factor $nh/2\pi$ is

A. It's Angular momentum           B. Energy

C. Linear momentum D. None of these

30. The energy of an electron is

A. $hc/\lambda$ B. $h\lambda/c$ C. $hv/c$ D. none of these

**31.** According to Bohr's Theory, electron moves around in those orbits only in which $nh/2\pi$ is its

A. Impulse B. Angular momentum C. Force D. Kinetic Energy

32. Which of the following waves can produce photo-electric effect?

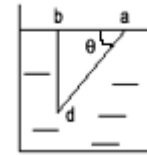A. Ultra-sound B. Infra-red C. Radio-waves D. X-rays

33. A glass prism of $\mu = 1.5$ is immersed in water as shown in the figure. A beam of light incident normally on the face *ab* is internally reflected from the face *ad* so as to incident normally on face *bd*. Given that refractive index of glass is 3/2 and that of water is 4/3. What is the value of $\theta$ ?

A. $\theta > \sin^{-1}(8/9)$ B. $\theta > \sin^{-1}(2/3)$



C. $\theta < \sin^{-1}(2/3)$ D. none of these

34. If two lenses are kept coaxial together, then what will be their power?

A. $R_1 + R_2$ B. $(R_1 R_2)/(R_1 + R_2)$ C. $(R_1 + R_2)/(R_1 R_2)$ D. none of these

35. The angular fringe-width does not depend upon

A. wavelength ($\lambda$) B. distance between slits (d)
C. distance between slits and screen (D) D. ratio ($\lambda/d$)

36. In a double slit experiment, the distance between slits is increased ten times whereas their distance from screen is halved, then what is the fringe-width?

A. remains same B. becomes 1/10 C. becomes 1/20 D. becomes 1/40

37. Which of the following electro-magnetic rays has maximum wavelength?

A. Radio waves B. X-rays C. Infra-red rays D. Ultra-violet rays

38. The resonant frequency is proportional to

A. R/LC B. $1/\sqrt{LC}$ C. $\sqrt{LC}$ D. none of these

39. The wave with wavelength of 10 cm lies in region of

A. Radio waves        B. Micro-waves        C. X-rays        D. Infra-red rays

40. If L = 100μ H, current changes by 1 A in 0.1 second. What is the emf produced?

A. 1 mV        B. 100 mV        C. 10 mV        D. 0.1 V

41. A magnetic needle is placed in a non -uniform magnetic field; which one is correct?

A. both force and torque act        B. force but no torque

C. torque but no force        D. none of these

42. In a circular coil of radius $r$ the magnetic field at the centre is proportional to:

A. $r^2$        B. $r$        C. $1/r$        D. $1/r^2$

43. If two electron beams travel in the same direction, they will

A. attract each other    B. repel each other    C. nothing will happen    D. none of these

44. One charge is moving along a circle in a magnetic field B, mass = $10^5$ kg, velocity = 1m/s, magnetic field = $10^{-2}$ $T$, $Q = 10^7$ coulomb. What is the radius of its circular tank?

A. 1m        B. 0.1m        C. 10m        D. none of these

45. If two resistors of resistances $2R$ and $3R$ are connected in parallel, then the heat produced in them will be in the ratio

A. 3 : 2        B. 2 : 1        C. 1 : 4        D. 4 : 1

46. A graph is drawn with force along Y-axis & time along X-axis. The area under the graph represents

A. momentum        B. couple        C. moment of the force        D. impulse of the force

47. When a substance was heated, its conductivity increased. What should it be out of the following?

A. Metal        B. Insulator        C. Semi-conductor    D. Semi-metal

48. A mass is revolving in a circle which is in a plane of paper. The direction of tangential acceleration is

A. upward to radius        B. towards the radius

C. tangential        D. at right angle to angular velocity

49. What is the potential at the center *c* ?

A. 0                    B. Kq/a√2

C. √2 (Kq/a)           D. none
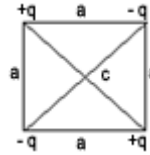


50. Electric field lines are parallel to the plane face of a hemisphere, what is the total flux passing through it

A. $E.\pi r^2/2$                    B. $E.\pi r^2/2E_0$

C. $E.2\pi r^2$                     D. 0

51. At Boyle's temperature,

A. Joules effect is positive        B. *b* of Vander Waal's equation is zero

C. Gas obeys Boyle's law            D. None of these

52. At 0 *K* which is true?

A. *b* of Vander Waal's equation becomes very small

B. all gases get liquified

C. metal become solidified

D. the motion of gas molecules becomes zero

53. Calculate the work done if temperature is changed from 0°C to 200°C at 1 atmosphere (R = 2 cal K$^{-1}$)

A. 100 calories      B. 200 calories      C. 400 calories      D. 800 calories

54. If a Carnot's Engine functions at source temperature 127°C and at a sink temperature 87°C, what is its efficiency?

A. 10%               B. 25%               C. 40%               D. 50%

55. Which is an intensive property?

A. Volume            B. Mass              C. Refractive index   D. Weight

56. If a particle is travelling with a speed of 0.9 of the speed of sound and is emitting radiations of frequency 1 kHz and moving towrads the observer, what is its apparent frequency?

A. 1.1               B. 0.8               C. 0.4               D. 10 kilohertz

57. In case of a transverse wave, frequency is proportional to:

A. √ T          B. 1/T          C. 1/√ T          D. T

58. A string is tied on a sonometer. Second end is hanging downward through a pulley with tension *T*. The velocity of the transverse wave produced is proportional to

A. 1/√ T          B. √ T          C. T          D. 1/T

59. If the frequency of oscillations of a particle doing SHM is *n*, the frequency of K.E. is

A. 2n          B. n          C. n/2          D. none of these

60. The ratio of the terminal velocities of two drops of radii *R* and *R*/2 is

A. 2          B. 1          C. 1/2          D. 4

61. If a mercury drop is divided into 8 equal parts, it's total energy

A. remains same          B. becomes twice          C. becomes half          D. becomes 4 times

62. Strain energy per unit volume in a stretched string is

A. 1/2 (stress x strain)          B. stress x strain          C. (stress x strain)$^2$          D. stress/strain

63. A satellite is revolving around earth. If it's height is increased to 4 times the height of geo-stationary satellite, what will become its time period?

A. 8 days          B. 4 days          C. 2 days          D. 16 days

64. When a body is lifted from surface of earth to a height equal to radius of earth, then the change in its P.E. is

A. mgR          B. 2 mgR          C. 1/2 mgR          D. 4 mgR

65. A body is projected from earth's surface to become its satellite, its time period of revolution will not depend upon

A. mass of earth          B. its own mass          C. gravitational constant          D. radius of orbit

66. Moment of inertia depends upon

A. Axis of rotation          B. Torque applied          C. Angular speed          D. Angular momentum

67. What is not conserved in the case of celestial bodies revolving around sun?

A. Kinetic energy          B. Mass          C. Angular          D. Linear momentum

momentum

68. If a force acts on a body, whose action line does not pass through its centre of gravity, then the body will experience

A. Angular acceleration

B. Linear acceleration

C. No acceleration

D. None of these

69. If a neutron collides with an alpha-particle, with velocity *V,* what is its resultant velocity?

A. 1/5 V

B. 2/5 V

C. 3/5 V

D. 4/5 V

70. Momentum is closely related to

A. Force

B. Impulse

C. Velocity

D. Kinetic Energy

71. In case of a uniform circular motion, velocity and acceleration are

A. Perpendicular

B. Same direction

C. Opposite direction

D. Not related to each other

72. An engine of power 7500W makes a train move on a horizontal surface with constant velocity of 20 ms$^{-1.}$ The force involved in the problem is

A.375 N

B.400 N

C.500 N

D.600 N

73. A person moves towards east for 5 km, then towards north for 12 km and then moves vertically up by 13 km. What is his distance now from the origin?

A. 13 √ 2

B. 5

C. 10

D. 20

74. What is $\vec{F} . \vec{ds}$

A. Torque

B. Impulse

C. Momentum

D. Work

75. Which one is not a dimensional constant?

A. Acceleration due to gravity

B. Surface Tension of water

C. Velocity of light

D. Reynold's Numer

76. Which of the following can measure the position of a particle most accurately?

A. polarized light

B. light with high wavelength

C. light with low wavelength

D. none of these

77. The dimension of Angular Momentum is

A. $MLT^{-2}$        B. $ML^2T^{-1}$        C. $ML^2T^{-2}$        D. $ML^2T$

78. The dimension of '*a*' in Vander Waal's gas equation is?

A. Atom litre$^{-2}$ mol$^2$      B. Atom litre$^2$ per mol      C. Atom litre$^{-1}$ mol$^{-2}$      D. Atom litre$^2$ mol$^{-2}$

79. The dimension of Action is

A. $M^2LT^{-3}$        B. $MLT^{-1}$        C. $MLT^{-2}$        D. $ML^2T^{-1}$

80. Photos get stuck on perfectly easily on reflecting surfaces because:

A. sticking area is more because of smoothness of reflecting surfaces

B. vacuum gets created between photo and reflecting surface

C. reflecting surfaces are warm surfaces

D. glue sticks nicely on reflecting surfaces

81. Surface temperature of the sun is of the order of

A. 5000 K        B. 7000 K        C. 6000 K        D. 12000 K

82. Two bodies A & B having masses in the ratio 1:4 have Kinetic energies in the ratio 4:1.The ratio of the linear momenta is

A. 1:4        B. 1:2        C. 1:1        D. 1:15

83. The function of base in transistor is

A. to stop the flow of electron        B. to stop the flow of current

C. to control the flow of current        D. to transmit current

84. Unidirectional property of *p-n* junction diode is used in

A. rectifier        B. amplifier        C. transistor        D. oscillator

85. A $^{238}U$ nucleus decays by emitting an alpha-particle of speed *v* ms$^{-1}$. The recoil speed of the residual nucleus is (in ms$^{-1}$)

A. - 4v/234        B. v/4        C. - 4v/238        D. 4v/234

86. Continuous spectrum of X -rays are produced

A. when electrons move from outer to inner orbits        B. when electrons move from inner to outer orbits

C. when electrons are accelerated by        D. none of these

moving towards the nucleus

87. According to Bohr's model of hydrogen atom, the radius of stationary orbits characterised by the principal quantum number is proportional to

A. $n^{-1}$      B. $n$      C. $n^{-2}$      D. $n^2$

88. When photons of energy 4.25 eV strike the surface of a metal *A*, the ejected photoelectrons have maximum kinetic energy $T_A$ eV and De-Broglie wavelength $\lambda_A$. The maximum kinetic energy of the photoelectrons liberated from another metal *B* by photons of energy eV is $T_B = (T_A - 1.5)$ eV. If the De-Broglie wavelength of these photoelectrons is $\lambda_B = 2\lambda_A$, then

A. the work function of A is 3.25 eV      B. the work function of B is 4.20 eV

C. $T_A = 2.00$ eV      D. $T_b = 2.75$ eV

89. The magnifying power of simple microscope is

A. $\propto f$      B. $\propto (1/f)$      C. $\propto \sqrt{f}$      D. $\propto (1/\sqrt{f})$

90. Refractive index depends on

A. angle of prism      B. wavelength of the light      C. intensity of light      D. frequency of light

91. A ray is incident in glass at 31°42' on glass-water boundary. If the angle of deviation of the ray is 4.5 degree, the angle of refraction in water will be

A. 27°12'      B. 35°92'      C. 26°92'      D. 36°12'

92. In Young's double slit experiment, the distance between the two slits is 0.1 mm, and the wavelength of light used is $4 \times 10^{-7}$ m. If the width of the fringe on the screen is 4 mm, the distance between screen and slit is

A. 0.1 mm      B. 1 cm      C. 0.1 cm      D. 1 m

93. The reason of various colours in bubble soap is

A. interference      B. visible light      C. diffraction      D. none of these

94. In a pure inductor circuit, what is the angle between potential and current ?

A. 0      B. $\pi$      C. $\pi/2$      D. $2\pi$

95. In an LCR circuit, Impedance is minimum when

A. $R = X_L$      B. $R = X_C$      C. $R = X_C + X_L$      D. $R = Z$

**96.** An LCR series circuit consists of $R = 25\Omega$ and the reactances of C and $L$ are $12\Omega$ and $24\Omega$ respectively. The impedance of the circuit is

A.$21\Omega$              B.$27.5\Omega$              C. $13\Omega$              D. $5\Omega$

97. In a transformer there are two coils placed near one another. First has 100 turns and 1A current and the other 25 turns. Current flowing through later will be

A. 1 A              B. 4 A              C. 16 A              D. 1/16 A

98. If two straight long conductors carry current in the same direction, the magnetic force on each other will be

A. repulsive          B. attractive          C. zero          D. none of these

99. If a particle is rotating between two magnetic fields, with certain velocity, this velocity depends upon

A. magnetic field                    B. angular velocity

C. torque                              D. acceleration

100. Two infinitely long, thin, insulated, straight wires lie in the $x$ -$y$ plane along the $x$ and $y$ axes respectively. Each wire carries a current $I$ respectively in the positive $x$-direction and the positive $y$-direction. The magnetic field will be zero at all points on the straight line

A. y = x              B. y = -x              C. y = x - 1              D. y = -x + 1

Solutions:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| A | A | B | A | B | B | A | C | A | C |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| B | A | B | A | A | A | B | B | B | A |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| D | D | A | D | A | A | D | B | A | A |
| 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| D | B | D | D | C | C | A | B | A | A |
| 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| A | C | A | A | A | D | C | C | A | D |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 |
| C | D | C | B | C | D | D | B | A | B |

| 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 |
|----|----|----|----|----|----|----|----|----|-----|
| B | A | A | C | B | A | A | A | B | B |
| 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| A | A | A | D | D | C | B | D | D | B |
| 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 |
| B | C | C | A | A | C | C | C | B | B |
| 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| D | D | A | C | D | B | B | B | B | A |