1. **In Bohr's theory the potential of an electron at a position is $\frac{kr^2}{2}$, k is constant, then the quantized energy of the electron in n^{th} orbit :**

   (1) $nh\left(\frac{k}{m}\right)$ (2) $nh\left(\frac{k}{m}\right)^{\frac{1}{2}}$ (3) $nh\left(\frac{m}{k}\right)$ (4) $nh\left(\frac{m}{k}\right)^{\frac{1}{2}}$

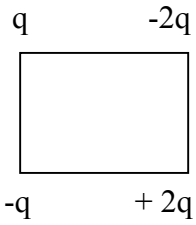
2. **To reduce the de-Broglies wave length of an electron from 100 pm to 50 pm, the required increase in energy is :**
   (1) 150 eV (2) 300 eV (3) 450 eV (4) 600 eV

3. **The angular width of fringes in Young's bislit experiment is 0.20^0 with the wavelength 5890 Å. If the whole apparatus is dipped in water, the angular width will be :**
   (1) 0.30^0 (2) 0.22^0 (3) 0.15^0 (4) 0.11^0

4. **Resistance of a 10 m. long wire of potentio meter is 1 Ω/m. A cell of 2.2 volt emf. and HRB is connected in series with the wire. How much resistance must be applied to get 2.2 $\frac{mv}{mt}$ gradient :**

(1) 1000 Ω (2) 990 Ω (3) 810 Ω (4) 790 Ω

5. **Four charges are placed on corners of a square, having side of 5 cm. , if q is one coulomb then electric field intensity at the centre will be :**



   (1) 1.02×10^7 N/c upwards
   (2) 2.04×10^7 N/c upwards
   (3) 2.04×10^7 N/c down
   (4) 1.02×10^7 N/c down

6. **Capacitance of a capacitor made by a thin metal foil is 2 μF. If the foil is filded with paper of thickness 0.15 mm. and dielectric constant of paper is 2.5, width of paper is 40 mm. then length of foil will be :**
   (1) 33.9 mm. (2) 13.4 mm. (3) 1.33 mm (4) 0.34 mm.

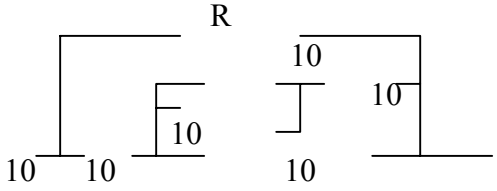
7. **An electron and an αα particle are accelerated with v volt voltage. If the masses are m_e and $m_{\alpha\alpha}$ then the ratio of momentum is :**

(1) $\sqrt{\frac{2m_e}{m_\alpha}}$ (2) $\sqrt{\frac{m_e}{2m_\alpha}}$ (3) $\sqrt{\frac{m_e}{m_\alpha}}$ (4) $\sqrt{\frac{m_e}{m_\alpha}}$

8. **Ultra sonic sound can be observed by :**
(1) Telephone (2) Hebb method (3) Quincke tube (4) Kundit tube

9. **Which two of the given transverse waves will give stationary wave when get super imposed :**
$z_1 = a \cos (kx - \omega t)$ ….. A
$z_2 = a \cos (kx \_ cot)$ …..B
$z_3 = a \cox (ky - \omega t)$ …..C
(1) A and B (2) A and C (3) B and C (4) any two

10. **For what value of R the net resistance of the circuit will be 18 ohms :**
(1) 24 Ω
(2) 16 Ω
(3) 10 Ω
(4) 8 Ω



11. **For a medium refractive indices for violet, red and yellow are 1.62, 1.52 and 1.55 resp. then dispersive power of medium will be :**
(1) 0.02 (2) 0.18 (3) 0.22 (4) 0.65

12. **The temperature at which the rms speed of hydrogen molecule is equal to escape velocity on earth surface will be :**
(1) 10059 K (2) 8270 K (3) 5030 K (4) 1060 K

13. **The temperature of a liquid drops from 365 K to 361 K in 2 minutes. Find the time during which temperature of the liquid drops from 344 K to 342 K. Room temp. is 294 K.**
(1) 60 sec. (2) 66 sec. (3) 72 sec. (4) 84 sec.

14. **Venturimeter is used to measure :**
(1) surface teusion of liquid
(2) rate of flow of liquid
(3) density of liquid
(4) pressure of liquid

15. A rod is fixed between two points at 20^0 C, coefficient of linear expansion of material of rod is 1.1×10^{-5} /^{0}C and Young's modulus is 1.2×10^{11} N/m. Find the force developed in the rod it temp. of rod becomes 10^0 C :

(1) 1.1×16^6 N/m^2
(2) 1.1×10^{15} N/m^2
(3) 1.2×10^7 N/m^2
(4) 1.32×10^8 N/m^2

16. If an air bubble of radius 1 mm. moves up with uniform velocity of 0.109 cm/s. in a liquid column of density 14.7×10^3 kg./m^3. If g = 10 m/sec.^{2} then coefficient of viscosity will be :

(1) 10.0 m=sec.^{2}
(2) 9.78 m-sec.$^{-2}$
(3) 9.62 m-sec.$^{-2}$
(4) 9.86 m-sec.$^{-2}$

17. A rocket launched with 10 km/sec. velocity radius of earth is R, then the maximum height attained by it will be :

(1) 5 R (2) 4 R (3) 3 R (4) 2 R

18. A block of 2 kg. mass and body of 1 kg. mass are connected with the two ends of a string. The string is passing through a pulley. The block is put on a horizontal table and the body is hanging. The table is friction less then acceleration and force of tension are:

(1) 4.38 ms^{-2}, 9.86 N
(2) 4.38 ms^{-2}, 6.54 N
(3) 3.27 ms^{-2}, 6.54 N
(4) 3.27 ms^{-2}, 9.86 N

19. A mass m performs oscillations of period T, when hanged by spring of force constant k, If spring is cut in two parts and arranged in parallel, If same mass is oscillated by them, new time period will be :

(1) $\frac{T}{2}$ (2) 2 T (3) $\frac{T}{\sqrt{2}}$ (4) T

20. In a triode amplifier μf= 70, gm= 1600 μmho and R_L = 0.1 MΩΩf input of 1v (rms) is given then power gained in load will be:

(1) 4.87 mω (2) 23.7 mω (3) 2.37 mω (4) 48.7 mω

21. Moment of inertia a rectangular thin plate having mass m, length ι, width b, about an axis passing through its centre and perpendicular to the plane is :

(1) $\frac{M\iota^2}{12}$ (2) $\frac{Mb^2}{12}$ (3) $\frac{M(\iota^2+b^2)}{3}$ (4) $\frac{M(\iota^2+b^2)}{12}$

22. In a triode circuit for a given plate voltage, plate current will be maximum when:

(1) V_g Positive and V_p negative
(2) V_g and V_p both positive
(3) $V_g = 0$ and V_p positive
(4) V_g negative and V_p positive

23. In p-n function avalanche current flows in circuit when be maximum when :
(1) excess (2) zero (3) reverse (4) forward

24. Half life of a radioactive element is 10 days. The time during which quantity remains 1/10 of initial mass will be :
(1) 16 days (2) 33 days (3) 50 days (4) 100 days

25. Resistance of semiconductor at OK is :
(1) small (2) large (3) infinity (4) zero

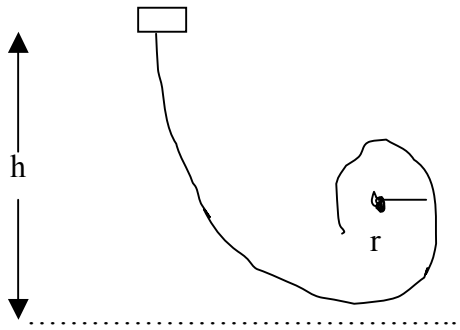
26. αœparticle of 400 KeV energy are bombarded on nucleus of 82 pb. In scattering of αœparticles, its minimum distance from nucleus will be :
(1) 0.59 pm (2) 5.9 pm (3) 0.59 nm (4) 0.59 Å

27. If the uncertainty in the position of an electron is 2Å then the uncertainty in the energy is (about) :
(1) 94 eV (2) 9.0 eV (3) 1.0 eV (4) 0.1 eV

28. Wrong statement is :
(1) Nuclear force is produced by the exchange of poins
(2) Nuclear force increases with increase in no. of nucleous
(3) Range of nuclear forces is very small
(4) Nuclear forces are strongest

29. The inductance required to connect bulb in series of 1 :
(1) 1.62 mH (2) 16.2 mH (3) 2.42 mH (4) 1.27 mH

30. A block follows the path as shown in the figure from height h. If radius of circular path is r, then relation holds good to complete full circle is



(1) $h \geq \frac{5r}{2}$

(2) $h > \frac{5r}{2}$

(3) $h \propto \frac{5r}{2}$

(4) $h = \frac{5r}{2}$

31. A hollow sphere has 6.4 m radius minimum velocity required by a cyclist at bottom to complete circle will be :

(1) 16 ms^{-1}

(2) 12.4 ms^{-1}

(3) 10.2 ms^{-1}

(4) 8 ms^{-1}

32. A block is lying on an inclined plane which makes 60^0 with the horizontal. If coefficient of friction between block and plane is 0.25 and g = 10 ms^{-2}. The acceleration of block when it moves along the plane will be :

(1) 86 m/sec. (2) 99 m/sec. (3) 124 m/sec. (4) 172 m/sec.

33. A charge moves in a circle perpendicular to a magnetic field. The time period of revolution is independent of :

(1) velocity (2) mass (3) charge (4) magnetic field

34. A coil of 40 ΩΩesistance has 100 turns and radius 6 mm. is connected to ammeter of 160 ohm resistance. Coil is placed perpendicular to the magnetic field. When coil is taken out of the field 32 μμcharge flows through it. The intensity of magnetic field will be :

(1) 0.566 T (2) 0.655 T (3) 5.66 T (4) 6.55 T

35. A choke coil of 0.1 H inductance and 12 ΩΩesistance. If it is connected to 60 Hz alternating current source the power factor will be:

(1) 0.24 (2) 0.28 (3) 0.30 (4) 0.32

36. For a gas C_v = 4.96 cal/mole-K, when 2 mole gas is heated from 340K to 342 K, increase in internal energy is :

(1) 9.92 cal. (2) 13.90 cal. (3) 19.84 cal. (4) 27.80 cal.

37. Luminous intensity for a bulb of 40 watt at 110 V is 11.01 lumen/watt. The distance at which intensity of illumination is 5 lumen/mt^2 will be:

(1) 44.04 m (2) 18.78 m (3) 9.39 m (4) 4.40 m

38. A 2m long rod of radius 1 cm. which is fixed from one end is given a twist of 0.8 radians. The shear strain developed will be :

(1) 0.016 (2) .008 (3) .004 (4) .002

39. A plane mirror makes an angle 300 with horizontal. It a vertical ray strikes the mirror, find the angle between mirror and reflected ray :
(1) 90^0 (2) 60^0 (3) 45^0 (4) 30^0

40. A rod of length ιand radius r is joined to a rod of length ι/2 and radius r/2 of same material. The free end of small rod is fixed to a rigid base and the free end of larger rod is given a twist of θθthe twist angle at the joint will be :
(1) $\frac{8\theta}{9}$ (2) $\frac{5\theta}{6}$ (3) $\frac{\theta}{2}$ (4) $\frac{\theta}{4}$

41. At NTP one mole of diatomic gas is compressed adiabatically to half of its volume (r= 1.41). The work done on gas will be :
(1) 2025 J (2) 1815 J (3) 1610 J (4) 1280 J

42. An achromatic combination is made with a lens of f focal length and W dispersive power with a lens having dispersive power of 2ωωThe work done on gas will be :

(1) - 2f (2) $-\frac{f}{2}$ (3) $\frac{f}{2}$ (4) 2f

43. An electron and proton lying 10 cm. apart. The ratio of electrostatic force and gravitational force between them will be:
(1) 10^{42} (2) 10^{39} (3) 10^{27} (4) 10^{19}

44. Two wires A and B of same material have radius 2r r. If resistance of B will be :
(1) 17 Ω (2) 68 Ω (3) 272 Ω (4) 544 Ω

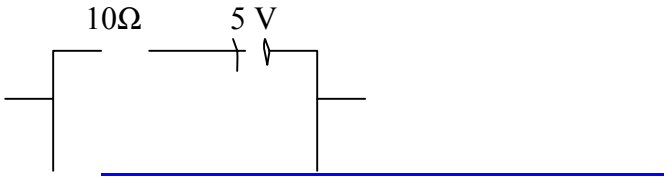
45. A charged plate has charge density of 2×10^{-6} c/m^2. The initial distance of an electron which is moving towards plate, can not strike the plate, if it is having energy of 100 eV :
(1) 3.51 cm. (2) 1.77 cm. (3) 3.51 mm. (4) 1.77 mm.

46. A sphere of radius 1 cm. has potential of 8000 V then the energy density near its surface will be :
(1) 2.83 Jm^{-3} (2) 8×10^3 Jm^{-3} (3) 32 Jm^{-3} (4) 64 x 105 Jm^{-3}

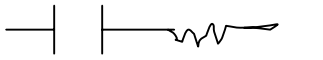
47. A proton of 200 Me V energy enters the magnetic field of 5 T. If direction of field if from south to north and motion is upwards the force acting on it will be :
(1) 1.6×10^{-6} N (2) 1.6×10^{-10} N (3) 0 (4) 3.2×10^{-8} N

48. If V_{AB} = uv in given figure then resistance X will be :

(1) 20
(2) 15



(3) 10
(4) 5



49. A charged water drop whose radius is 0.1 μm is equilibrium in an electric field. If charge on it is equal to charge of an electron will be (g= 10 ms^{-2}) :
(1) 1610 NC^{-1} (2) 262 NC^{-1} (3) 26.2 NC^{-1} (4) 1.61 NC^{-1}

50. The charge on 500 ml. water due to protons will be :
(1) $1.67x10^{23}$ (2) $1.67x10^{26}$ (3) $6.0x10^{27}$ (4) $6x10^{23}$

51. A piece of cloud having area $25x10^6$ m^2 and electric potential of 10^5 volt. If the height of cloud is 0.75 km. then the energy density of electric field between earth and cloud will be :
(1) 1475 J (2) 1225 J (3) 750 J (4) 250 J

52. 1 Farad in esu is :
(1) $\frac{1}{3} \times 10^{-6}$ (2) 9×10^{11} (3) 3×10^{10} (4) $\frac{1}{9} \times 10^{-11}$

53. Electric potential is given by : $V = 6x - 8xy^2 - 8y + 6yz - 4z^2$ then the electric force acting on 2 coulomb point charge placed on origin will be :

(1) 2 N (2) 6 N (3) 8 N (4) 20 N

54. The wavelength of $K_{\alpha\alpha}$ lines given by Molybdenum (At No. 42) is 0.7078 Å then wavelength of $K_{\alpha\alpha}$ for zinc (At no. 30) will be :
(1) 0.3541 Å (2) 1.3873 Å (3) 0.9425 Å (4) 1.2547 Å

55. A plane wave front of 7000 Å fallson an aperture. The area of half period zone of the diffraction pattern on screen 1 meter away from the aperture will be :
(1) $28x10^{-7}$ m^2 (2) $44x10^{-7}$ m^2 (3) $22x10^{-7}$ m^2 (4) $14x10^{-7}$ m^2

56. In Young's double slit experiment 62 fringes are seen in visible region for sodium light of wavelength 5893 Å. If violet light of wave length 4358 Å is used in place of sodium light then number of fringes seen will be :
(1) 84 (2) 74 (3) 64 (4) 54

57. Average wavelength of light emitted by a 100 watt bulb is 5000 Å. The no. of emitted photons per second :
(1) $5x10^{17}$ (2) $2.5x10^{22}$ (3) $3x10^{23}$ (4) $2.5x10^{19}$

58. To see first 20 lines of Balmer series distinctly minimum resolving power of instrument should be :
(1) 1040 (2) 983 (3) 920 (4) 878

59. If diffraction pattern of an electron from a crystal is same as diffraction pattern of X-rays of wavelength 0.61 Å. The energy of electron beam is :
(1) 0.4 keV (2) 1 ke V (3) 4 ke V (4) 50 ke V

60. Two parallel pillars are 11 km. away from an observer. The minimum distance between the pillars so that they can be seen separately will be :
(1) 183 m. (2) 915 m (3) 20.8 m. (4) 3.2 m

61. The focal length of objective and eyepiece of a telescope are 100 cm. and 5 cm. Final image is formed at least distance of distinct vision. The magnification of telescope is :
(1) 20 (2) 24 (3) 30 (4) 36

62. A planet is revolving around the sun. The average distance of the plant from the sum is 1.588 times than that of earth from sun . The time period of the planet is :
(1) 2 yrs. (2) 1.89 yrs. (3) 1.59 yrs. (4) 1.25 yrs.

63. Time period of a brass pendulum is 1 sec. at 20^0 C. Linear expansion coeff is 1.93×10^{-5} $(^0C)^{-1}$. At 30^0 C temp. how much the clock will be back in a week
(1) 504s (2) 224s (3) 56s (4) 8s

64. **Mass and radius of the earth is M and R. Wrok done to bring a 1 kg. mass from surface to the infinity is :**
(1) $\frac{GM}{2R}$ (2) $\frac{GM}{R}$ (3) $\sqrt{\frac{GM}{2R}}$ (4) $\sqrt{\frac{2GM}{R}}$

65. In the following reaction what are the values of A,B,C,D and E:
$_{92}U^{238} \rightarrow_B Th^{AB} \rightarrow_D Pa^{CE} \rightarrow_{92} U^{234}$
(1) A = 234, B = 90, C = 234, D = 93, E = α
(2) A= 238, B = 93, C = 234, D = 91, E = β
(3) A = 234, B = 90, C = 238, D = 94, E = α
(4) A = 234, B = 90, C = 234, D = 91, E = β

66. A bomb of 12 kg. divides in two parts ratio of masses is 1 : 3. If kinetic energy of smaller part is 216 J, then the momentum of bigger part in kg-m/sec. is :
(1) 108 (2) 72 (3) 36 (4) Data is incomplete

67. Weight of 1 kg. becomes 1/6 on moon, if radius of moon is 1.768×10^6. Mass of moon will be :

(1) 7.65×10^{22} kg. (2) 7.56×10^{26} kg. (3) 5.98×10^{24} kg. (4) 1.99×10^{30} kg.

68. Due to some force F_1 a body oscillates with period 4/5 sec. and due to other force F_2 oscillates with 3/5 sec. If both forces act simultaneously new period will be :

(1) 0.36 sec. (2) 0.48 sec. (3) 0.72 sec. (4) 0.64 sec.

69. A wave is given by $y = 3 \sin 20 \left(\frac{1}{0.04} - \frac{x}{0.01} \right)$ where y in cm.

frequency of wave and maximum acceleration will be :

(1) 25 Hz, 7.5×10^4 cm.-sec.$^{-2}$
(2) 25 Hz, 4.7×10^4 cm.-sec.$^{-2}$
(3) 50 Hz, 7.5×10^3 cm.-sec.$^{-2}$
(4) 100 Hz, 4.7×10^3 cm.-sec.$^{-2}$

70.Two forces of 5 and 10 dynes resp. are acting on a particle, the resultant force never can be :

(1) 8 dyne (2) 5 dyne (3) 12 dyane (4) 4 dyne

71.A boggy of uniformly moving train is suddenly detached from train and stops after covering some distance. The distance covered by the boggy and distance covered by the train in the same time has relation :

(1) no definite ratio
(2) first will be ¼ of second
(3) first will be ½ of second
(4) both will be equal

72.ππmesons can be :

(5) π^+, π-, π^0
(6) π^+ and π^-
(7) π^+, π^0
(8) π^- and π^0

73.In helium nucleus there are :

(9) 2 positron, 2 neutrons
(10) 2 protons, 2 neutrons
(11) 2 protons, 2 neutrons, 2 electrons
(12) 2 protons, 2 electrons

74.Equivalent energy of 1 amu is :

(13) 9.31 MeV
(14) 931 KeV
(15) 93.1 MeV
(16) 931 Mev

75.Density of nucleus is related to mass no. by :

(1) $\rho \propto \frac{1}{A}$ (2) $\rho \propto \sqrt{A}$ (3) $\rho \propto A$ (4) ρ = constant

76.The particles emitted by radio active decay are deflected by magnetic field. The particles will be :

(17) electron and α-particle
(18) electron, proton and neutron
(19) electron, proton and α
(20) proton and α

77.At 0^0K Fermi level for metals :
(21) depends on metal
(22) lies between empty levels
(23) lies between filled levels
(24) separate empty and filled levels

78.If quantity of a radioactive element remains $\frac{1}{16}$ of initial one in 30 yrs. Half life of this element will be :
(1) 24 yrs. (2) 18 yrs (3) 7.5 yrs (4) 1.9 yrs.

79. The second's hand of a watch has length 6 cm. speed of end point and magnitude of difference of velocities at two perpendicular positions will be :
(25) 6.2 and 8.8 mm-sec.$^{-1}$
(26) 8.88 and 6.28 mm-sec.$^{-1}$
(27) 8.88 and 4.44 mm-sec.$^{-1}$
(28) 6.28 and zero mm-sec.$^{-1}$

80.A meter scale is standing straight vertically on a table. The velocity of upper end, when it strikes the table. When lower end is fixed will be :
(1) 1.7 ms^{-1} (2) 5.4 ms^{-1} (3) 8.7 ms^{-1} (4) 10.9 ms^{-1}

81.Fundamental frequency of an open pipe is :
(1) 15 Hz (2) 20 Hz (3) 30 Hz (4) 10 Hz

82.The cause of Fraunhoffer's lines is :
(1) diffraction (2) interference (3) emission (40 obsorption

83.Wavelength of third line of Balmer series for H ion is 108.5 mm. The binding energy of electron in the ion is :
(1) 122.4 eV (2) 54.4 eV (3) 13.6 eV (4) 3.4 eV

84.Wavelengths of extreme lines of Paschen series for hydrogen is :
(29) 2.27 μm and 7.43 μm
(30) 1.45 μm and 4.04 μm
(31) 0.818 μm and 1.89 μm
(32) 0.365 μm and 0.656 μm

85.An ionic atom is equivalent to hydrogen atom has wavelength equal to ¼ of the wavelengths of hydrogen lines. The ion will be :
(1) He^+ (2) Li^{++} (3) Ne^{++} (4) $Na+^{10}$

86.An observer standing at station observes frequency 219 when a train approaches and 184 when train goes away from him. If velocity of sound in air is 340 m/sec., then velocity of train and actual frequency of whistle will be :

(33) 32.5 ms-1, 205 Hz
(34) 29.5 ms-1, 205 Hz
(35) 25.5 ms-1, 200 Hz
(36) 29.5 ms-1, 200 Hz

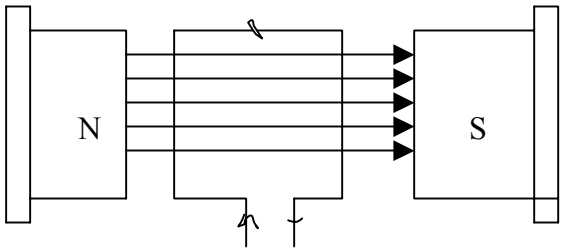
87.The kinetic energies of two bodies of 4 kg. and 16 kg. mass is same, the ratio of their momentum is :

(1) 4 : 1 (2) 1 : 2 (3) 2 : 1 (4) 1 : 4

88.Wave length of light emitted by a star is shifting towards the red end, then the star:

(37) moving towards earth
(38) moving far from earth
(39) nothing can be said
(40) is stationery

89.In the following diagram a rectangular coil is placed in 0.25 T uniform magnetic field, the area is 96 x 10^{-4} M^2 and no. of turns is 50, 2 amp current is flowing then the torque is :



(1) 0.24 N-m (2) 0.96 N-m (3) 0.36 N-m (4) 0.48 N-m

90.Plate resistances of two triode values is 4 kΩ and 8 kΩ and amplification coeff. If 40. If used as amplifiers with these load resistances then the ratio of voltage gains is :

(1) 10 (2) ¾ (3) 16/9 (4) 4/3

91.Two particles of same mass are moving in the circular paths r_1 and r_2 radius, the ratio of their centripetal forces is :

(1) $\sqrt{r_2} : \sqrt{r_1}$ (2) $\sqrt{r_1} : \sqrt{r_2}$ (3) $r_1 : r_2$ (4) $r_2 : r_1$

92.In an AC circuit R = 100 Ω, L = 800 mH and E = 200 sin 300t then the peak value current is :

(1) 1.17 A (2) 0.83 A (3) 0.59 A (4) 1.70 A

93.Length of wire of potentio meter is 100 cm. and resistance is 0.005 ΩΩm. A battery of 2.0 volt emf and 1.5 ΩΩnternal resistance is connected at the ends of the wire then the value of potential gradient is :

(1) 4×10^{-4} v/m (2) 0.005 v/m (3) 0.05 v/m (4) 0.5 v/m

94.RMS velocity of a gas molecules is 300 M/s at a given temperature. RMS velocity of a gas, of which molecular weight is double and temp. is half of that of the first gas, is :

(1) 150 m/sec. (2) 300 m/sec. (3) $300\sqrt{2}$ m/sec. (4) 600 m/sec.

95.Two cars are moving on two perpendicular roads towards a crossing with uniform speeds of 72 km/hr. and 36 km/hr. If first car blows horn of 280 Hz frequency, then the frequency heard by the driver of second car when line joining the cars 450 angle with the roads will be :

(1) 280 Hz (2) 289 Hz (3) 298 Hz (4) 321 Hz

96.A disc of 1/3 m radius is hanged by a point on circumference by horizontal rail. Period of oscillation is 1.42 sec. value of g by this experiment will be :

(1) 10.0 m-sec^{-2} (2) 9.78 m-$sec.^{-2}$ (3) 9.62 m-$sec.^{-2}$ (4) 9.86 m-sec^{-2}

97. Two masses of 5 kg. each falling from height 10 m. , by which 2 kg. water is stirred. The rise is temp. of water will be :

(1) 0.12^0 (2) 0.32^0 (3) 1.2^0 (4) 2.6^0

98.A circular road of 1000 m radius has banking angle 45^0, the maximum safe speed of a car having 2000 kg. mass will be, if the coefficient of friction between tyre and road is 0.5.

(1) 86/ m/sec. (2) 99 m/sec. (3) 124 m/sec. (4) 172 m/sec.