AIPMT - 1999

Q.1 The error in measurement of radius of a sphere is 0.1% then error in its volume is -

(1) 0.3% (2) 0.4% (3) 0.5% (4) 0.6%

Q.2 A body starts falling from height 'h' and travels distance h/2 during last second of motion then time of flight is (In second) -

(1) $\sqrt{2} - 1$ (2) $2 + \sqrt{2}$

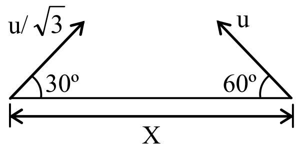
(3) $\sqrt{2} + \sqrt{3}$ (4) $\sqrt{3} + 2$

Q.3 The K.E. of a person is just half of K.E. of a boy whose mass is just half of that person. If person increases its speed by 1 m/s, then its K.E. equals to that of boy then initial speed of person was -

(1) $(\sqrt{2} + 1)$ m/s (2) $(2 + \sqrt{2})$ m/s

(3) $2(\sqrt{2} + 2)$ m/s (4) None

Q.4 Two particles separated at a horizontal distance X as shown in fig. they projected at the same line as shown in fig. with different initial speeds. The time after which the horizontal distance between them become zero -



(1) $\frac{x}{u}$ (2) $\frac{u}{2x}$

(3) $\frac{2u}{x}$ (4) None of these

Q.5 For a particle displacement time relation is $t = \sqrt{x} + 3$. Its displacement when its velocity is zero -

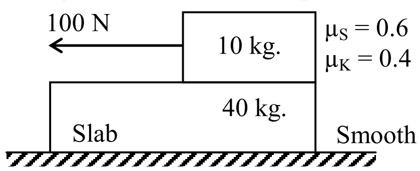
(1) 2m

(2) 4m

(3) 0

(4) None of these

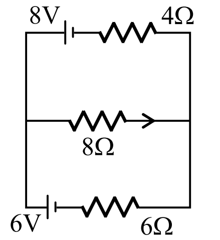
Q.6 If 100N force is applied to 10 kg. block as shown in diagram then acceleration produced for slab -



(1) 1.65 m/s^2 (2) 0.98 m/s^2

(3) 1.2 m/s^2 (4) 0.25 m/s^2

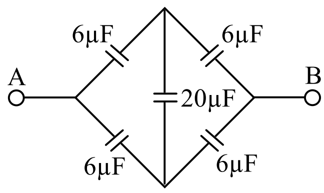
Q.7 The current in 8Ω resistance is (See fig.)



(1) 0.69 A (2) 0.92 A

(3) 1.30 A (4) 1.6 A

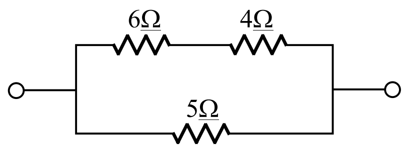
Q.8 The effective capacity of the network between terminals A and B is -



(1) 6 μF (2) 20 μF

(3) 3 μF (4) 10 μF

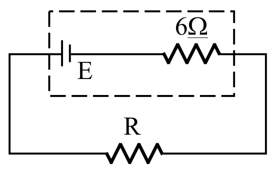
Q.9 If the power dissipated in 5Ω is 20 W then power dissipated in 4Ω is -



(1) 4 W (2) 6 W

(3) 10 W (4) 20 W

Q.10 The value of R for which power in it is maximum-



(1) 3Ω (2) 6Ω

(3) 12Ω (4) 9Ω

Q.11 Initially plane of coil is parallel to the uniform magnetic field B. In time Δt it makes to perpendicular to the magnetic field, then charge flows in Δt depends on this time as -

(1) $\propto \Delta t$ (2) $\propto \frac{1}{\Delta t}$

(3) $\propto (\Delta t)^0$ (4) $\propto (\Delta t)^2$

Q.12 A current carrying coil (I = 5A, R = 10 cm.) having 50 number of turns find field at its centre-

(1) 1.57 mT (2) 3.14 mT
(3) 1 mT (4) 2 mT

Q.13 Eight equals charged tiny drops are combined to form a big drop. If the potential on each drop is 10V then potential of big drop will be -

(1) 40V (2) 10V
(3) 30V (4) 20V

Q.14 For a inductor coil L = 0.04 H, then workdone by source to establish a current of 5A in it is -

(1) 0.5 J (2) 1.00 J
(3) 100 J (4) 20 J

Q.15 The terminal potential difference of a cell is greater than its emf when -

(1) A battery of less emf is connected in its series
(2) A battery of higher emf is connected in its series
(3) A battery of higher emf is connected in its parallel
(4) A battery of less emf is connected in its parallel

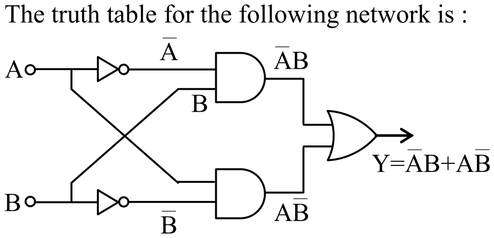
Q.16 In millikan oil drop experiment a charged drop falls with a terminal velocity V. If an electric field E is applied vertically upwards it moves with terminal velocity 2V in upward direction. If electric field reduces to E/2 then its terminal velocity will be -

(1) $\frac{V}{2}$ (2) V (3) $\frac{3V}{2}$ (4) 2V

Q.17 For a vibration magnetometer, the time period of suspended bar magnet can be reduced by -

(1) Moving it towards south pole
(2) Moving it towards north pole
(3) Moving it towards equator
(4) Anyone of them

Q.18 The truth table for the following network is :



(1)

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

(2)

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

(3)

A	B	Y
0	0	1
0	1	0
1	0	0
1	1	1

(4) None of the above

Q.19 Zener diode is used as -

(1) Half wave rectifier
(2) Full wave rectifier
(3) A.C. voltage stablizer
(4) D.C. voltage stablizer

Q.20 Depletion layer has (for an unbiased PN junction) -

(1) Electrons (2) Holes
(3) Static ions (4) Neutral atoms

Q.21 A cylindrical tube (L = 125 cm) is resonant with a tuning fork of frequency 330 Hz. If it is filling by water then to get resonance again, minimum length of water column is (V_{air} = 330 m/s) -

(1) 50 cm (2) 60 cm (3) 25 cm (4) 20 cm

Q.22 Initial pressure and volume of a gas are P and V respectively. First its volume is expanded to 4V by isothermal process and then again its volume makes to be V by adiabatic process then its final pressure is (γ = 1.5) -

(1) 8P (2) 4P (3) P (4) 2P

Q.23 A sphere maintained at temperature 600 K, has cooling rate R in an external environment of 200 K temp. If its temp. falls to 400 K then its colling rate will be -

(1) $\frac{3}{16}R$ (2) $\frac{16}{3}R$
(3) $\frac{9}{27}R$ (4) None

Q.24 A particle is projected with velocity 'u' makes an angle θ w.r.t. horizontal. Now it breaks in two identical parts at highest point of trajectory. If one part is retrace its path, then velocity of other part is -

(1) 3u cos θ (2) 2u cos θ
(3) u cos θ (4) u

Q.25 The amplitude of a S.H.O. reduces to 1/3 in first 20 secs. then in first 40 sec. its amplitude becomes -

(1) $\frac{1}{3}$ (2) $\frac{1}{9}$

(3) $\frac{1}{27}$ (4) $\frac{1}{\sqrt{3}}$

Q.26 Two springs A and B ($K_A = 2\ K_B$) are stretched by same suspended weights then ratio of workdone in stretching is -

(1) 1 : 2 (2) 2 : 1

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

Q.27 A spring elongated by length 'L' when a mass 'M' is suspended to it. Now a tiny mass 'm' is attached and then released, its time period of oscillation is -

(1) $2\pi\sqrt{\frac{(M+m)\ell}{Mg}}$ (2) $2\pi\sqrt{\frac{m\ell}{Mg}}$

(3) $2\pi\sqrt{L/g}$ (4) $2\pi\sqrt{\frac{M\ell}{(m+M)g}}$

Q.28 Frequency of simple pendulum in a free falling lift is -

(1) Zero (2) Infinite

(3) Can't be say (4) Finite

Q.29 The energy and capacity of a charged parallel plate capacitor are E and C respectively. Now a dielective slab of $\in_r = 6$ is inserted in it then energy and capacity becomes (Assuming charge on plates remains constant)

(1) 6E, 6C (2) E, C

(3) $\frac{E}{6}$,6C (4) E, 6C

Q.30 The current conduction in a discharge tube is due to -

(1) Electrons only

(2) +ve ions and –ve ions

(3) –ve ions and electrons

(4) +ve ions, and electrons

Q.31 A light of amplitude A and wavelength λ is incident on a metallic surface, then saturation current flows is proportional to (assume cut off wave length = λ_0) -

(1) A^2, if $\lambda > \lambda_0$ (2) A^2, if $\lambda < \lambda_0$

(3) A, if $\lambda > \lambda_0$ (4) A, if $\lambda < \lambda_0$

Q.32 Light of wavelength 3000 Å in Photoelectric effect gives electron of max. K.E. 0.5 eV. If wavelength change to 2000 Å then max. K.E. of emitted electrons will be :

(1) Less than 0.5 eV

(2) 0.5 eV

(3) Greater than 0.5 eV

(4) PEE does not occurs

Q.33 The K.E. of electron and photon is same then relation between their De-Broglie wavelength :

(1) $\lambda_p < \lambda_e$ (2) $\lambda_p = \lambda_e$

(3) $\lambda_p > \lambda_e$ (4) $\lambda_p = 2\lambda_e$

Q.34 The total energy of an electron is 3.555 MeV, then its Kinetic energy is :

(1) 3.545 MeV (2) 3.045 MeV

(3) 3.5 MeV (4) None

Q.35 Two identically charged particles A and B initially at rest, are accelerated by a common potential difference V. They enters into a transverse uniform magnetic field B. They describe a circular path of radii r_1 and r_2 respectively then their mass ratio is :

(1) $\left(\frac{r_1}{r_2}\right)^2$ (2) $\left(\frac{r_2}{r_1}\right)^2$

(3) $\left(\frac{r_1}{r_2}\right)$ (4) $\left(\frac{r_2}{r_1}\right)$

Q.36 A radio-active elements emits one α and β particles then mass no. of daughter element is :

(1) Decreased by 4 (2) Increased by 4

(3) Decreased by 2 (4) Increased by 2

Q.37 The half life of a radio nuclide is 77 days then its decay constant is :

(1) 0.003/day (2) 0.006/day

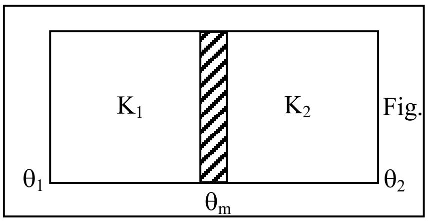
(3) 0.009/day (4) 0.012/day

Q.38 For a prism its refractive index is cot A/2 then minimum angle of deviation is :

(1) 180 – A (2) 180 – 2A

(3) 90 – A (4) A/2

Q.39 Two conducting slabs of heat conductivity K_1 and K_2 are joined as shown in fig. The temp. at ends of the slabs are θ_1 and θ_2 ($\theta_1 > \theta_2$) the, final temp. (θ_m) of junction is :



(1) $\frac{K_1\theta_1 + K_2\theta_2}{K_1 + K_2}$ (2) $\frac{K_1\theta_2 + K_2\theta_1}{K_1 + K_2}$

(3) $\frac{K_1\theta_2 - K_2\theta_1}{K_1 + K_2}$ (4) None

Q.40 A particle starts from rest with constant acceleration. The ratio of space-average velocity to the time average velocity is :

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

Q.41 If radius of earth shrinks by 1% then for acceleration due to gravity :

(1) No change at poles
(2) No change at equator
(3) Max. change at equator
(4) Equal change at all locations

Q.42 Rohini satellite is at a height of 500 km. and Insat-B is at a height of 3600 km. from surface of earth then relation between their orbital velocity (V_R, V_I) is :

(1) $V_R > V_I$ (2) $V_R < V_I$
(3) $V_R = V_I$ (4) No relation

Q.43 For moon, its mass is 1/81 of earth mass and its diameter is 1/3.7 of earth dia. If acceleration due to gravity at earth surface is 9.8 m/s^2 then at moon its value is :

(1) 2.86 m/s^2 (2) 1.65 m/s^2
(3) 8.65 m/s^2 (4) 5.16 m/s^2

Q.44 When a spring is subjected to 4N force its length is a metre and if 5N is applied length is b metre. If 9N is applied its length is :

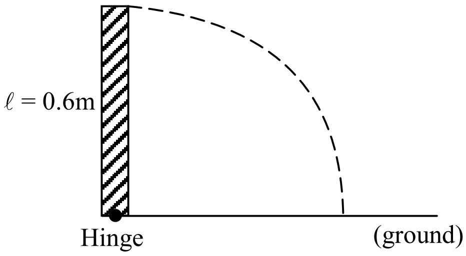
(1) 4b – 3a (2) 5b – a
(3) 5b – 4a (4) 5b – 2a

Q.45 For a body angular velocity $\vec{\omega} = \hat{i} - 2\hat{j} + 3\hat{k}$ and radius vector is $\vec{r} = \hat{i} + \hat{j} + \hat{k}$ then its velocity is :

(1) $-5\hat{i} + 2\hat{j} + 3\hat{k}$ (2) $-5\hat{i} + 2\hat{j} - 3\hat{k}$

(3) $-5\hat{i} - 2\hat{j} + 3\hat{k}$ (4) $-5\hat{i} - 2\hat{j} - 3\hat{k}$

Q.46 When a stick is released (as shown in fig.). Its free end velocity when it strikes the ground is :



(1) 4.2 m/s (2) 1.4 m/s
(3) 2.8 m/s (4) $\sqrt{6}$ m/s

Q.47 Frequency of an E.M. waves is 10 MHz then its wavelength is :

(1) 30 m (2) 300 m
(3) 3 m (4) None of the above

Q.48 Two particles are projected with same initial velocity one makes angle θ with horizontal while other makes an angle θ with vertical. If their common range is R then product of their time of flight is directly proportional to :

(1) R (2) R^2 (3) $\frac{1}{R}$ (4) R^0

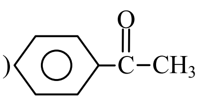
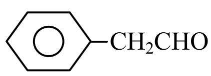
Q.49 In compound microscope the magnification is 95, and the distance of object from objective lens 1/3.8 cm and focal length of objective is ¼ cm. What is the magnification of eye pieces when final image is formed at least distance of distinct vision :

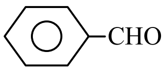
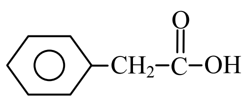
(1) 5 (2) 10 (3) 100 (4) None

Q.50 On the basis of unit cell concept a crystal has :

(1) 7 systems (2) 14 systems
(3) 230 systems (4) 32 systems

Q.51 Phenyl acetylene reacts with dil. H_2SO_4 in presence of $HgSO_4$ gives :

(1)  (2) 

(3)  (4) 

Q.52 According to hardy Schultze law the order of coagulation power of cations will be :

(1) $Na^+ > Ba^{+2} > Al^{+3}$ (2) $Al^{+3} > Ba^{+2} > Na^+$
(3) $Ba^{+2} > Al^{+3} > Na^+$ (4) $Al^{+3} > Na^+ > Ba^{+2}$

Q.53 Which of the following compound gives p-cresol with p-methyl diazonium chloride :

(1) H_2O (2) H_3PO_2
(3) HCOOH (4) C_6H_5OH

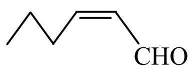
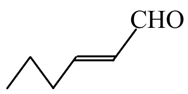
Q.54 Mole ratio of H_2 and O_2 gas is 8 : 1 what will be the ratio of wt. :
(1) 1 : 1 (2) 2 : 1
(3) 4 : 1 (4) 1 : 2

Q.55 Ionization energy of second orbit of Li^{+2} will be :
(1) 122.4 eV (2) 40.8 eV
(3) 30.6 eV (4) 13.6 eV

Q.56 Which of the following electronic configuration will have maximum I.P. difference between II and III I.P. :
(1) $1s^2\ 2s^2\ 2p^6\ 3s^1$ (2) $1s^2\ 2s^2\ 2p^6\ 3s^2$
(3) $1s^2\ 2s^2\ 2p^6$ (4) $1s^2\ 2s^2\ 2p^5$

Q.57 The concentration of a solution is changed from 0.2 to 0.4, then what will be rate and rate constant. The reaction is of first order and rate constant is $K = 1 \times 10^{-6}$:
(1) 2×10^{-7} ; 1×10^{-6} (2) 1×10^{-7} ; 1×10^{6}
(3) 4×10^{-7} ; 1×10^{-6} (4) 2×10^{-3} ; 1×10^{-3}

Q.58 Half life of a radioactive sample is 4 days. After 16 days how much quantity of matter remain undecayed :
(1) $\frac{1}{4}$ (2) $\frac{1}{8}$ (3) $\frac{1}{16}$ (4) $\frac{1}{32}$

Q.59 Structure of trans 2-hexanal is :
(1) 
(2) 
(3) 
(4) None of the above

Q.60 Which of the following gives ethyl benzene with phenyl methyl ketone :
(1) Zn–Hg+HCl (2) $LiAlH_4$
(3) $KMnO_4$ (4) None of the above

Q.61 Acetaldehyde reacts with semicarbazide product will be :
(1) $CH_3CH = NNH–CO–NH_2$
(2) $CH_3CH = NCONHNH_2$
(3) $CH_3CH = NHNH_2$
(4) $CH_3-\overset{\overset{\displaystyle O}{||}}{C}-NH-CONH_2$

Q.62 Cynohydrin of the following compound on hydrolysis gives optically active product :
(1) HCHO (2) CH_3CHO
(3) CH_3COCH_3 (4) All of the above

Q.63 Which of the following is a chiral compound :
(1) 2-methyl pentanoic acid
(2) 3-methyl pentanoic acid
(3) 4-methyl pentanoic acid
(4) None of these

Q.64 Compound 'A' on chlorination gives compound 'B'. 'B' reacts with alc. KOH gives gas 'C', which decolourises Baeyer reagent and ozonolysis of compound 'C' gives only HCHO compound 'A' is :
(1) C_2H_6 (2) C_2H_4
(3) C_4H_{10} (4) C_2H_5Cl

Q.65 Monomer of natural rubber is :
(1) $CH_3-\underset{\underset{\displaystyle CH_3}{|}}{C}=CH-CH_3$
(2) $CH_3-CH=CH-CH_3$
(3) $CH_2=\underset{\underset{\displaystyle CH_3}{|}}{C}-CH=CH_2$
(4) $CH_2=\underset{\underset{\displaystyle CH_3}{|}}{C}-\underset{\underset{\displaystyle CH_3}{|}}{C}=CH_2$

Q.66 Which of the following compound contain zero oxidation state of Fe :
(1) $[Fe(CN)_6]^{-4}$
(2) $[Fe(CN)_6]^{-3}$
(3) $Fe(CO)_5$
(4) All the above

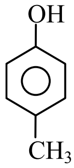
Q.67 A compound contain C, H and O. If C = 40% and H = 6.67% then empirical formula of compound will be :
(1) CH_2O (2) CH_4O
(3) CH_4O_2 (4) CHO

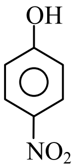
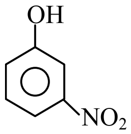
Q.68 $[Cu(NH_3)_4]^{+2}$ reacts with HNO_3 in excess of water gives :
(1) $Cu(OH)_2$ (2) $Cu(NO_3)_2$
(3) $Cu(H_2O)^{-2}$ (4) None of the above

Q.69 Cr in $[Cr(NH_3)_6]\ Br_3$ has number of unpaired electron :
(1) 4 (2) 3
(3) 1 (4) 2

Q.70 Sucrose on hydrolysis gives :
(1) L(+) Glucose + D(+) Fructose
(2) L(–) Glucose + L(–) Fructose
(3) D(+) Glucose + D(–) Fructose
(4) D(+) Glucose + L(–) Fructose

Q.71 Order of acidic strength of the following compound will be :

(A)  (B) C_6H_5OH

(C)  (D) 

(1) C > D > B > A
(2) D > C > B > A
(3) A > B > C > D
(4) B > A > C > D

Q.72 Which of the following comp. is coloured and has unpaired electron :
(1) CuF_2 (2) $K_2Cr_2O_7$
(3) $KMnO_4$ (4) $K_4[Fe(CN)_6]$

Q.73 Which of the following does not reduce Fehling solution :
(1) Glucose (2) Fructose
(3) Sucrose (4) Maltose

Q.74 O.N. of P in pyrophosphoric acid is :
(1) + 5 (2) + 2
(3) + 3 (4) + 4

Q.75 Which of the following example behave as a lewis acid BF_3, $SnCl_2$, $SnCl_4$:
(1) Stenus chloride, stenic chloride
(2) BF_3, stenus chloride
(3) Only BF_3
(4) BF_3, stenus chloride, stenic chloride

Q.76 In which of the following comp. H atom is directly linked with phosphorus :
(1) H_3PO_2 (2) H_3PO_3
(3) H_3PO_4 (4) $H_4P_2O_7$

Q.77 a Zn + b NO_3^- + cH + → d NH_4^+ + e H_2O + f Zn^{+2} a, b, c, d, e and f are :

	a	b	c	d	e	f
(1)	2	4	6	8	4	2
(2)	1	4	10	3	1	4
(3)	4	1	10	1	3	4
(4)	10	4	1	3	4	2

Q.78 Determine the value of E^0 cell for the following reaction :
$Cu^{+2} + Sn^{+2} \rightarrow Cu + Sn^{+4}$
Equilibrium constant is 10^6
$Cu^{++} + Sn^{++} \rightarrow Cu + Sn^{+4}$
(1) 0.1773 (2) 0.01773
(3) 0.2153 (4) 1.773

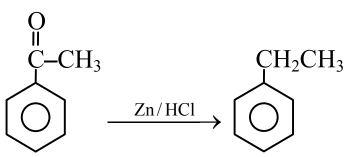
Q.79 What will be the H^+ con when 4 gm NaOH dissolved in 1000 ml. of water :
(1) 10^{-1} (2) 10^{-13}
(3) 10^{-4} (4) 10^{-10}

Q.80 What is true for a cyclic process :
(1) W = 0 (2) $\Delta E = 0$
(3) $\Delta H = 0$ (4) $\Delta E \neq 0$

Q.81 Increasing order of bond length is :
(1) $NO^- < NO < NO^+ < O_2^-$
(2) $O_2^- < NO < NO^- < NO^+$
(3) $O_2^- < NO^- < NO < NO^+$
(4) $NO^+ < NO < NO^- < O_2^-$

Q.82 A system is expanded under adiabatic process :
(1) Temp. increase (2) ΔE decreases
(3) ΔE increases (4) None of these

Q.83 Which of the following is true for a reaction in which all the reactant & product are liquids :
(1) $\Delta H = \Delta E$
(2) $\Delta H = \Delta W$
(3) $\Delta H > \Delta E$
(4) None of the above

Q.84 Clemenson's reaction is :
(1) 
(2) $C_6H_5–COCH_3 + NH_2NH_2 \rightarrow \xrightarrow{C_2H_5ON} C_6H_5CH_2CH_3$
(3) $CH_3COCH_3 + 4HI \xrightarrow{Red.P} CH_3CH_2CH_3$
(4) All the above

Q.85 Which of the following reaction gives by isocyanide :
(1) Rimer Tieman reaction
(2) Carbyl amine reaction
(3) Hoffmann bromamide reaction
(4) None of the above

Q.86 In a gaseous mixture which of NO_2, CO_2 and N_2O gases have same rate of diffusion :

(1) NO_2, CO_2 (2) CO_2, N_2O
(3) NO_2, N_2O (4) All

Q.87 Compound 'A' in acidic medium does not give ppt with H_2S but in NH_4OH medium gives a ppt comp. 'A' is :

(1) $FeCl_3$ (2) $AlCl_3$
(3) $ZnCl_2$ (4) $SnCl_2$

Q.88 $FeCr_2O_7$ reacts with Na_2CO_3 gives the product :

(1) Na_2CrO_4 (2) $Na_2Cr_2O_7$
(3) Fe_3O_4 (4) FeO

Q.89 A compound BA_2 has $K_{sp} = 4 \times 10^{-12}$ solubility of this comp. will be :

(1) 10^{-3} (2) 10^{-4} (3) 10^{-5} (4) 10^{-6}

Q.90 H_2O_2 on oxidation gives :

(1) O^{-2} (2) OH^- (3) O_2^- (4) O_2

Q.91 What is false for mole fraction :

(1) $x < 1$ (2) $-2 \le x \le 2$
(3) $0 \le x \le 1$ (4) Always non-negative

Q.92 MgO and NaCl has similar structure. In MgO magnesiuem is surrounded by how many oxygen atoms :

(1) 2 (2) 4 (3) 6 (4) 1

Q.93 General behaviour of O_3 is :

(1) Gives electrons (2) Gives O_2
(3) Reaction with H_2 (4) Accept electrons

Q.94 How many ATP will be formed by oxidation of 1 mole glucose :

(1) 36 (2) 40
(3) 24 (4) 32

Q.95 400 ml gas at 500 torr and 666.6 ml gas at 600 torr taken in a container of 3 litre then the total pressure of mixture :

(1) 200 torr (2) 400 torr
(3) 600 torr (4) 50 torr

Q.96 Which of the following is steroid harmones :

(1) Progesterone (2) Cholesterole
(3) ACTH (4) Adrenaline

Q.97 The dipole moment of compound AB is 10.92 D and that of compound CD is 12.45 D. The bond length AB is 2.72 A^0 and that of CD is 2.56 A^0 then for these compound true statement is :

(1) More ionic nature in AB
(2) More ionic nature in CD
(3) Equal in both
(4) Not predicted

Q.98 The bombarment of α-particle on $_7N^{14}$, emits proton then new atom will be :

(1) $_8O^{17}$ (2) $_8O^{16}$
(3) $_6C^{14}$ (4) Ne

Q.99 Half life of a substance is 77 days then its decay constant will be :

(1) 0.9 (2) 0.09
(3) 0.009 (4) 0.013

Q.101 Number of base pairs in human chromosomes :

(1) 3×10^9 (2) 3×10^7
(3) 6×10^8 (4) 6×10^7

Q.102 Total amount of CO_2 fixed annually by plants :

(1) 7×10^{23} ton (2) 7×10^{13} ton
(3) 7×10^{10} ton (4) 7×10^{11} ton

Q.103 Most stable pesticides :

(1) Organophosphates (2) Organochlorines
(3) Bordeaux mixture (4) Azaderectnin

Q.104 Best economic method to harvest the solar energy :

(1) Solar cell
(2) Energy plantation
(3) Cultivation of sugar cane then energy obtain by burning it
(4) Solar cooker

Q.105 Main reason of disturbance of biological diversity :

(1) Green house effect
(2) Hunting
(3) Soil erosion
(4) Destruction of natural habitats

Q.106 Best method to preserve the wild relatives of plants :

(1) By growing them in natural habitats
(2) Gene library
(3) By storing seeds
(4) Cryopreservation

Q.107 Practical purpose of taxonomy or classification :

(1) Facilitate the identification of unknown species
(2) Explain the origin of organisms
(3) To know the evolutionary history
(4) Identification of medicinal plants

Q.108 Koch's postulates not applicable to :

(1) Mycobacterium leprae
(2) Tuberculosis
(3) Pneumonia
(4) Cholera

Q.109 Amount of cellular DNA increases during :
(1) Cytokinesis (2) Fertilisation
(3) Mutation (4) Respiration

Q.110 Initiation codon in eukaryotes :
(1) UGA (2) CCA
(3) AGA (4) AUG

Q.111 Transition of exarch bundles of root to endarch bundles of stem occurs in :
(1) Epicotyl (2) Hypocotyl
(3) Apical bud (4) Coleoptile

Q.112 Which induces the development of corpus Luteum :
(1) LH (2) Oestrogen
(3) FSH (4) LTH

Q.113 Plant pathogenic bacteria are mostly :
(1) Gram + Non spore forming
(2) Gram – Non spore forming
(3) Gram + spore forming
(4) Gram (–) spore forming

Q.114 First transgenic plant :
(1) Potato (2) Tomato
(3) Tobacco (4) Maize

Q.115 Dolly sheep was obtained by :
(1) Cloning the udder cell (somatic cell) fused with unnucleated oocyte
(2) Cloning of gametes
(3) Tissue culture
(4) None

Q.116 CCK and secretin secreted by :
(1) Stomach (2) Ileum
(3) Duodenum (4) Colon

Q.117 Suspensory ligaments are found in :
(1) Brain (2) Eyes
(3) Liver (4) Pancrease

Q.118 Life span of worker honey bee :
(1) 30 days (2) 15 days
(3) 90 days (4) 10 days

Q.119 Para thormone deficiency leads to :
(1) Decrease of Ca^{+2} level in blood
(2) Increase of Ca^{+2} level in blood
(3) Osteoporosis
(4) Hypercalemia

Q.120 Gene composed of :
(1) Amino acids (2) Polynucleotide
(3) Fatty acid (4) Nitrogen bases

Q.121 Ornithophilly takes place in :
(1) Yellow flower having nectaries
(2) Scented flower
(3) Flower with charming colour
(4) Modified corolla tube

Q.122 Bhopal gas tragedy is related with :
(1) Methane
(2) Carban mono oxide
(3) Methyl Iso cyanate (MIC)
(4) SO_2

Q.123 Concentration of DDT is highest in :
(1) Primary consumer
(2) Producers
(3) Top consumer
(4) Decomposers

Q.124 Percentage energy transferred to higher tropic level in food chain is :
(1) 1% (2) 10% (3) 90% (4) 100%

Q.125 What change occurs by changing one base in DNA :
(1) Always a change of one amino acid in protein
(2) Change in complex sequence of amino acid
(3) Always a change in property of protein
(4) Does not necessarily change the phenotype

Q.126 HIV infects :
(1) RBC (2) T – helper cells
(3) B - cells (4) Basophils

Q.127 Which of the following statement is true for bryophyta -
(1) Along with water absorption roots also provide anchorment to plants
(2) Sporophyte is dominant
(3) Gametophyte is dominant and sporophyte is mostly parasitic
(4) Gametophyte is parasitic

Q.128 Lichens can be used as :
(1) Bio-indicator for water and air pollution
(2) Initial vegetation for waste lands
(3) Source of wood
(4) To check the air pollution

Q.129 Biotic and abiotic components form :
(1) Community (2) Society
(3) Population (4) Species

Q.130 Endosperm in Gymnosperm is :
(1) Polyploid (2) Diploid
(3) Triploid (4) Haploid

Q.131 The plant having the largest flower is :
(1) Total stem parasite
(2) Epiphyte
(3) Total root parasite
(4) Partial stem parasite

Q.132 *Anabaena* is associated with Azolla's :
(1) Stem (2) Leaves
(3) Roots (4) Flowers

Q.133 The allele for tallness is dominant over that of dwarfness. This is called :
(1) Law of independent assortment
(2) Law of segregation
(3) Law of unit character
(4) Law of dominance

Q.134 Oxytocin mainly helps in :
(1) Milk production (2) Child birth
(3) Diuresis (4) Gametogenesis

Q.135 What ratio is expected in offsprings if father is colour blind and mother's father was colour blind:
(1) 50% daughter – colour blind
(2) All the sons are colour blind
(3) All the daughters colour blind
(4) All the sons are normal

Q.136 When AABBcc is crossed with AaBbCc then the ratio of hybrid for all the three genes is :
(1) 1/8 (2) 1/4
(3) 1/16 (4) 1/32

Q.137 Which hormone is concerned with the concentration of urine :
(1) Oxytocin (2) Vassopressin
(3) Prolactin (4) Cortisol

Q.138 Ventricular contraction in command of :
(1) S.A. Node
(2) A.V. Node
(3) Purkinje fibers
(4) Papillary muscles

Q.139 Which of the following does not contain metal :
(1) Glycoproteins
(2) Ferritin
(3) Cytochromes
(4) Chromoproteins

Q.140 Double unit membrane is absent in :
(1) Ribosomes
(2) Nucleus
(3) Plastids
(4) E.R.

Q.141 Function of Nucleases :
(1) Break the polynucleotide chain by breaking the each terminal nucleotide
(2) Breaks phosphodiester bond
(3) Breaks peptide bonds
(4) Breaks ester bonds

Q.142 What is phytotron :
(1) A device to grow the plants in controlled environment
(2) Growing plants in green house
(3) Radiation chamber to induce the mutations
(4) Apparatus to study the effect of light on plants

Q.143 Species diversity is maximum in :
(1) Tropical rain forest (2) Temperate forest
(3) Deserts (4) Hill slops

Q.144 Exponential growth is shown by :
(1) Unicellular forms (2) A cell in tissue culture
(3) Embryo (4) Multicellular plants

Q.145 Which of the following is secondary pollutant
(1) PAN (2) CO
(3) NO_2 (4) SO_2

Q.146 According to forestery commission report 1997 the total forest cover of India :
(1) 11% (2) 19.5%
(3) 17% (4) 18.7%

Q.147 During injury mast cells secrete :
(1) Histamine (2) Heparin
(3) Prothrombin (4) Antibodies

Q.148 Nitrogen fixing bacteria converts :
(1) $N_2 \rightarrow NH_3$ (2) $NH_4^+ \rightarrow$ Nitrates
(3) $NO_2 \rightarrow NO_3$ (4) $NO_3 \rightarrow N_2$

Q.149 Insulin differs from Growth hormone in :
(1) Increases activity of m-RNA and Ribosomes
(2) Increase the permeability of cell membrane
(3) Affects metabolism of fats by inducing lipogenesis
(4) Increasing protein synthesis

Q.150 Homologous organs are :
(1) Wings of cockroach and wings of bats
(2) Wings of insects and wings of birds
(3) Air bladder of fishes and lungs of frog
(4) Pectoral fins of fishes and forelimbs of horse

Q.151 Which arrangement is in correct ascending order:
(1) Species < genus < order < family
(2) Genus < species < family < order
(3) Order < family < genus < species
(4) Species < genus < family < order

Q.152 In stomach after physical and chemical digestion food is called :
(1) Chyme (2) Chyle
(3) Amino acid (4) Bolus

Q.153 Exchange of bicarbonates and chloride ions between RBC and plasma is called :
(1) Chloride shift
(2) Bohr's effect
(3) Haldane's effect
(4) Intra cellular respiration

Q.154 Which gland decreases in size with increasing age :
(1) Thyroid (2) Adrenal
(3) Thymus (4) Pituitory

Q.155 Which of following occurs in maximum concentration in blood plasma (ECF) :
(1) K^+ (2) Mg^{+2}
(3) Ca^{+2} (4) Na^+

Q.156 Large scale death of fishes occur in :
(1) Saline lake (2) Oligotrophic lake
(3) Eutrophic lake (4) Shallow lake

Q.157 A normal human being requires how much calories per day :
(1) 2500 k. cal (2) 4000 k. cal
(3) 5000 k. cal (4) 686 k. cal

Q.158 Which of the following yield maximum energy :
(1) By glycolysis in a sprinter
(2) Aerobic respiration in germinating seeds
(3) Fermentation by yeast
(4) Anaerobic respiration

Q.159 Main reason of water bloom in rivers, lakes, sea etc. is :
(1) Brown algae and green algae
(2) Cyanobacteria and dinoflagellates
(3) Eicchornia
(4) Fishes

Q.160 Insectivorous plants grow in the soil which is deficient in :
(1) Mg (2) Ca
(3) P (4) N

Q.161 Which pair is of insectivorous plants :
(1) Drosera and Vallisneria
(2) Utricularia and Hydrilla
(3) Allobandra and Utricularia
(4) Rafflesia and Dionea

Q.162 What shall be the water potential of a root hair cell absorbing water from the soil :
(1) Zero (2) Less than zero
(3) More than zero (4) Infinite

Q.163 Deficiency of oxygen affects most the :
(1) Brain (2) Skin
(3) Kidney (4) Intestine

Q.164 Maximum DDT in birds feeding on :
(1) Fishes (2) Meat
(3) Insects (4) Seeds

Q.165 Fully digested food reaches to liver by :
(1) Hepatic portal vein (2) Hepatic artery
(3) Hepatic vein (4) All the above

Q.166 Fraternal twin one baby is haemophilic while baby's brother is normal then which statement is true :
(1) Baby is male
(2) Baby is female
(3) Mother is heterozygous
(4) Mother is homozygous

Q.167 Which one is associated with occupational hazard is :
(1) Flurosis (2) Pneumoconieosis
(3) Silicosis (4) Asthma

Q.168 Azolla is used in the cultivation of :
(1) Maize (2) Sorghum
(3) Wheat (4) Rice

Q.169 Which one produce gas by decomposing the gobar (Dung) in gobar gas :
(1) Fungus
(2) Virus
(3) Methanogenic bacteria
(4) Algae

Q.170 Pantothenic acid & Biotin associated with :
(1) Vitamin D (2) Vitamin B complex
(3) Vitamin K (4) Vitamin E

Q.171 Which one is wrong pair :
(1) Scurvy – Vitamin C
(2) Rickets – Vitamin D
(3) Night blindness (Xerophthalmia) – Vitamin A
(4) Beriberi – Vitamin K

Q.172 Maximum photosynthesis takes place by :
(1) Phytoplankton (2) Zooplankton
(3) Marsh plants (4) Woody plants

Q.173 Reptiles like mammals originated in :
(1) Jurassic (2) Triassic
(3) Cretaseus (4) Permian

Q.174 Dental formula of adolescent human being before seventeen year :
(1) $\frac{2122}{2122}$ (2) $\frac{2123}{2123}$
(3) $\frac{2102}{2102}$ (4) $\frac{2023}{1023}$

Q.175 Molecular weight of DNA in yeast is :
(1) 2.56×10^9 (2) 0.5×10^9
(3) 7×10^7 (4) 6×10^6

Q.176 Minute quantity of hormones & steroid are detected by :
(1) Electrophoresis
(2) Radio immunoassay
(3) Electro encephalogram
(4) Fractional analysis

Q.177 Hybridoma is :
(1) Collection of DNA from DNA
(2) Collection of RNA from DNA
(3) A fusion of tumour sex cell with non tumour sex cell
(4) A fusion of tumour somatic cell with non tumour somatic cell

Q.178 Which substance can be used as male contraceptive in future :
(1) FSH (2) LH
(3) Testosterone (4) Progesterone

Q.179 Genetic material of prokaryotic cell :
(1) Non histonic double stranded DNA
(2) Histonic double stranded DNA
(3) Histone & DNA both are absent
(4) Histone without DNA

Q.180 Ligament consist of :
(1) Yellow fibres + Elastic fibres
(2) Yellow fibres + Collagen (white) fibres
(3) Yellow fibres + Muscle fibres
(4) White fibres + Muscle fibres

Q.181 Tendon consist of :
(1) Non Elastic connective tissue
(2) White Elastic tissue
(3) Collagen (white) fibres + Muscle fibres
(4) Only collagen fibres

Q.182 Industrial melanism is example of :
(1) Natural selection (2) Mutation
(3) Racial difference (4) Predation

Q.183 Casparian bands are found in :
(1) Endodermis (2) Pericycle
(3) Periderm (4) Cortex

Q.184 Funaria's male gametes are :
(1) Poly flagellate (2) Mono flagellate
(3) Biflagellate (4) Tetra flagellate

Q.185 E. coli are used in production of :
(1) Rifampicin (2) LH
(3) Ecdyson (4) Interferon

Q.186 Which one is obtained by S. Miller in his experiments on origin of life before 1953 :
(1) Simple sugars (2) Amino acids
(3) Nucleotide (4) Peptides

Q.187 Which protein found in maximum amount :
(1) Catalase
(2) Zinc carbonic anhydrase
(3) Transferase
(4) RUBISCO

Q.188 After ovulation follicles converted into :
(1) Corpus luteum (2) Corpus albicans
(3) Corpus cavernosa (4) Corpus calosum

Q.189 Minor change in gene's structure is called :
(1) Reversible mutation
(2) Point mutation
(3) Forward mutation
(4) Back ward mutation

Q.190 Green house effect is :
(1) Gardening outside the house
(2) Global cooling
(3) Global warming
(4) Green colour house

Q.191 What will be happen if the number of organism increased at a place :
(1) Inter species competition
(2) Intra species competition
(3) Both
(4) None

Q.192 What is vaccine :
(1) Treated bacteria, virus & protein
(2) Treated algae
(3) Treated fungi
(4) Treated plasmodium

Q.193 Shell of egg in bird becomes thin (not properly formed) due to the pollution of pesticides. This is due to interference in the activity of :

(1) Ca ATPase (2) Mg ATPase
(3) Calmodulin (4) None

Q.194 Agglutination occurs in blood present in a test tube. This indicate :

(1) Antibodies are present in plasma
(2) Antigens are present on R.B.C.
(3) Antigens are present in plasma
(4) Antibodies are present on R.B.C.

Q.195 Secondary structure of protein, which is attached to lipid layer and lining the pores of cell membrane will be :

(1) α-Helix (2) β-Strand
(3) β-Chain (4) Random

Q.196 Recently extinct animal from India is :

(1) Acinonyx
(2) Rhinoceros unicornieus
(3) Panthera leo
(4) Panthera tigris

Q.197 Simplest reflex action in human is :

(1) Mono synaptic (2) Bi synaptic
(3) Tri synaptic (4) Poly synaptic

Q.198 In inducible operon, regulatory gene synthesize:

(1) Promoter (2) Operator
(3) Repressor (4) Aporepressor

Q.199 Neuroglial cells associated with :

(1) Heart (2) Kidney
(3) Brain (4) Eyes

Q.200 Diatomaceous earth is used as heat insulator in boilers and steam pipes because the cell wall of diatom :

(1) Composed of iron
(2) Composed of silicon dioxide
(3) Is conductor of heat
(4) Is bad conductor of electricity

ANSWER KEY (AIPMT-1999)

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans	1	2	1	1	3	2	1	1	1	2	3	1	1	2	3	1	3	2	4	3
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans	1	4	1	1	2	1	1	1	3	4	2	3	3	2	1	1	3	2	1	3
Ques.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans	4	1	2	3	1	1	1	1	1	1	1	2	1	4	3	2	3	3	2	1
Ques.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans	1	2	1, 2	1	3	3	1	2	2	3	1	1	3	1	4	1, 2	3	1	2	2, 3
Ques.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans	4	2	1	1	2	2	3	1	2	4	2	3	2	1	1	1	2	1	3	
Ques.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans	1	4	2	2	4	1	1	1	2	4	2	1	2	3	1	3	2	3	1	2
Ques.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans	1	3	3	2	4	2	3	1	1	4	3	2	4	2	1	1	2	1	1	1
Ques.	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Ans	2	1	1	2	1	2	1	1	3	4	4	1	1	3	4	3	1	2	2	4
Ques.	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Ans	3	2	1	1	1	3	2	4	3	2	4	1	2	1	1	2	4	4	1	2
Ques.	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
Ans	4	1	1	3	4	2	4	1	2	3	3	1	3	2	1	1	1	3	3	2

HINTS & SOLUTIONS

1. $V = \frac{4}{3}\pi R^3$; $\frac{\Delta V}{V} = \frac{3\Delta R}{R}$

% change in volume = 3 × 0.1 = 0.3%

2. $h = \frac{1}{2}gt^2$ …… (i)

$\frac{h}{2} = \frac{1}{2}g(t-1)^2$ …… (ii)

$\frac{1}{4}gt^2 = \frac{1}{2}g(t-1)^2$

$\frac{t}{\sqrt{2}} = t - 1$

$t\left(1 - \frac{1}{\sqrt{2}}\right) = 1$

$t = \frac{\sqrt{2}}{\sqrt{2}-1} \times \frac{\sqrt{2}+1}{\sqrt{2}+1}$

$t = \sqrt{2}\,(\sqrt{2}+1)$

$t = 2 + \sqrt{2}$

3. Let initial speed of man of mass m be u then

$KE_{man} = \frac{1}{2}mu^2$ & $KE_{boy} = 2 \times \frac{1}{2}mu^2 = mu^2$

Now if man increases his speed by 1 m/s^{-1} then

$KE_{man} = \frac{1}{2}m(u+1)^2 = KE'_{boy} = mu^2$

$\Rightarrow \frac{u+1}{u} = \sqrt{2}$

$\Rightarrow u = \frac{1}{\sqrt{2}-1} \times \frac{\sqrt{2}+1}{\sqrt{2}+1} = (\sqrt{2}+1)\ ms^{-1}$.

4. $\text{Time} = \frac{\text{Relative horizontal distance}}{\text{Relative horizontal velocity}}$

$= \frac{x}{u\cos 60^\circ + \frac{u}{\sqrt{3}}\cos 30^\circ} = \frac{x}{u}$

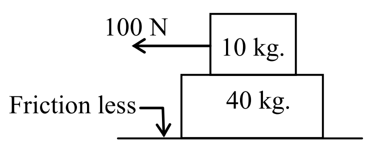
5. $t = \sqrt{x} + 3$

$x = (t-3)^2$

$v = \frac{dx}{dt} = 2(t-3) = 0$

at t = 3, $x = (3-3)^2 = 0$

6.

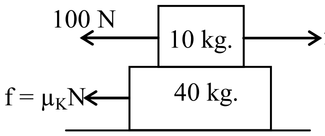


Let the net acceleration of the slab be **a** limiting friction

$F_S = \mu mg = 0.6 \times 10 \times 9.8 = 58.8$ N

100 N > 58.8 N

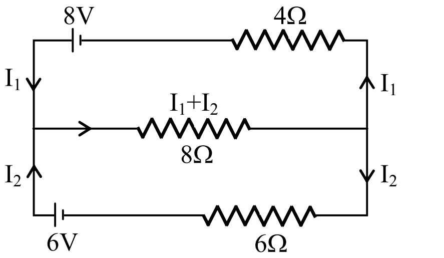
i.e. slab will accelerate with different acceleration.



f = 40a

$0.4 \times 10 \times 9.8 = 40a \Rightarrow a = 0.98\ m/s^2$

7. **Method-I**



$-8(I_1 + I_2) - 4I_1 + 8 = 0$ … (i)

$-8(I_1 + I_2) - 6I_2 + 6 = 0$ … (ii)

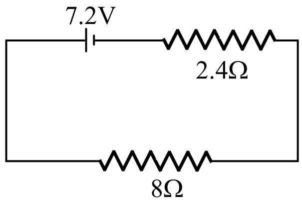
Solving eq^n. (i) and (ii), we get

$I_1 = \frac{8}{13},\ I_2 = \frac{1}{13}$

Current in 8Ω = $I_1 + I_2 = 0.69A$

Method-II

Given circuit can be reduced to

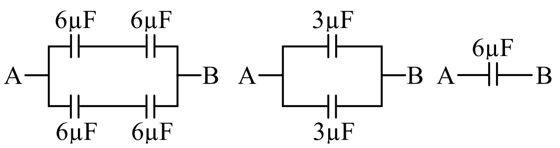


$E_{net} = \frac{\frac{8}{4}+\frac{6}{6}}{\frac{1}{4}+\frac{1}{6}} = 7.2$ volt

$\frac{1}{R_{net}} = \frac{1}{4} + \frac{1}{6} = \frac{10}{24} \Rightarrow R_{net} = 2.4\Omega$

$\Rightarrow I = \frac{7.2}{10.4} = 0.69$ A

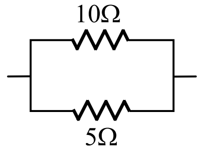
8. Here bridge is balanced then 20μF becomes ineffective.



Therefore $C_{AB} = 6\mu F$

9. $P = VI = V^2/R$, voltage constant

$P \propto 1/R$



then power in 10Ω will be 10W when I constant then

$P = I^2R$

$P \propto R$

$\frac{P'}{10} = \frac{4}{10} \Rightarrow P' = 4W$

10. For maximum power consumption –

R = r = 6Ω

11. $\because \quad q = \frac{\Delta\phi}{R} \quad \therefore q \propto (\Delta t)^o$

12. Magnetic field at the centre of coil $B = \frac{\mu_0 iN}{2a}$

$= \frac{4\pi\times10^{-7}\times5\times50}{2\times10/100} = 1.57 \times 10^{-3}$ T

= 1.57 mT.

13. Given :

$8V_{tiny} = V_{big}$

$8\frac{4}{3}\pi r^3 = \frac{4}{3}\pi R^3$

2r = R

$V_{tiny} = \frac{Kq}{r}$

$V_{big} = \frac{K\times8q}{R}$

$V_{big} = \frac{8Kq}{2r}$

$V_{big} = 4V_{tiny}$

$V_{big} = 4 \times 10 \quad \Rightarrow \quad 40$ V

14. Work done by source

$= E \times q = E\left(\frac{\Delta\phi}{R}\right) = E\ \frac{LI_0}{R}$

$= \left(\frac{E}{R}\right)LI_0 = (I_0)LI_0 = LI_0^2$

$= 0.04 \times (5)^2 = 1.0$ J

16. $V = \frac{Q\times E\times t}{m}$

$V \propto E$

So Ans. $\frac{V}{2}$

17. $T = 2\pi\sqrt{I/MB_H}$; $B_H = 0$ at poles

B_H = max at equator

$B_H \uparrow \;\; \Rightarrow \; T \downarrow$

18. $Y = \overline{A}B + A\overline{B} = A \oplus B$

Ex – OR Gate

A	B	A + B	A ⊕ B
0	0	0	0
1	0	1	1
0	1	1	1
1	1	1	0

19. Zener diode → DC voltage stabilizer.

20. Unbiased PN junction

Deplation layer → static ions

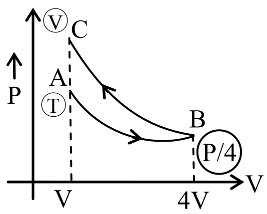
21. $f = \dfrac{(2n-1)v}{4\ell}$

$$\ell = \frac{(2n-1)v}{4f} = \frac{(2n-1)\times 330}{4\times 330} = \frac{(2n-1)}{4}$$

$\ell = \dfrac{1}{4}$ m, $\dfrac{3}{4}$ m = 25 cm, 75 cm.

∴ Minimum height of water column
= 125 – 75 = 50 cm

22. For isothermal process



$P_AV_A = P_BV_B$

$PV = P_B(4V)$

$P_B = \dfrac{P}{4}$

for adiabatic process

$P_BV_B^{\gamma} = P_CV_C^{\gamma}$

$$P_c = \frac{P}{4}\left(\frac{4V}{V}\right)^{1.5} = \frac{P}{4}\times 8 = 2P$$

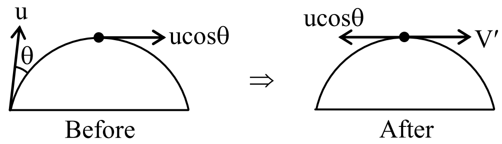
23. According to stefan's law –

$$\frac{R'}{R} = \frac{(400)^4-(200)^4}{(600)^4-(200)^4} = \frac{4^4-2^4}{6^4-2^4}$$

$$= \frac{(4^2+2^2)(4^2-2^2)}{(6^2+2^2)(6^2-2^2)} = \frac{20\times 12}{40\times 32}$$

$R' = \dfrac{3}{16}R$

24.



$$mu\cos\theta = -\frac{mu}{2}\cos\theta + \frac{m}{2}v'$$

$v' = 3u\cos\theta$

25 Amplitude of damped oscillation at time t

$x = x_0e^{-\lambda t}$ Where λ is a constant

after 20 sec

$$\frac{x_0}{3} = x_0e^{-\lambda(20)} \Rightarrow e^{-\lambda(20)} = \frac{1}{3} \qquad \text{..... (1)}$$

After 40 sec

$x' = x_0e^{-\lambda(40)} \Rightarrow x_0e^{-\lambda(2\times 20)}$

from (1)

$$x' = x_0\left(\frac{1}{3}\right)^2 = \frac{x_0}{9}$$

26. $W = \dfrac{1}{2}Kx^2$, $\quad F = -Kx$

$$W = \frac{1}{2}K\,.\,\frac{F^2}{K^2} = \frac{F^2}{2K}$$

$$W \propto \frac{1}{K} \Rightarrow \frac{W_A}{W_B} = \frac{K_B}{K_A} = \frac{K_B}{2K_B} = \frac{1}{2}$$

27. $\because\; T = 2\pi\sqrt{\dfrac{M}{K}} \quad \therefore Mg = K\ell$

Therefore $T = 2\pi\sqrt{\dfrac{(M+m)\ell}{Mg}}$

28. $n = \dfrac{1}{2\pi}\sqrt{\dfrac{g_{eff.}}{\ell}}$

In a freely falling lift $g_{eff} = g - g = 0$ then n = 0

29. $C_{PPC} = \dfrac{\epsilon_0\epsilon_r A}{d} \Rightarrow C' = 6C$

$E_{PPC} = \dfrac{q}{\epsilon_0\epsilon_r A} \Rightarrow E' = \dfrac{E}{6}$

32. $K.E._{max.} = \dfrac{hc}{\lambda} - \phi$

Then K.E. will be greater than 0.5 eV

33. $(K.E.)_e = E_{ph}$

$$\frac{1}{2}mv^2 = \frac{hc}{\lambda ph} \Rightarrow \frac{1}{2}\left(\frac{h}{\lambda_e v}\right)v^2 = \frac{hc}{\lambda ph}$$

$\dfrac{\lambda_e}{\lambda ph} = \dfrac{v}{2c} \qquad c > v$

$\lambda ph > \lambda_e$

34. Total energy of electron

= K.E. + Rest Mass energy

K.E. = 3.555 – 0.51 = 3.045 MeV

35. $r = \frac{\sqrt{2mqV_{acce}}}{qB}$

$r \propto \sqrt{m}$

$\frac{m_1}{m_2} = \left(\frac{r_1}{r_2}\right)^2$

37. decay constant $= \frac{0.693}{T_{1/2}} = \frac{0.693}{77}$

= 0.009/day

38. $\mu = \frac{\cos\frac{A}{2}}{\sin\frac{A}{2}} = \frac{\sin\frac{A+\delta_m}{2}}{\sin\frac{A}{2}}$

$\frac{\pi}{2} - \frac{A}{2} = \frac{A}{2} + \frac{\delta_m}{2}$

$\Rightarrow \quad \delta_m = 180 - 2A$

39. $Q = \frac{K_1A(\theta_1-\theta)t}{d} = \frac{K_2A(\theta-\theta_2)t}{d}$

Or $\quad K_1\theta_1 - K_1\theta = K_2\theta - K_2\theta_2$

$K_1\theta_1 + K_2\theta_2 = K_1\theta + K_2\theta$

$\theta = \frac{K_1\theta_1 + K_2\theta_2}{K_1 + K_2}$

40. $< v >_{time} = \frac{\int v dt}{\int dt} = \frac{\int_0^T at dt}{\int_0^T dt} = \frac{aT}{2}$

$< v >_{space} = \frac{\int v ds}{\int ds} = \frac{\int v \frac{ds}{dt} dt}{\int \frac{ds}{dt} dt}$

$= \frac{\int_0^T v^2 dt}{\int_0^T v dt} = \frac{\int_0^T a^2t^2 dt}{\int_0^T at dt} = \frac{2}{3} aT$

$\frac{< v >_{space}}{< v >_{time}} = \frac{2aT/3}{aT/2} = \frac{4}{3}$

42. $V_0 = \sqrt{\frac{GM}{r}}$; M = mass of earth

$V_0 \propto \frac{1}{\sqrt{r}}$ then $V_R > V_1$

43. $g = \frac{GM}{R^2}$ or $g \propto \frac{M}{R^2}$

$g_M = \frac{M_M}{M_E} \times \left(\frac{R_E}{R_M}\right)^2 \times g_E$

$= \frac{1}{81} \times (3.7)^2 \times 9.8 = \frac{9.8}{6} = 1.65 \text{ m/s}^2$

44. Let natural length of spring be λ_0 then according to question

$4 = K(a - \ell_0)$

$5 = K(b - \ell_0)$

$\Rightarrow \ell_0 = 5a - 4b$; $k = \frac{1}{b-a}$

Now if we apply 9 N force then

$9 = k(\ell - \ell_0) \Rightarrow 9 = \frac{1}{(b-a)}[\ell - 5a + 4b]$

$\Rightarrow \ell = 5b - 4a$

45. $\vec{v} = \vec{w} \times \vec{r}$

$= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -2 & 3 \\ 1 & 1 & 1 \end{vmatrix}$

$= \hat{i}(-2-3) - \hat{j}(1-3) + \hat{k}(1+2)$

$= -5\hat{i} + 2\hat{j} + 3\hat{k}$

46. The centre of mass of the stick fall through 0.3 m. According to law of conservation of energy

$\frac{1}{2} I\omega^2 = mgh$

$\frac{1}{2}\frac{m\ell^2}{3}\frac{V^2}{\ell^2} = mgh \qquad (\because v = \omega\ell)$

Here $h = \ell/2 = 0.3$m

$V = \sqrt{6gh} = \sqrt{6 \times 9.8 \times 0.3} = 4.2$ m/s

47. $\lambda = \frac{c}{v} = \frac{3\times10^8}{10\times10^6} = 30$ meter

48. $R = \frac{u^2\sin 2\theta}{g}$, $\quad t_1 = \frac{2u\sin\theta}{g}$

$t_2 = \frac{2u\sin(90^\circ-\theta)}{g} = \frac{2u\cos\theta}{g}$

$\because \quad t_1t_2 = \frac{4u^2\sin\theta\cos\theta}{g} = \frac{2R}{g}$

or $\quad t_1t_2 \propto R$

49. Compound microscope $M = m_0 \times m_e$

$M = \frac{F_0}{u + F_0} \times m_e$

$\Rightarrow \quad 95 = \frac{1/4}{-1/3.8 + 1/4} m_e$

$\Rightarrow \quad 95 = 19m_e \quad \Rightarrow m_e = \frac{95}{19} = 5$