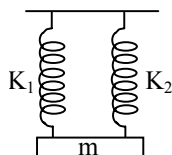


AIPMT - 2002

Q.1 A mass is suspended separately by two different springs in successive order then time period is t_1 and t_2 respectively. If it is connected by both spring as shown in figure then time period is t_0 , the correct relation is :-



- (1) $t_0^2 = t_1^2 + t_2^2$ (2) $t_0^{-2} = t_1^{-2} + t_2^{-2}$
 (3) $t_0^{-1} = t_1^{-1} + t_2^{-1}$ (4) $t_0 = t_1 + t_2$

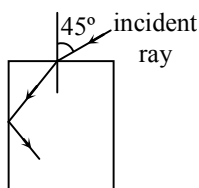
Q.2 When an oscillator completes 100 oscillation its amplitude reduced to $\frac{1}{3}$ of initial value. What will be its amplitude, when it completes 200 oscillation :-

- (1) $\frac{1}{8}$ (2) $\frac{2}{3}$ (3) $\frac{1}{6}$ (4) $\frac{1}{9}$

Q.3 A circular disc is to be made by using iron and aluminium so that it acquired maximum moment of inertia about geometrical axis. It is possible with :-

- (1) Aluminium at interior and iron surround to it
 (2) Iron at interior and aluminium surround to it
 (3) Using iron and aluminium layers in alternate order
 (4) Sheet of iron is used at both external surface and aluminium sheet as internal layers

Q.4 For the given incident ray as shown in figure, the condition of total internal reflection of this ray the minimum refractive index of prism will be :-



- (1) $\frac{\sqrt{3}+1}{2}$ (2) $\frac{\sqrt{2}+1}{2}$ (3) $\sqrt{\frac{3}{2}}$ (4) $\sqrt{\frac{7}{6}}$

Q.5 The value of plank's constant is :-

- (1) 6.63×10^{-34} J/s
 (2) 6.63×10^{-34} kg-m²/s
 (3) 6.63×10^{-34} kg-m²
 (4) 6.63×10^{-34} J-s⁻¹

Q.6 Displacement between max. P.E. position and max. K.E. position for a particle excuting simple harmonic motion is :-

- (1) $\pm \frac{a}{2}$ (2) + a
 (3) $\pm a$ (4) - 1

Q.7 A disc is rotating with angular speed ω . If a child sits on it, what is conserved :-

- (1) Linear momentum
 (2) Angular momentum
 (3) Kinetic energy
 (4) Potential energy

Q.8 Which is having minimum wavelength :-

- (1) X-rays (2) Ultra violet rays
 (3) γ -rays (4) Cosmic rays

Q.9 If particles are moving with same velocity, then De-Broglie wavelength is maximum for :-

- (1) Proton (2) α -particle
 (3) Neutron (4) β -particle

Q.10 When ultraviolet rays incident on metal plate then photoelectric effect does not occur, it occurs by incidence of :-

- (1) Infrared rays (2) X-rays
 (3) Radio wave (4) Light wave

Q.11 What is the cause of "Green house effect" :-

- (1) Infra-red rays (2) Ultra violet rays
 (3) X-rays (4) Radio waves

Q.12 Which of the following is not the property of cathode rays :-

- (1) It produces heating effect
 (2) It does not deflecte in electric field
 (3) It casts shadow
 (4) It produces flurosence

Q.13 A solid sphere of radius R is placed on smooth horizontal surface. A horizontal force 'F' is applied at height 'h' from the lowest point. For the maximum, acceleration of centre of mass, which is correct :-

- (1) $h = R$
 (2) $h = 2R$
 (3) $h = 0$
 (4) No relation between h and R



- Q.14** Diameter of human eye lens is 2 mm. What will be the minimum distance between two points to resolve them, which are situated at a distance of 50 meter from eye. The wavelength of light is 5000 \AA :-
(1) 2.32 m (2) 4.28 mm
(3) 1.25 cm (4) 12.48 cm
- Q.15** A bulb is located on a wall. Its image is to be obtained on a parallel wall with the help of convex lens. If the distance between parallel walls is 'd' then required focal length of lens placed in between the walls is :-
(1) Only $\frac{d}{4}$
(2) Only $\frac{d}{2}$
(3) More than $\frac{d}{4}$ but less than $\frac{d}{2}$
(4) Less than or equal to $\frac{d}{4}$
- Q.16** The Wien's displacement law express relation between :-
(1) Wavelength corresponding to maximum energy and temperature
(2) Radiation energy and wavelength
(3) Temperature and wavelength
(4) Colour of light and temperature
- Q.17** Which of the following is best close to an ideal black body :-
(1) Black lamp
(2) Cavity maintained at constant temperature
(3) Platinum black
(4) A lump of charcoal heated to high temp.
- Q.18** For a black body at temperature 727°C , its radiating power is 60 watt and temperature of surrounding is 227°C . If temperature of black body is changed to 1227°C then its radiating power will be :-
(1) 304 W (2) 320 W
(3) 240 W (4) 120 W
- Q.19** Consider two rods of same length and different specific heats (S_1, S_2), conductivities (K_1, K_2) and area of cross-sections (A_1, A_2) and both having temperature T_1 and T_2 at their ends. If rate of loss of heat due to conduction is equal, then :-
(1) $K_1A_1 = K_2A_2$ (2) $\frac{K_1A_1}{S_1} = \frac{K_2A_2}{S_2}$
(3) $K_2A_1 = K_1A_2$ (4) $\frac{K_2A_1}{S_2} = \frac{K_1A_2}{S_1}$
- Q.20** The efficiency of carnot engine is 50% and temperature of sink is 500K. If temperature of source is kept constant and its efficiency raised to 60%, then the required temperature of the sink will be :-
(1) 100 K (2) 600 K
(3) 400 K (4) 500 K
- Q.21** Unit of Stefan's constant is :-
(1) Watt-m²-K⁴ (2) Watt-m²/K⁴
(3) Watt/m²-K (4) Watt/m²K⁴
- Q.22** Number of atom per unit cell in B.C.C. :-
(1) 9 (2) 4
(3) 2 (4) 1
- Q.23** An object of mass 3kg is at rest. Now a force of $\vec{F} = 6t^2\hat{i} + 4t\hat{j}$ is applied on the object then velocity of object at $t = 3$ second is :-
(1) $18\hat{i} + 3\hat{j}$ (2) $18\hat{i} + 6\hat{j}$
(3) $3\hat{i} + 18\hat{j}$ (4) $18\hat{i} + 4\hat{j}$
- Q.24** A body of mass m is placed on earth surface which is taken from earth surface to a height of $h = 3R$ then change in gravitational potential energy is :-
(1) $\frac{mgR}{4}$ (2) $\frac{2}{3}mgR$
(3) $\frac{3}{4}mgR$ (4) $\frac{mgR}{2}$
- Q.25** A point P consider at contact point of a wheel on ground which rolls on ground without slipping then value of displacement of point P when wheel completes half of rotation (If radius of wheel is 1m) :-
(1) 2m (2) $\sqrt{\pi^2 + 4}$ m
(3) π m (4) $\sqrt{\pi^2 + 2}$ m
- Q.26** A block of mass 10 kg placed on rough horizontal surface having coefficient of friction $\mu = 0.5$, if a horizontal force of 100 N acting on it then acceleration of the block will be :-
(1) 10 m/s² (2) 5 m/s²
(3) 15 m/s² (4) 0.5 m/s²



Q.27 A lift of mass 1000 Kg which is moving with acceleration of 1 m/s^2 in upward direction, then the tension developed in string which is connected to lift is :-

- (1) 9800 N (2) 10, 800 N
 (3) 11000 N (4) 10, 000 N

Q.28 A particle (A) is dropped from a height and another particle (B) is projected in horizontal direction with speed of 5 m/s from the same height then correct statement is :-

- (1) Particle (A) will reach at ground first with respect to particle (B)
 (2) Particle (B) will reach at ground first with respect to particle (A)
 (3) Both particles will reach at ground simultaneously
 (4) Both particles will reach at ground with same speed

Q.29 A rod of length is 3m and its mass acting per unit length is directly proportional to distance x from one of its end then its centre of gravity from that end will be at :-

- (1) 1.5 m (2) 2 m
 (3) 2.5 m (4) 3.0 m

Q.30 If kinetic energy of a body is increased by 300% than percentage change in momentum will be

- (1) 100% (2) 150%
 (3) 265% (4) 73.2%

Q.31 For a transistor $\frac{I_C}{I_E} = 0.96$, then current gain for common emitter configuration :-

- (1) 12 (2) 6 (3) 48 (4) 24

Q.32 A wave travelling in positive X-direction with $A = 0.2 \text{ m}$ velocity = 360 m/s and $\lambda = 60 \text{ m}$, then correct expression for the wave is :-

- (1) $y = 0.2 \sin [2\pi (6t + \frac{x}{60})]$
 (2) $y = 0.2 \sin [\pi (6t + \frac{x}{60})]$
 (3) $y = 0.2 \sin [2\pi (6t - \frac{x}{60})]$
 (4) $y = 0.2 \sin [\pi(6t - \frac{x}{60})]$

Q.33 A whistle revolves in a circle with angular speed $\omega = 20 \text{ rad/sec}$ using a string of length 50 cm. If the frequency of sound from the whistle is 385 Hz, then what is the minimum frequency heard by an observer which is far away from the centre :- ($V_{\text{sound}} = 340 \text{ m/s}$)

- (1) 385 Hz (2) 374 Hz
 (3) 394 Hz (4) 333 Hz

Q.34 In a PN junction :-

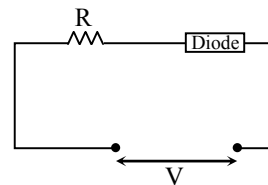
- (1) High potential at N side and low potential at P side
 (2) High potential at P side and low potential at N side
 (3) P and N both are at same potential
 (4) Undetermined

Q.35 The given truth table is for which logic gate :-

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

- (1) NAND (2) XOR (3) NOR (4) OR

Q.36 For the given circuit of P-N junction diode which is correct :-



- (1) In F.B. the voltage across R is V
 (2) In R.B. the voltage across R is V
 (3) In F.B. the voltage across R is 2 V
 (4) In R.B. the voltage across R is 2 V

Q.37 Specific resistance of a conductor increases with :

- (1) Increase in temperature
 (2) Increase in cross section area
 (3) Increase in cross section and decrease in length
 (4) Decrease in cross section area

Q.38 For a series LCR circuit the power loss at resonance is :-

- (1) $\frac{V^2}{\omega L - \frac{1}{\omega C}}$ (2) $I^2 L \omega$
 (3) $I^2 R$ (4) $\frac{V^2}{C \omega}$



- Q.39** Some charge is being given to a conductor. Then its potential : -
(1) Is maximum at surface
(2) Is maximum at centre
(3) Is remain same throughout the conductor
(4) Is maximum somewhere between surface and centre
- Q.40** For a cell terminal P.D. is 2.2V when circuit is open and reduces to 1.8V when cell is connected to a resistance of $R = 5\Omega$. Determine internal resistance of cell (r) is then : -
(1) $\frac{10}{9}\Omega$ (2) $\frac{9}{10}\Omega$
(3) $\frac{11}{9}\Omega$ (4) $\frac{5}{9}\Omega$
- Q.41** To convert a galvanometer into a voltmeter one should connect a : -
(1) High resistance in series with galvanometer
(2) Low resistance in series with galvanometer
(3) High resistance in parallel with galvanometer
(4) Low resistance in parallel with galvanometer
- Q.42** A capacitor of capacity C_1 charged upto V volt and then connected to an uncharged capacitor C_2 . Then final P.D. across each will be
(1) $\frac{C_2V}{C_1+C_2}$ (2) $\frac{C_1V}{C_1+C_2}$
(3) $\left(1+\frac{C_2}{C_1}\right)$ (4) $\left(1-\frac{C_2}{C_1}\right)V$
- Q.43** Identical charges ($-q$) are placed at each corner of a cube of side 'b' then electrical potential energy of charge ($+q$) which is placed at centre of cube will be
(1) $\frac{-4\sqrt{2}q^2}{\pi\epsilon_0 b}$ (2) $\frac{-8\sqrt{2}q^2}{\pi\epsilon_0 b}$
(3) $\frac{-4q^2}{\sqrt{3}\pi\epsilon_0 b}$ (4) $\frac{8\sqrt{2}q^2}{4\pi\epsilon_0 b}$
- Q.44** Which of the following are suitable for the fusion process : -
(1) Light nuclei
(2) heavy nuclei
(3) Element must be lying in the middle of the periodic table
(4) Middle elements, which are lying on binding energy curve
- Q.45** The magnetic field of given length of wire for single turn coil at its centre is 'B' then its value for two turns coil for the same wire is : -
(1) $\frac{B}{4}$ (2) $\frac{B}{2}$
(3) $4B$ (4) $2B$
- Q.46** A charge 'q' moves in a region where electric field and magnetic field both exist, then force on it is : -
(1) $q(\vec{V} \times \vec{B})$ (2) $q\vec{E} + q(\vec{V} \times \vec{B})$
(3) $q\vec{E} + q(\vec{B} \times \vec{V})$ (4) $q\vec{B} + q(\vec{E} \times \vec{V})$
- Q.47** Two bar magnets having same geometry with magnetic moments M and $2M$, are firstly placed in such a way that their similar poles are same side then its time period of oscillation is T_1 . Now the polarity of one of the magnet is reversed then time period of oscillation is T_2 , then : -
(1) $T_1 < T_2$ (2) $T_1 = T_2$
(3) $T_1 > T_2$ (4) $T_2 = \infty$
- Q.48** The velocity of electromagnetic wave is parallel to : -
(1) $\vec{B} \times \vec{E}$ (2) $\vec{E} \times \vec{B}$
(3) \vec{E} (4) \vec{B}
- Q.49** A sample of radioactive element containing 4×10^{16} active nuclei. Half life of element is 10 days, then number of decayed nuclei after 30 days : -
(1) 0.5×10^{16} (2) 2×10^{16}
(3) 3.5×10^{16} (4) 1×10^{16}
- Q.50** A deuteron is bombarded on ${}_8\text{O}^{16}$ nucleus then α -particle is emitted then product nucleus is -
(1) ${}_7\text{N}^{13}$ (2) ${}_5\text{B}^{10}$
(3) ${}_4\text{Be}^9$ (4) ${}_7\text{N}^{14}$
- Q.51** ${}_{92}\text{U}^{235}$, nucleus absorb a neutron and disintegrate in ${}_{54}\text{Xe}^{139}$, ${}_{38}\text{Sr}^{94}$ and x So, What will be the product x : -
(1) 3 - neutrons (2) 2 - neutrons
(3) α - partical (4) β - partical
- Q.52** In Hydrozen atom, energy of first excited state is -3.4 eV. Then find out KE of same orbit of Hydrogen atom : -
(1) $+3.4$ eV (2) $+6.8$ eV
(3) -13.6 eV (4) $+13.6$ eV



- Q.53** Reaction $\text{BaO}_2(\text{s}) \rightleftharpoons \text{BaO}(\text{s}) + \text{O}_2(\text{g})$;
 $\Delta H = + \text{ve}$. In equilibrium condition. Pressure of O_2 is depends on :-
 (1) Increase mass of BaO_2
 (2) Increase mass of BaO
 (3) Increase temp. on Eq^{m} .
 (4) Increase mass of BaO_2 and BaO both
- Q.54** Solubility of MX_2 - type electrolytes is 0.5×10^{-4} Mole/lit. then find out K_{sp} of electrolytes :-
 (1) 5×10^{-12} (2) 25×10^{-10}
 (3) 1×10^{-13} (4) 5×10^{-13}
- Q.55** 1 M and 2.5 litre NaOH solution mixed with another 0.5 M and 3 litre NaOH solution. Then find out molarity of resultant solution :-
 (1) 0.80 M (2) 1.0 M
 (3) 0.73 M (4) 0.50 M
- Q.56** Which has highest pH :-
 (1) CH_3COOK (2) Na_2CO_3
 (3) NH_4Cl (4) NaNO_3
- Q.57** Solution of 0.1 N NH_4OH and 0.1 N NH_4Cl has pH 9.25, Then find out pkb of NH_4OH :-
 (1) 9.25 (2) 4.75
 (3) 3.75 (4) 8.25
- Q.58** Vander waal's real gas, act as a ideal gas, at which conditions :-
 (1) High temp., Low pressure
 (2) Low temp., High pressure
 (3) High temp., High pressure
 (4) Low temp., Low pressure
- Q.59** Unit of entropy is :-
 (1) $\text{JK}^{-1} \text{mol}^{-1}$ (2) J mol^{-1}
 (3) $\text{J}^{-1}\text{K}^{-1} \text{mol}^{-1}$ (4) JK mol^{-1}
- Q.60** In a closed insulated container a liquid is stirred with a paddle to increase the temperature which of the following is true :-
 (1) $\Delta E = W \neq 0, q = 0$
 (2) $\Delta E = W = q \neq 0$
 (3) $\Delta E = 0, W = q \neq 0$
 (4) $W = 0 \Delta E = q \neq 0$
- Q.61** 2 mole of ideal gas at 27°C temp. is expanded reversibly from 2 lit. to 20 lit. Find entropy change ($R = 2 \text{ cal/mol K}$) :-
 (1) 92.1 (2) 0
 (3) 4 (4) 9.2
- Q.62** Heat of combustion ΔH° for $\text{C}(\text{s})$, $\text{H}_2(\text{g})$ and $\text{CH}_4(\text{g})$ are -94 , -68 and -213 Kcal/mol . then ΔH° for $\text{C}(\text{s}) + 2\text{H}_2(\text{g}) \rightarrow \text{CH}_4(\text{g})$ is :-
 (1) -17 Kcal (2) -111 Kcal
 (3) -170 Kcal (4) -85 Kcal
- Q.63** $3\text{A} \rightarrow 2\text{B}$, rate of reaction $\frac{+d[\text{B}]}{dt}$ is equals to :-
 (1) $-\frac{3}{2} \frac{d[\text{A}]}{dt}$ (2) $-\frac{2}{3} \frac{d[\text{A}]}{dt}$
 (3) $-\frac{1}{3} \frac{d[\text{A}]}{dt}$ (4) $+2 \frac{d[\text{A}]}{dt}$
- Q.64** $2\text{A} \rightarrow \text{B} + \text{C}$
 It would be a zero order reaction when :-
 (1) The rate of reaction is proportional to square of conc. of A
 (2) The rate of reaction remains same at any conc. of A
 (3) The rate remains unchanged at any conc. of B and C
 (4) The rate of reaction doubles if conc. of B is increased to double
- Q.65** Which has maximum molecules :-
 (1) 7 gm N_2 (2) 2 gm H_2
 (3) 16 gm NO_2 (4) 16 gm O_2
- Q.66** A solution contains non volatile solute of molecular mass M_2 . Which of the following can be used to calculate the molecular mass of solute in terms of osmotic pressure :-
 (1) $M_2 = \left(\frac{m_2}{\pi}\right) \text{VRT}$ (2) $M_2 = \left(\frac{m_2}{V}\right) \frac{\text{RT}}{\pi}$
 (3) $M_2 = \left(\frac{m_2}{V}\right) \pi \text{RT}$ (4) $M_2 = \left(\frac{m_2}{V}\right) \frac{\pi}{\text{RT}}$
- Note :** $m_2 \rightarrow$ mass of solute
 $V \rightarrow$ Volume of solution
 $p \rightarrow$ Osmotic pressure
- Q.67** A solution containing components A and B follows Raoult's law :-
 (1) A - B attraction force is greater than A - A and B - B
 (2) A - B attraction force is less than A - A and B - B
 (3) Attraction force remains same in A - A and B - B
 (4) Volume of solution is different from sum of volume of solute and solvent

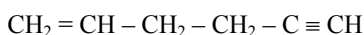


- Q.68** Which reaction is not feasible :-
(1) $2\text{KI} + \text{Br}_2 \rightarrow 2\text{KBr} + \text{I}_2$
(2) $2\text{KBr} + \text{I}_2 \rightarrow 2\text{KI} + \text{Br}_2$
(3) $2\text{KBr} + \text{Cl}_2 \rightarrow 2\text{KCl} + \text{Br}_2$
(4) $2\text{H}_2\text{O} + 2\text{F}_2 \rightarrow 4\text{HF} + \text{O}_2$
- Q.69** In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam :-
(1) Hg is more inert than Pt
(2) More voltage is required to reduce H^+ at Hg than at Pt
(3) Na is dissolved in Hg while it does not dissolve in Pt
(4) Conc. of H^+ ions is larger when Pt electrode is taken
- Q.70** Which of the following statement is true :-
(1) Silicon exhibits 4 coordination number in its compound
(2) Bond energy of F_2 is less than Cl_2
(3) Mn(III) oxidation state is more stable than Mn (II) in aqueous state
(4) Elements of 15th gp shows only + 3 and + 5 oxidation states
- Q.71** Which of the following order is wrong :-
(1) $\text{NH}_3 < \text{PH}_3 < \text{AsH}_3$ - Acidic
(2) $\text{Li} < \text{Be} < \text{B} < \text{C} - \text{I}^{\text{st}}$ IP
(3) $\text{Al}_2\text{O}_3 < \text{MgO} < \text{Na}_2\text{O} < \text{K}_2\text{O}$ - Basic
(4) $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Cs}^+$ - Ionic radius
- Q.72** General electronic configuration of lanthanides is
(1) $(n-2) f^{1-14} (n-1) s^2 p^6 d^{0-1} ns^2$
(2) $(n-2) f^{10-14} (n-1) d^{0-1} ns^2$
(3) $(n-2) f^{0-14} (n-1) d^{10} ns^2$
(4) $(n-2) d^{0-1} (n-1) f^{1-14} ns^2$
- Q.73** An atom has electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^3 4s^2$, you will place it in which group :-
(1) Fifth (2) Fifteenth
(3) Second (4) Third
- Q.74** Which of the following is iso-electronic :-
(1) CO_2, NO_2 (2) $\text{NO}_2^-, \text{CO}_2$
(3) CN^-, CO (4) SO_2, CO_2
- Q.75** Which of the following has $p_\pi - d_\pi$ bonding
(1) NO_3^- (2) SO_3^{2-}
(3) BO_3^{3-} (4) CO_3^{2-}
- Q.76** In NO_3^- ion number of bond pair and lonepair of electrons on nitrogen atom are :-
(1) 2, 2 (2) 3, 1
(3) 1, 3 (4) 4, 0
- Q.77** Which of the following shows maximum number of oxidation states :-
(1) Cr (2) Fe
(3) Mn (4) V
- Q.78** Atomic number of Cr and Fe are respectively 24 and 26, which of the following is paramagnetic with the spin of electron :-
(1) $[\text{Cr}(\text{CO})_6]$ (2) $[\text{Fe}(\text{CO})_5]$
(3) $[\text{Fe}(\text{CN})_6]^{-4}$ (4) $[\text{Cr}(\text{NH}_3)_6]^{+3}$
- Q.79** The hypothetical complex chloro diaquatrammine cobalt (III) chloride can be represented as :-
(1) $[\text{CoCl}(\text{NH}_3)_3(\text{H}_2\text{O})_2]\text{Cl}_2$
(2) $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})\text{Cl}_3]$
(3) $[\text{Co}(\text{NH}_2)_3(\text{H}_2\text{O})_2\text{Cl}]$
(4) $[\text{Co}(\text{NH}_3)_3(\text{H}_2\text{O})_3\text{Cl}_3]$
- Q.80** In the silver plating of copper, $\text{K}[\text{Ag}(\text{CN})_2]$ is used instead of AgNO_3 . The reason is :-
(1) A thin layer of Ag is formed on Cu
(2) More voltage is required
(3) Ag^+ ions are completely removed from solution
(4) Less availability of Ag^+ ions, as Cu can not displace Ag from $[\text{Ag}(\text{CN})_2]^-$ ion
- Q.81** CuSO_4 when reacts with KCN forms CuCN, which is insoluble in water. It is soluble in excess of KCN, due to formation of the following complex :-
(1) $\text{K}_2[\text{Cu}(\text{CN})_4]$ (2) $\text{K}_3[\text{Cu}(\text{CN})_4]$
(3) CuCN_2 (4) $\text{Cu}[\text{KCu}(\text{CN})_4]$
- Q.82** Position of non polar & polar part in miscell
(1) Polar at outer surface but non polar at inner surface
(2) Polar at inner surface non polar at outer surface
(3) Distributed over all the surface
(4) Are present in the surface only
- Q.83** In borex bead test which compound is formed
(1) Ortho borate
(2) Meta borate
(3) Double oxide
(4) Tetra borate

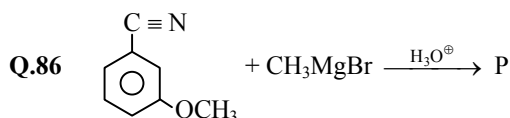
Q.84 Zn gives H₂ gas with H₂SO₄ & HCl but not with HNO₃ because :-

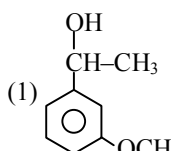
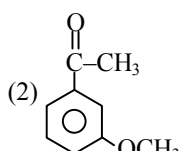
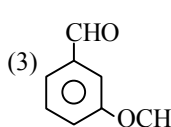
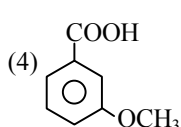
- (1) Zn act as oxidising agent when react with HNO₃
- (2) HNO₃ is weaker acid then H₂SO₄ & HCl
- (3) In electrochemical series Zn is above hydrogen
- (4) NO₃[⊖] is reduced in preference to hydronium ion

Q.85 IUPAC name of the following is



- (1) 1, 5-hexenyne
- (2) 1-hexene-5-yne
- (3) 1-hexyne-5-ene
- (4) 1, 5-hexynene

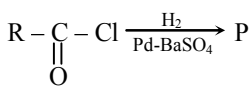


- (1) 
- (2) 
- (3) 
- (4) 

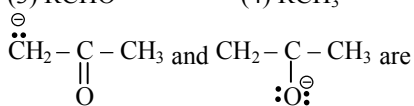
Q.87 n-propyl alcohol and isopropyl alcohol can be chemically distinguished by which reagent :-

- (1) PCl₅
- (2) Reduction
- (3) Oxidation with Potassium dichromate
- (4) Ozonolysis

Q.88 In the following reaction product 'P' is :-



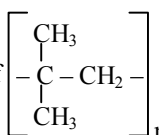
- (1) RCH₂OH
- (2) RCOOH
- (3) RCHO
- (4) RCH₃

Q.89 

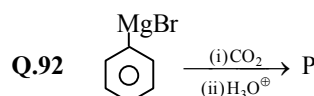
- (1) Resonating structures
- (2) Tautomers
- (3) Geometrical isomers
- (4) Optical isomers

Q.90 Reactivity order of halides for dehydrohalogenation is :-

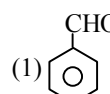

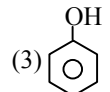
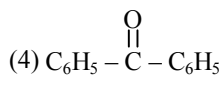
- (1) R - F > R - Cl > R - Br > R - I
- (2) R - I > R - Br > R - Cl > R - F
- (3) R - I > R - Cl > R - Br > R - F
- (4) R - F > R - I > R - Br > R - Cl

Q.91 Monomer of  is :-

- (1) 2-methyl propene
- (2) Styrene
- (3) Propylene
- (4) Ethene

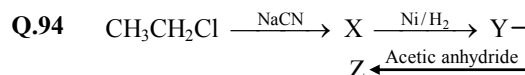


In the above reaction product 'P' is :-

- (1) 
- (2) 
- (3) 
- (4) 

Q.93 Cellulose is polymer of :-

- (1) Glucose
- (2) Fructose
- (3) Ribose
- (4) Sucrose



Z in the above reaction sequence is :-

- (1) CH₃CH₂CH₂NHCOCH₃
- (2) CH₃CH₂CH₂NH₂
- (3) CH₃CH₂CH₂CONHCH₃
- (4) CH₃CH₂CH₂CONHCOCH₃

Q.95 When phenol is treated with CHCl₃ and NaOH, the product formed is :-

- (1) Benzaldehyde
- (2) Salicylaldehyde
- (3) Salicylic acid
- (4) Benzoic acid

Q.96 The percentage of C, H and N in an organic compound are 40%, 13.3% and 46.7% respectively then empirical formula is :

- (1) C₃H₁₃N₃
- (2) CH₂N
- (3) CH₄N
- (4) CH₆N

Q.97 Enzymes are made up of :-

- (1) Edible proteins
- (2) Proteins with specific structure
- (3) Nitrogen containing carbohydrates
- (4) Carbohydrates



- Q.98** Geometrical isomers are differ in : -
(1) Position of functional group
(2) Position of atoms
(3) Spatial arrangement of atoms
(4) Length of carbon chain
- Q.99** When $\text{CH}_3\text{CH}_2\text{CHCl}_2$ is treated with NaNH_2 , the product formed is : -
(1) $\text{CH}_3 - \text{CH} = \text{CH}_2$
(2) $\text{CH}_3 - \text{C} \equiv \text{CH}$
(3) $\text{CH}_3\text{CH}_2\text{CH} \begin{cases} \text{NH}_2 \\ \text{NH}_2 \end{cases}$
(4) $\text{CH}_3\text{CH}_2\text{CH} \begin{cases} \text{Cl} \\ \text{NH}_2 \end{cases}$
- Q.100** Which is not true statement : -
(1) α -carbon of α -amino acid is asymmetric
(2) All proteins are found in L-form
(3) Human body can synthesize all proteins they need
(4) At pH = 7 both amino and carboxylic groups exist in ionised form
- Q.101** Which is a reducing sugar : -
(1) Galactose
(2) Gluconic acid
(3) β -methyl galactoside
(4) Sucrose
- Q.102** Significance of mimicry is -
(1) Attack (Offence)
(2) Protection (Defence)
(3) Both (1) & (2)
(4) Isolation
- Q.103** Which of the following is correct match -
(1) Down Syndrome = 21st Chromosome
(2) Sickle cell anaemia = X - Chromosome
(3) Haemophilia = Y - Chromosome
(4) Parkinson Disease = X & Y Chromosome
- Q.104** Some bacteria able to grow in Streptomycin containing medium due to -
(1) Natural selection
(2) Induced mutation
(3) Reproductive isolation
(4) Genetic drift
- Q.105** In a population, unrestricted reproductive capacity is called as -
(1) Biotic potential (2) Fertility
(3) Carrying capacity (4) Birth rate
- Q.106** Change in sequence of nucleotide in DNA is called as -
(1) Mutagen (2) Mutation
(3) Recombination (4) Translation
- Q.107** Reason of fast speciation in present day crop plants is -
(1) Mutation (2) Isolation
(3) Polyploidy (4) Sexual Reproduction
- Q.108** Which of the following is important for speciation : -
(1) Seasonal isolation
(2) Reproductive isolation
(3) Behavioural isolation
(4) Tropical isolation
- Q.109** Which of the following are homologous organs :-
(1) Wings of birds & Locust
(2) Wings of birds (Sparrow) & Pectoral fins of fish
(3) Wings of bat & Butterfly
(4) Legs of frog & Cockroach
- Q.110** Genetic drift operates in : -
(1) Small isolated population
(2) Large isolated population
(3) Fast reproductive population
(4) Slow reproductive population
- Q.111** There is no life on moon due to the absence of -
(1) O_2 (2) Water
(3) Light (4) Temperature
- Q.112** According to fossils which discovered up to present time, origin and evolution of man was started from which country -
(1) France (2) Java
(3) Africa (4) China
- Q.113** Impulse of heart beat originates from : -
(1) S.A. Node (2) A. V. Node
(3) Vagus Nerve (4) Cardiac Nerve
- Q.114** Which cartilage is present on the end of long bones -
(1) Calcified cartilage
(2) Hyaline cartilage
(3) Elastic cartilage
(4) Fibrous cartilage



- Q.115** Melanin protect from :-
(1) U.V. rays (2) Visible rays
(3) Infrared rays (4) X-rays
- Q.116** Continuous bleeding from an injured part of body is due to deficiency of ; -
(1) Vitamin -A (2) Vitamin - B
(3) Vitamin - K (4) Vitamin - E
- Q.117** What will happen if ligaments are cut or broken : -
(1) Bones will move freely at joints
(2) No movement at joint
(3) Bone will become unfix
(4) Bone will become fixed
- Q.118** Which of the following statement is true for Lymph : -
(1) WBC and serum
(2) All components of blood except RBCs and some proteins
(3) RBCs, WBCs and Plasma
(4) RBCs, Proteins and Platelets
- Q.119** Choose the correct sequence of stages of growth curve for Bacteria : -
(1) Lag, Log, stationary, Decline phase
(2) Lag, Log, Stationary phase
(3) Stationary, Lag, Log, Decline phase
(4) Decline, Lag, Log phase
- Q.120** The semilog of per minute growing bacteria is plotted against time. What will the shape of graph : -
(1) Sigmoid (2) Hyperbolic
(3) Ascending straight line
(4) Descending straight line
- Q.121** Mainly which hormones control menstrual cycle in human beings : -
(1) FSH (2) LH
(3) FSH, LH, Estrogen (4) Progesteron
- Q.122** When both ovary of rat are removed then which hormone is decreased in blood : -
(1) Oxytocin (2) Prolactin
(3) Estrogen
(4) Gonadotrophic releasing factor
- Q.123** Which of the following statement is correct for node of Ranvier of nerve : -
(1) Neurilemma is discontinuous
(2) Myelin sheath is discontinuous
(3) Both neurilemma & Myelin sheath are discontinuous
(4) Covered by myelin sheath
- Q.124** Which of the following is used in the treatment of Thyroid cancer : -
(1) I_{131} (2) U_{238} (3) Ra_{224} (4) C_{14}
- Q.125** Hydrolytic enzymes which act on low pH are called as : -
(1) Protease (2) α -Amylase
(3) Hydrolases (4) Peroxidase
- Q.126** Stool of a person contain whitish grey colour due to malfunction of which type of organ : -
(1) Pancrease (2) Spleen
(3) Kidney (4) Liver
- Q.127** Adrenalin direct affect on : -
(1) S.A. Node
(2) β -cells of Langerhans
(3) Dorsal root of spinal cord
(4) Epithelial cells of stomach
- Q.128** Acromegaly is caused by : -
(1) Excess of S.T.H.
(2) Excess of Thyroxin
(3) Deficiency of Thyroxin
(4) Excess of Adrenalin
- Q.129** In fluid mosaic model of plasma membrane
(1) Upper layer is non-polar and hydrophilic
(2) Polar layer is hydrophobic
(3) Phospholipids form a bimolecular layer in middle part
(4) Proteins form a middle layer
- Q.130** Organisms which obtain energy by the oxidation of reduced inorganic compounds are called : -
(1) Photo autotrophs
(2) Chemo autotrophs
(3) Saprozoic
(4) Coproheterotrophs
- Q.131** In which condition, the gene ratio remains constant for any species : -
(1) Sexual selection (2) Random mating
(3) Mutation (4) Gene flow
- Q.132** Which of the following occurs more than one and less than five in a chromosome : -
(1) Chromatid (2) Chromomere
(3) Centromere (4) Telomere
- Q.133** Ribosomes are produced in :
(1) Nucleolus (2) Cytoplasm
(3) Mitochondria (4) Golgibody



- Q.134** Mitotic spindle is mainly composed of which protein :-
(1) Actin (2) Tubulin
(3) Actomyosin (4) Myoglobin
- Q.135** Cancerous cells can easily be destroyed by radiations due to :-
(1) Rapid cell division (2) Lack of nutrition
(3) Fast mutation (4) Lack of oxygen
- Q.136** Which fungal disease spreads by seed and flowers :-
(1) Loose smut of Wheat
(2) Corn stunt
(3) Covered smut of Barley
(4) Soft rot of Potato
- Q.137** Sequence of which of the following is used to know the phylogeny :-
(1) m-RNA (2) r-RNA
(3) t-RNA (4) DNA
- Q.138** Which of the following secretes toxins during storage conditions of crop plants :-
(1) *Aspergillus* (2) *Penicillium*
(3) *Fusarium* (4) *Colletotrichum*
- Q.139** Which of the following plants produces seeds but not flowers :-
(1) Maize (2) Mint (3) Peepal (4) Pinus
- Q.140** Best material for the study of mitosis in laboratory :-
(1) Anther (2) Root tip
(3) Leaf tip (4) Ovary
- Q.141** In five kingdom system, the main basis of classification :-
(1) Structure of nucleus
(2) Nutrition
(3) Structure of cell wall
(4) Asexual reproduction
- Q.142** Which of the following is without exception in Angiosperms :-
(1) Presence of vessels
(2) Double fertilisation
(3) Secondary growth
(4) Autotrophic nutrition
- Q.143** Which bacteria is utilized in Gobar gas plant :-
(1) Methanogens
(2) Nitrifying bacteria
(3) Ammonifying bacteria
(4) Denitrifying bacteria
- Q.144** During the formation of bread it becomes porous due to release of CO₂ by the action of :-
(1) Yeast (2) Bacteria
(3) Virus (4) Protozoans
- Q.145** In protozoa like *Amoeba* and *Paramecium*, a organ is found for osmoregulation which is :-
(1) Contractile vacuole (2) Mitochondria
(3) Nucleus (4) Food vacuole
- Q.146** Which of the following is absent in polluted water :-
(1) Hydrilla (2) Water hyacinth
(3) Larva of stone fly (4) Blue green algae
- Q.147** What is true for individuals of same species
(1) Live in same niche
(2) Live in same habitat
(3) Interbreeding
(4) Live in different habitat
- Q.148** In which era reptiles were dominated :-
(1) Coenozoic era (2) Mesozoic era
(3) Paleozoic era (4) Archaeozoic era
- Q.149** Number of wild life is continuously decreasing. What is the main reason of this :-
(1) Predation
(2) Cutting down of forest
(3) Destruction of habitat
(4) Hunting
- Q.150** In Angiosperms pollen tube liberate their male gametes into the :-
(1) Central cell (2) Antipodal cells
(3) Egg cell (4) Synergids
- Q.151** Maximum green house gas released by which country :-
(1) India (2) France
(3) U.S.A. (4) Britain
- Q.152** What is the direction of micropyle in anatropous ovule :-
(1) Upward (2) Downward
(3) Right (4) Left
- Q.153** Which type of association is found in between entomophilous flower and pollinating agent :-
(1) Mutualism (2) Commonsalism
(3) Coperation (4) Co-evolution
- Q.154** In which of the following notochord is present in embryonic stage :-
(1) All chordates (2) Some chordates
(3) Vertebrates (4) Non chordates



- Q.155** In Angiosperm all the four microspores of tetrad are covered by a layer which is formed by : -
(1) Pectocellulose (2) Callose
(3) Cellulose (4) Sporopollenin
- Q.156** In which of the animal dimorphic nucleus is found : -
(1) *Amoeba proteus*
(2) *Trypanosoma gambiens*
(3) *Plasmodium vivax*
(4) *Paramecium caudatum*
- Q.157** Two different species can not live for long duration in the same niche or habitat. This law is : -
(1) Allen's law
(2) Gause's law
(3) Competitive exclusion principal
(4) Weiseman's theory
- Q.158** Which of the following is a correct pair : -
(1) *Cuscuta* – parasite
(2) *Dischidia* – insectivorous
(3) *Opuntia* – predator
(4) *Capsella* – hydrophyte
- Q.159** Bamboo plant is growing in a far forest then what will be the trophic level of it : -
(1) First trophic level (T_1)
(2) Second trophic level (T_2)
(3) Third trophic level (T_3)
(4) Fourth trophic level (T_4)
- Q.160** Which pigment absorbs the red and farred light
(1) Cytochrome (2) Phytochrome
(3) Carotenoids (4) Chlorophyll
- Q.161** Opening and closing of stomata is due to the : -
(1) Hormonal change in guard cells
(2) Change in Turgor pressure of guard cells
(3) Gaseous exchange
(4) Respiration
- Q.162** How many ATP molecules produced by Aerobic oxidation of one molecule of glucose : -
(1) 2 (2) 4
(3) 38 (4) 34
- Q.163** Choose the correct match
Bladderwort, sundew, venus flytrap : -
(1) *Nepenthes*, *Dionea*, *Drosera*
(2) *Nepenthes*, *Utricularia*, *Vanda*
(3) *Utricularia*, *Drosera*, *Dionea*
(4) *Dionea*, *Trapa*, *Vanda*
- Q.164** In Photosynthesis energy from light reaction to dark reaction is transferred in the form of : -
(1) ADP (2) ATP
(3) RUDP (4) Chlorophyll
- Q.165** Which of the following absorb light energy for photosynthesis : -
(1) Chlorophyll (2) Water molecule
(3) O_2 (4) RUBP
- Q.166** Seed dormancy is due to the : -
(1) Ethylene (2) Abscissic acid
(3) IAA (4) Starch
- Q.167** Edible part in mango is : -
(1) Mesocarp (2) Epicarp
(3) Endocarp (4) Epidermis
- Q.168** What is true for cleavage : -
(1) Size of embryo increase
(2) Size of cells decrease
(3) Size of cells increase
(4) Size of embryo decrease
- Q.169** Geocarpic fruit is : -
(1) Potato (2) Peanut
(3) Onion (4) Garlic
- Q.170** In which animal nerve cell is present but brain is absent : -
(1) Sponge (2) Earthworm
(3) Cockroach (4) Hydra
- Q.171** In bacteria, plasmid is : -
(1) Extra chromosomal material
(2) Main DNA
(3) Non functional DNA
(4) Repetative gene
- Q.172** Transformation experiment was first performed on which bacteria : -
(1) *E. coli*
(2) *Diplococcus pneumoniae*
(3) *Salmonella*
(4) *Pasteurella pestis*
- Q.173** Which statement is correct for bacterial transduction : -
(1) Transfer of some genes from one bacteria to another bacteria through virus
(2) Transfer of some genes from one bacteria to another bacteria by conjugation
(3) Bacteria obtained its DNA directly
(4) Bacteria obtained DNA from other external source



- Q.174** Which steroid is used for transformation :-
(1) Cortisol (2) Cholesterol
(3) Testosteron (4) Progesteron
- Q.175** Main function of lenticel is :-
(1) Transpiration
(2) Guttation
(3) Gaseous exchange
(4) Bleeding
- Q.176** Which of the following is the example of sex linked disease :-
(1) AIDS
(2) Colour blindness
(3) Syphilis
(4) Gonorrhoea
- Q.177** Vessels are found in :-
(1) All angiosperms and some gymnosperm
(2) Most of the angiosperm and few gymnosperms
(3) All angiosperms, all gymnosperms and some pteridophyta
(4) All pteridophyta
- Q.178** In *E. Coli*, during lactose metabolism repressor binds to :-
(1) Regulator gene (2) Operator gene
(3) Structural gene (4) Promoter gene
- Q.179** Four radial V.B. are found in :-
(1) Dicot root (2) Monocot root
(3) Dicot stem (4) Monocot stem
- Q.180** Which of the following is the example of pleiotropic gene ; -
(1) Haemophilia (2) Thalassemia
(3) Sickle cell anaemia (4) Colour blindness
- Q.181** A gene said to be dominant if :-
(1) It express it's effect only in homozygous stage
(2) It expressed only in heterozygous condition
(3) It expressed both in homozygous and heterozygous condition
(4) It never expressed in any condition
- Q.182** Axillary bud and terminal bud derived from the activity of :-
(1) Lateral meristem
(2) Intercalary meristem
(3) Apical meristem
(4) Parenchyma
- Q.183** If a diploid cell is treated with colchicine then it becomes :-
(1) Triploid (2) Tetraploid
(3) Diploid (4) Monoploid
- Q.184** What is the reason of formation of embryoid from pollen grain in tissue culture medium
(1) Cellular totipotency
(2) Organogenesis
(3) Double fertilization
(4) Test tube culture
- Q.185** A plant of F_1 -generation with genotype "AABbCC". On selfing of this plant what is the phenotypic ratio in F_2 -generation :-
(1) 3 : 1
(2) 1 : 1
(3) 9 : 3 : 3 : 1
(4) 27 : 9 : 9 : 9 : 3 : 3 : 3 : 1
- Q.186** In a DNA percentage of thymine is 20% then what is the percentage of guanine :-
(1) 20% (2) 40%
(3) 30% (4) 60%
- Q.187** A diseased man marries a normal woman. They get three daughter and five sons. All the daughter were diseased and sons were normal. The gene of this disease is :-
(1) Sex linked dominant
(2) Sex linked recessive
(3) Sex limited character
(4) Autosomal dominant
- Q.188** Out of 64 codons, 61 codons code for 20 types of amino acid it is called :-
(1) Degeneracy of genetic code
(2) Overlapping of gene
(3) Wobbling of codon
(4) Universality of codons
- Q.189** Jacob and Monod studied lactose metabolism in *E.Coli* and proposed operon concept. Operon concept applicable for :-
(1) All prokaryotes
(2) All prokaryotes and some eukaryotes
(3) All prokaryotes and all eukaryotes
(4) All prokaryotes and some protozoanes
- Q.190** Collagen is :-
(1) Fibrous protein (2) Globular protein
(3) Lipid (4) Carbohydrate



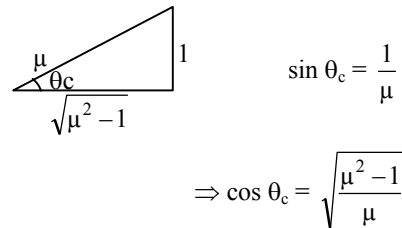
- Q.191** Lipids are insoluble in water because lipids molecules are : -
(1) Hydrophilic (2) Hydrophobic
(3) Neutral (4) Zwitter ions
- Q.192** Exon part of m-RNAs have code for : -
(1) Protein (2) Lipid
(3) Carbohydrate (4) Phospholipid
- Q.193** Which of the following statement is true : -
(1) Vessels are multicellular and with wide lumen
(2) Tracheids are multicellular and with narrow lumen
(3) Vessels are unicellular and with narrow lumen
(4) Tracheids are unicellular and with wide lumen
- Q.194** Which of the following enzymes are used to join bits of DNA : -
(1) Ligase
(2) Primase
(3) DNA polymerase
(4) Endonuclease
- Q.195** Which of the following crops have been brought to India from New world : -
(1) Cashewnut, potato, rubber
(2) Mango, tea
(3) Tea, rubber, mango
(4) Coffee
- Q.196** Manipulation of DNA in genetic engineering became possible due to the discovery of : -
(1) Restriction endonuclease
(2) DNA ligase
(3) Transcriptase
(4) Primase
- Q.197** There are three genes a, b and c. The percentage of crossing over between a and b is 20%, b and c is 28% and a and c is 8%. What is the sequence of genes on chromosome
(1) b, a, c (2) a, b, c
(3) a, c, b (4) None
- Q.198** Which of the following reunites the exon segments after RNA splicing : -
(1) RNA polymerase
(2) RNA primase
(3) RNA ligase
(4) RNA proteases
- Q.199** Introduction of food plants developed by genetic engineering is not desirable because -
(1) Economy of developing countries may suffer
(2) These products are less tasty as compared to the already existing products
(3) This method is costly
(4) There is danger of coming viruses, allergens and toxins with introduced crop
- Q.200** Nucleus of a donor embryonal cell/somatic cell is transferred to an enucleated egg cell. Then after the formation of organism, what shall be true : -
(1) Organism will have extranuclear genes of the donor cell
(2) Organism will have extra nuclear genes of recipient cell
(3) Organism will have extra nuclear genes of both donor and recipient cell
(4) Organism will have nuclear genes of recipient cell

ANSWER KEY (AIPMT-2002)

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

HINTS & SOLUTIONS

1. $\therefore T = 2\pi\sqrt{\frac{m}{K}} \Rightarrow K \propto \frac{1}{T^2}$
 In this case $K = K_1 + K_2$
 $\frac{1}{t_0^2} = \frac{1}{t_1^2} + \frac{1}{t_2^2} \Rightarrow t_0^{-2} = t_1^{-2} + t_2^{-2}$



2. For damped oscillation amplitude $A = A_0 e^{-bt}$
 $\frac{A_0}{3} = A_0 e^{-b(100T)} \Rightarrow e^{-100bT} = \frac{1}{3}$
 at $t = 200T$, $A = A_0 e^{-b(200T)} = A_0 (e^{-100bT})^2$
 $\Rightarrow A = A_0 \left(\frac{1}{3}\right)^2 = \frac{A_0}{9}$

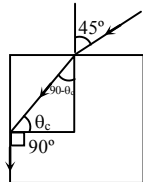
Alternate solution (objective method)
 for given condition $\mu = \sqrt{1 + \sin^2 \theta}$
 $\Rightarrow \mu = \sqrt{1 + \sin^2 45^\circ} = \mu = \sqrt{1 + \frac{1}{2}} = \sqrt{\frac{3}{2}}$

3. Density of iron is more than Aluminium.

6. Extreme position Mean position Extreme position
 $x = -a$ $x = 0$ $x = +a$
 P.E. (max) K.E. (Max.) (P.E.) Max.

4. For given condition snell's law give

1. $\sin 45^\circ = \mu \sin (90 - \theta_c)$



$\frac{1}{\sqrt{2}} = \mu \cos \theta_c = \sqrt{\mu^2 - 1}$
 $\Rightarrow \mu^2 = 1 + \frac{1}{2} \Rightarrow \mu^2 = \frac{3}{2} \Rightarrow \mu = \sqrt{\frac{3}{2}}$

9. $\therefore \lambda = \frac{h}{mv} \quad \therefore \lambda \propto \frac{1}{m}$

13. Smooth surface is given so rolling motion is not possible. Sphere will perform linear motion.

14. For the aperture, limit of resolution -

$\frac{y}{D} \geq \frac{\lambda}{d} \Rightarrow y \geq \frac{\lambda D}{d}$
 $y \geq \frac{5 \times 10^{-7}}{2 \times 10^{-3}} \times 50 \geq 1.25 \text{ cm.}$

15. For image formation $f \leq d/4$

18. $P \propto (T^4 - T_0^4)$

$$\frac{P_2}{P_1} = \frac{(1500)^4 - (500)^4}{(1000)^4 - (500)^4} = \frac{500^4(3^4 - 1)}{500^4(2^4 - 1)}$$

$$\frac{P_2}{60} = \frac{80}{15} \Rightarrow P_2 = 320 \text{ W}$$

19. Use $\frac{dQ}{dt} = \frac{KA}{L} (T_1 - T_2)$

20. $\%n = \left(1 - \frac{T_2}{T_1}\right) \times 100$

For 50% $\frac{50}{100} = 1 - \frac{500}{T_1} \Rightarrow T_1 = 1000 \text{ K}$

For 60% $\frac{60}{100} = 1 - \frac{T_2}{1000} \Rightarrow T_2 = 400 \text{ K}$

23. $\vec{a} = \frac{\vec{F}}{m} = 2t^2\hat{i} + \frac{4}{3}t\hat{j}$

$$d\vec{v} = (2t^2\hat{i} + \frac{4}{3}t\hat{j})dt$$

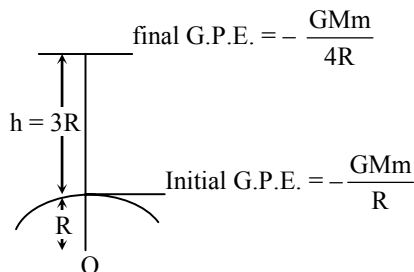
Integrate on both sides

$$\vec{v} = 2\left[\frac{t^3}{3}\right]\hat{i} + \frac{4}{3}\left[\frac{t^2}{2}\right]\hat{j}$$

at $t = 3 \text{ sec.}$ $\vec{v} = \frac{2}{3}(3)^3\hat{i} + \frac{4}{6}(3)^2\hat{j}$

$$= 18\hat{i} + 6\hat{j}$$

24.

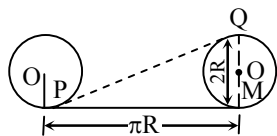


Change in G.P.E. = final energy - initial energy

$$= -\frac{GMm}{4R} + \frac{GMm}{R} = \frac{GMm}{R} \left[1 - \frac{1}{4}\right]$$

$$= \frac{3}{4} \frac{GMm}{R} = \frac{3}{4} \frac{GM}{R^2} mR = \frac{3}{4} gmR$$

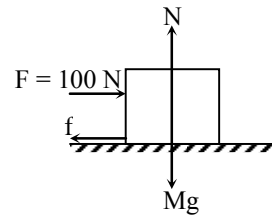
25.



$$\text{displacement } PQ = \sqrt{(PM)^2 + (QM)^2}$$

$$= \sqrt{(\pi R)^2 + (2R)^2} = \sqrt{\pi^2 + 4} \quad (\because R = 1\text{m})$$

26. $f_{\max} = \mu N = \mu Mg = (0.5)(10)(10) = 50 \text{ N}$



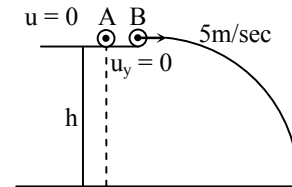
$$\Rightarrow a = \frac{\text{net force}}{\text{mass}}$$

$$= \frac{100 - 50}{10}$$

$$= 5 \text{ m/sec}^2$$

27. $T = m(g + a) = 1000(9.8 + 1) = 10,800 \text{ N}$

28.



For particle (A)

$$h = \frac{1}{2}gt^2$$

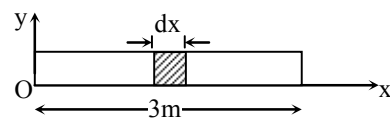
$$t_A = \sqrt{\frac{2h}{g}}$$

For particle (B) In vertical direction

Use $s = ut + \frac{1}{2}at^2$

$$\Rightarrow h = \frac{1}{2}gt_B^2 \Rightarrow t_B = \sqrt{\frac{2h}{g}}$$

29.



Here $\rho = kx$ where k is a constant mass of small element of dx length is

$$dm = kx \cdot dx$$

$$x_{\text{cm}} = \frac{\int x \cdot dm}{\int dm} = \frac{\int_0^3 x(x \cdot dx)}{\int_0^3 x \cdot dx} = \frac{\left[\frac{x^3}{3}\right]_0^3}{\left[\frac{x^2}{2}\right]_0^3} = \frac{\frac{27}{3}}{\frac{9}{2}} = 2$$

30.

$$P_1 = \sqrt{2mE_1}; P_2 = \sqrt{2mE_2}$$

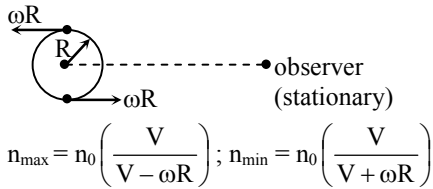
$$= \sqrt{2m\left(E_1 + \frac{300}{100}E_1\right)} = \sqrt{2m(4E_1)} = 2P_1$$



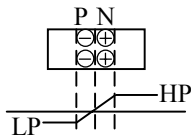
$$\% \text{ change} = \frac{P_2 - P_1}{P_1} \times 100 = \frac{2P_2 - P_1}{P_1} \times 100 = 100\%$$

31. $\beta = \frac{\alpha}{1 - \alpha} = 24$

33.



34.



37. The value of ρ does not depend on geometry but increases with increase in temperature.

38. In A.C. circuit power loss $P = VI \cos \phi$
 $P = VI = I^2 R$ ($\because \phi = 0$ at resonance)

39. Inside the conductor $E = 0$ so potential remains same.

40. T.P.D (V) = $E - Ir$ (Remember it)

$$V = E - \left(\frac{E}{R+r} \right) r = \frac{ER}{R+r}$$

from given conditions $E = 2.2$ & when $R = 5$ then TPD $V = 1.8$ V

$$\text{therefore } 1.8 = \frac{2.2 \times 5}{5+r} \Rightarrow r = \frac{10}{9} \Omega$$

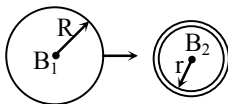
42. $V_{\text{common}} = \frac{C_1 V_1 + C_2 V_2}{C_1 + C_2} = (\because V_2 = 0)$

$$\Rightarrow V_{\text{common}} = \frac{C_1 V}{C_1 + C_2}$$

43. E.P.E = $8 \left[\frac{1}{4\pi \epsilon_0} \frac{(q)(-q)}{(\sqrt{3}b/2)} \right] = \frac{-4q^2}{\sqrt{3}\pi \epsilon_0 b}$

Note : distance between centre to any corner = $\frac{\sqrt{3}b}{2}$

45. $B_1 = B = \frac{\mu_0 I}{2R}$



$$B_2 = \frac{\mu_0 (2I)}{2r}$$

$$\because 2 \times 2\pi r = 2\pi R \quad \therefore r = R/2$$

$$\Rightarrow B_2 = 4 \frac{\mu_0 I}{2R} = 4B$$

46. Lorentz force $\vec{F}_L = \vec{F}_e + \vec{F}_m$
 $= q\vec{E} + q(\vec{v} \times \vec{B})$

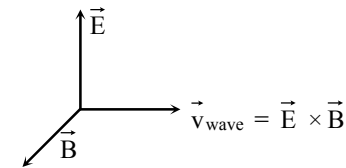
47. $T = 2\pi \sqrt{\frac{1}{MB}} \Rightarrow T \propto \frac{1}{\sqrt{M}}$

case I : $M_1 = 2M + M$

case II : $M_2 = 2M - M$

$$\frac{T_1}{T_2} = \sqrt{\frac{M}{3M}} = \frac{1}{\sqrt{3}} \Rightarrow T_2 = \sqrt{3} T_1$$

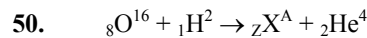
48. For electromagnetic wave



49. $t = nT, X = \frac{X_0}{2^n}, n = \frac{t}{T} = \frac{30}{10} = 3$

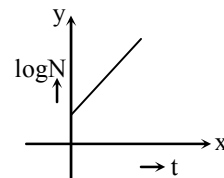
Active nuclei $X = \frac{4 \times 10^{16}}{(2)^3}$ and

decayed nuclei $X = (X_0 - X) = 3.5 \times 10^{16}$



use conservation of charge and mass

120. Rate of increase of bacteria $\rightarrow \frac{dN}{dt}$



$$\frac{dN}{dt} = \mu N \Rightarrow N = N_0 e^{\mu t}$$

$$\Rightarrow \log N = \log N_0 + \mu t$$

$$(y = mx + c ; y = \log N, m = \mu ; x = t)$$