Competishun

52/6, Opposite Metro Mas Hospital, Shipra Path, Mansarovar

Date: 02/09/2024

Time: 3 hours **Max. Marks:** 300

PRATHAM-1 (24-25)_MCT-3

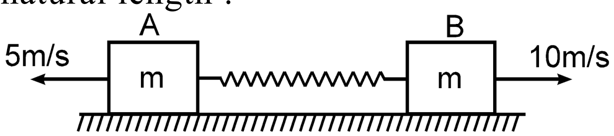
Physics

Single Choice Question

Q1 Force acting on a particle is $\vec{F} = (\alpha y\,\hat{i} + \beta xy\,\hat{j})$. Find the work done by this force , when particle is moved along the line 2x = 3y from origin to the point (3,2) {take all quantities in SI units and $\alpha = 1$, $\beta = 1$}

a) 2 **b)** 7 **c)** 11 **d)** 15

Q2 The two blocks A and B of same mass connected to a spring and placed on a smooth surface. They are given velocities (as shown in the figure) when the spring is in its natural length :



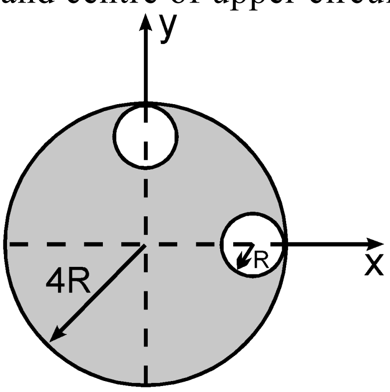
a) the maximum velocity of B will be 10 m/s

b) the maximum velocity of B will be greater than 10 m/s

c) the spring will have maximum extension when A and B both stop

d) the spring will have maximum extension when both move towards left.

Q3 From the uniform disc of radius 4 R two small disc of radius R are cut off. The centre of mass of the new structure will be : (Centre of lower circular cavity lies on x-axis and centre of upper circular cavity lies on y-axis)



a) $\hat{i}\frac{R}{5} + \hat{j}\frac{R}{5}$ **b)** $-\hat{i}\frac{R}{5} + \hat{j}\frac{R}{5}$ **c)** $-\hat{i}\frac{R}{5} - \hat{j}\frac{R}{5}$ **d)** $-\frac{3R}{14}(\hat{i} + \hat{j})$

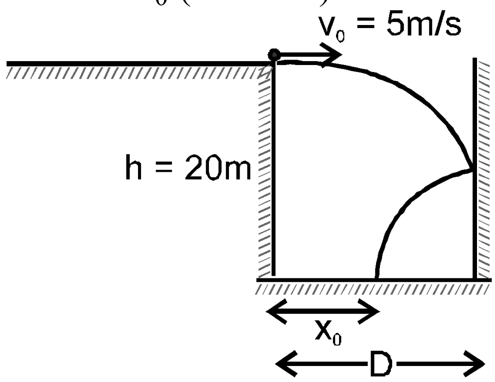
Q4 Two identical particles of same mass, having velocities opposite to each other, equal in magnitude, collide head on. During collision 50% of kinetic energy is lost. Coefficient of restitution is :

a) $\frac{1}{\sqrt{2}}$ **b)** $\frac{1}{2}$ **c)** $\frac{2}{3}$ **d)** $\frac{1}{4}$

Q5 Consider a river of width 100 m. A man who can swim with velocity 4 m/s w.r.t. river, swims in such away that he crosses the river in minimum time. If the velocity of river is 3 m/s, then drift will be :

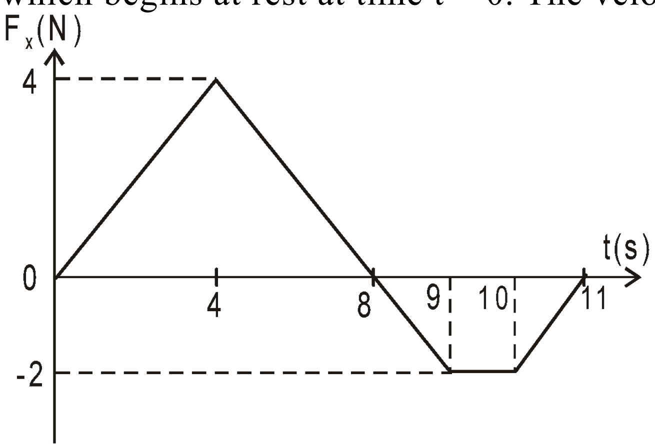
a) 75 m **b)** 100 m **c)** 125 m **d)** 50 m

Q6 A ball leaves a horizontal table with velocity v_0 = 5 m/s. The ball bounces elastically from a vertical wall at a horizontal distance D (= 8m) from the table, as shown in figure. The ball then strikes the floor a distance x_0 from the table ($g = 10\ m/s^2$). The value of x_0 (in metre) is



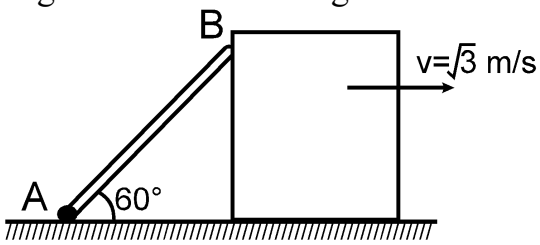
a) 6 **b)** 4 **c)** 8 **d)** 2

Q7 A 2 kg toy car can move along an x axis. Graph shows force F_x, acting on the car which begins at rest at time t = 0. The velocity of the particle at t = 10 s is :



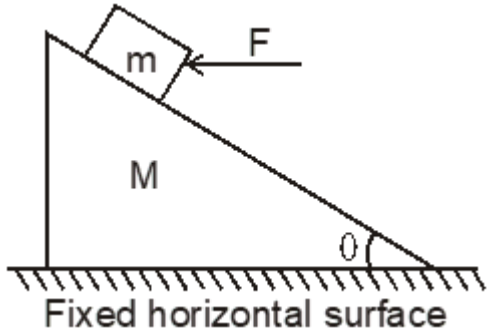
a) – i m/s **b)** – 1.5 i m/s **c)** 6.5 i m/s **d)** 13 i m/s

Q8 A rod AB is shown in figure. End A of the rod is fixed on the ground. Block is moving with velocity $\sqrt{3}$ m/s towards right. The velocity of end B of rod when rod makes an angle of 60° with the ground is:



a) $\sqrt{3}$ m/s **b)** 2 m/s **c)** $2\sqrt{3}$ m/s **d)** 3 m/s

Q9 A block of mass m lies on wedge of mass M, which lies on fixed horizontal surface. The wedge is free to move on the horizontal surface. A horizontal force of magnitude F is applied on block as shown, neglecting friction at all surfaces, the value of force F such that block has no relative motion w.r.t. wedge will be : (where g is acceleration due to gravity)

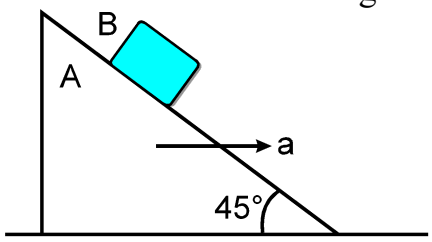


a) $(M + m)\, g \tan\theta$ **b)** $(M + m)\, g \cot\theta$ **c)** $\frac{m}{M}(M + m)\, g \tan\theta$ **d)** $\frac{m}{M}(M + m)\, g \cot\theta$

Q10 A body is projected up a rough inclined plane from the bottom with some velocity. It travels up the incline and then returns back. If the time of ascent is t_a and time of descent is t_d, then

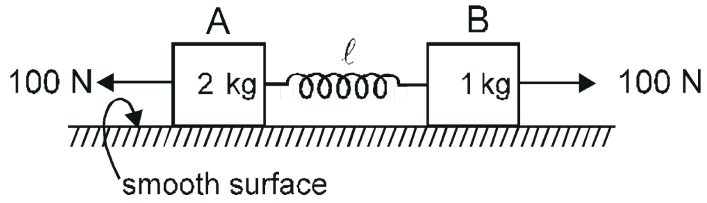
a) $t_a = t_d$ **b)** $t_a > t_d$ **c)** $t_a < t_d$ **d)** data insufficient

Q11 If the coefficient of friction between A and B is μ, the maximum horizontal acceleration of the wedge A for which B will remain at rest w.r.t the wedge is :



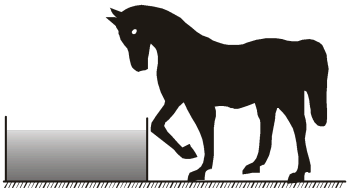
a) μg **b)** $g\left(\frac{1+\mu}{1-\mu}\right)$ **c)** $\frac{g}{\mu}$ **d)** $g\left(\frac{1-\mu}{1+\mu}\right)$

Q12 In the figure shown initially spring is in relaxed state & blocks are at rest. Now 100 N force is applied on block A & B as shown in figure. After some time velocity of 'A' becomes 2 m/s and that of 'B' 4 m/s and block A displaced by amount 10 cm towards left and spring is stretched by amount 30 cm. Then work done by spring force on A will be :



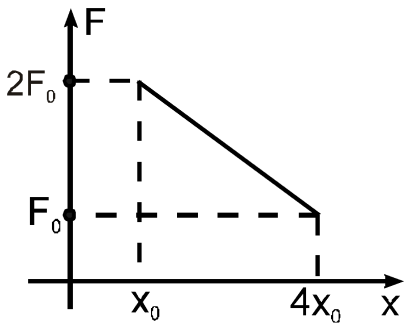
a) 9/3 J **b)** – 6 J **c)** 6 J **d)** None of these

Q13 A horse drinks water from a cubical container of side 1 m. The level of the stomach of horse is at 2 m from the ground. Assume that all the water drunk by the horse is at a level of 2 m from the ground. Then minimum work done by the horse in drinking the entire water of the container is (Take $\rho_{water} = 1000\ kg/m^3$ and $g = 10\ m/s^2$) :



a) 10 kJ **b)** 15 kJ **c)** 20 kJ **d)** zero

Q14 A particle of mass m moving along a straight line experiences force F which varies with the distance x travelled as shown in the figure. If the velocity of the particle at x_0 is $\sqrt{\frac{2F_0 x_0}{m}}$, then velocity at $4x_0$ is:



a) $2\sqrt{\frac{2F_0 x_0}{m}}$ **b)** $2\sqrt{\frac{F_0 x_0}{m}}$ **c)** $\sqrt{\frac{F_0 x_0}{m}}$ **d)** none of these

Q15 A car is travelling at 57.6 km/hr on an unbanked (horizontal) circular road of radius $\frac{160}{3}$ m. If the coefficient of friction between the road and the car is 0.8, then the maximum tangential deceleration that driver of car can achieve by applying the brakes at this moment is : ($g = 10\ m/s^2$)

a) $8\ m/s^2$ **b)** $4.8\ m/s^2$ **c)** $6.4\ m/s^2$ **d)** $16\ m/s^2$

Q16 Force exerted by the floor of a lift on the foot of a boy standing on it is more than the actual weight of the boy if the lift is moving

a) down and speed is increasing **b)** up and speed is decreasing

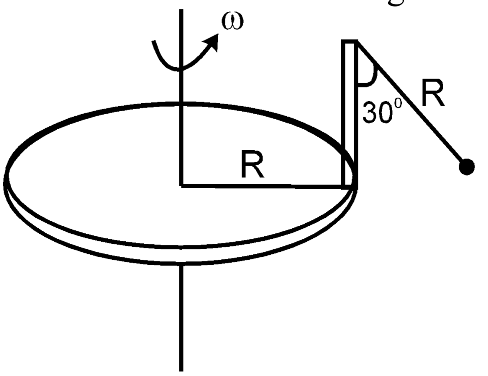
c) up and speed is decreasing **d)** down and speed is decreasing

Q17 An engine can pull 4 coaches at a maximum speed of 20 m/s. Mass of the engine is twice the mass of every coach. Assuming resistive forces to the proportional to the weight, approximate maximum speeds of the engine when it pulls 12 and 6 coaches are

a) 8.5 m/s and 15 m/s respectively **b)** 6.5 m/s and 8 m/s respectively

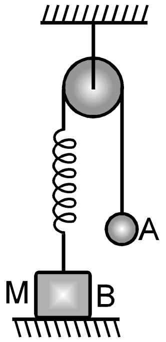
c) 8.5 m/s and 13 m/s respectively **d)** 10.5 m/s and 15 m/s respectively

Q18 A disc of radius R has a light pole fixed perpendicular to the disc at the circumference which in turn has a pendulum of length R attached to its other end as shown in figure. The disc is rotated with a constant angular speed ω. The string is making an angle 30^0 with the rod. Then the angular speed ω of disc is:



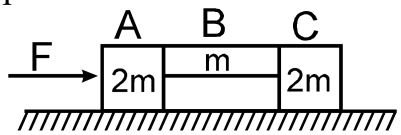
a) $\left(\frac{\sqrt{3}\,g}{R}\right)^{1/2}$ **b)** $\left(\frac{\sqrt{3}\,g}{2\,R}\right)^{1/2}$ **c)** $\left(\frac{g}{\sqrt{3}\,R}\right)^{1/2}$ **d)** $\left(\frac{2\,g}{3\sqrt{3}\,R}\right)^{1/2}$

Q19 In the Figure, the ball A is released from rest when the spring is at its natural length. For the block B, of mass M to leave contact with the ground at some stage, the minimum mass of A must be:



a) 2 M **b)** M **c)** M/2 **d)** A function of M and the force constant of the spring.

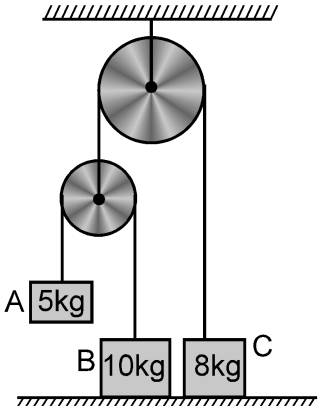
Q20 The system is pushed by a force F as shown in figure. All surfaces are smooth except between B and C. Friction coefficient between B and C is μ. Minimum value of F to prevent block B from downward slipping is



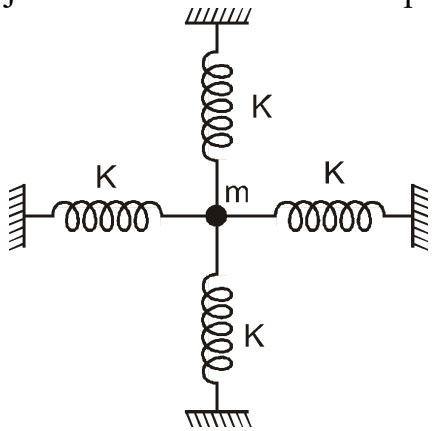
a) $\left(\frac{3}{2\mu}\right)mg$ **b)** $\left(\frac{5}{2\mu}\right)mg$ **c)** $\left(\frac{5}{2}\right)\mu mg$ **d)** $\left(\frac{3}{2}\right)\mu mg$

Numerical

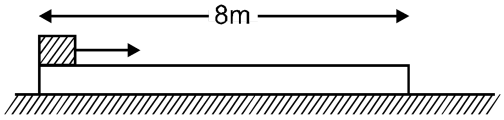
Q21 In the following arrangement the system is initially at rest. The 5 kg block is now released. Assuming the pulleys and string to be massless and smooth. If the acceleration of block 'C' is $\frac{x}{10}$ m/s^2, then find value of x. Take g = 9.8 m/s^2.



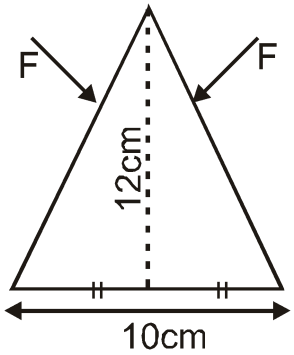
Q22 Figure shows a particle of mass m attached with 4 identical springs each of spring constant K and each of which are initially in their natural length L. The gravitational force is neglected. If the mass is slightly displaced by distance x along a line perpendicular to the plane of the figure and released then the force acting on particle just when it is released is proportional to x^n, find n.



Q23 A small block is projected with some speed on a large block of same mass & of length 8m as shown in figure. Initially larger block is at rest. Friction is present only between the blocks. When the relative motion ends between the blocks, the small block is at the rightmost edge of the larger block. What is the displacement (in m) of the lower block w.r.t. earth in this time ?

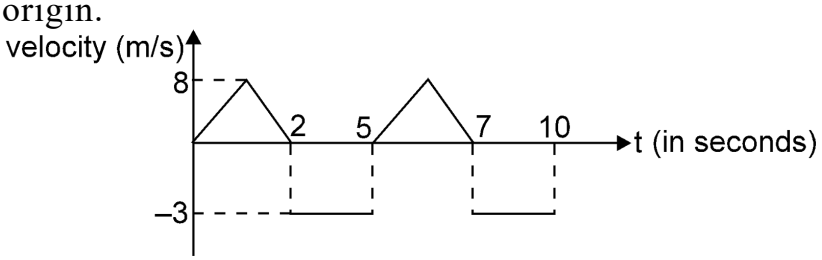


Q24 A person is holding a uniform triangular wedge of mass 0.5 kg to avoid its motion under gravity as shown in figure. The static friction coefficient between person's both fingers and the wedge is $\mu_S = 0.5$. The minimum normal force that person must apply with each finger in order to hold up the wedge is $\frac{13x}{2}$ N. Find X (consider no rotation)



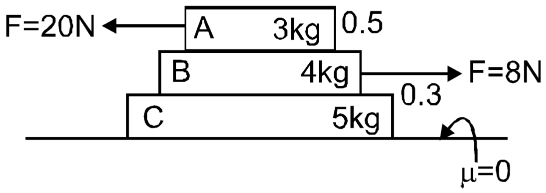
Q25 A person standing on the bank of a river wants to cross the river in minimum possible time. Find the distance (in km) travelled by the person with respect to ground when he reaches the opposite bank of the river.
Width of river = 1km
Speed of river flow = 10 m/sec
Swimming capacity of man in still water = $\frac{10}{\sqrt{3}}$ m/sec

Q26 A particle moves along X axis. At t = 0 it was at x = – 1. It's velocity varies with time as shown in the figure. Find the number of times the particle passes through the origin.

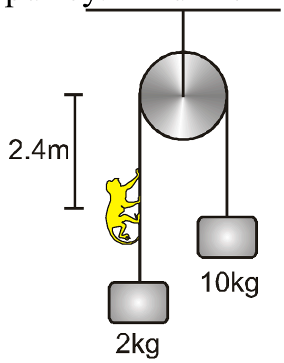


Q27 A small block is projected up from the bottom of a fixed incline, inclined at 60° from the horizontal. Coefficient of friction between the block & the incline is $\frac{\sqrt{3}}{2}$. If the ratio of descending time to ascending time is λ then find the value of λ^2 ?

Q28 In the situation shown coefficient of friction between A and B is 0.5 and between B and C is 0.3. Friction acting between B and C is xN then $\frac{9x}{7}$ is :



Q29 Two blocks of mass 10 kg and 2 kg respectively are connected by an ideal string passing over a fixed smooth pulley as shown in figure. A monkey of mass 8 kg started climbing the string with a constant acceleration of 2 m/s^2 with respect to string at t = 0. Initially the system is in equilibrium and monkey is at a distance 2.4 from the pulley. Find the time taken by monkey to reach the pulley in sec.



Q30 A particle is moving in xy plane. Its velocity and acceleration at any certain instant is given by $\vec{v} = 3\hat{i} + 4\hat{j}$ m/s and $\vec{a} = 5\hat{i} + \frac{15}{4}\hat{j}$. Find the rate of change of speed (in m/s^2) of particle at that instant.

Chemistry

Single Choice Question

Q31 The period number in the long form of the periodic table is equal to :

a) magnetic quantum number of any element of the period.

b) atomic number of any element of the period.

c) maximum Principal quantum number of any element of the period.

d) maximum Azimuthal quantum number of any element of the period.

Q32 You are given 4.9 % w/v aqueous solution of H_2SO_4 of density 1.49 g/ml, then which is **INCORRECT** option?

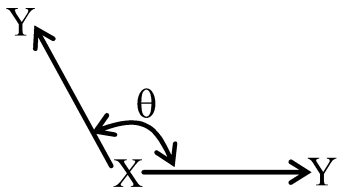
a) molarity (M) of the solution = 0.5 M **b)** strength = 49 g/litre

c) % by weight of H_2SO_4 = 40% **d)** concentration of H^+ion = 1 M

Q33 Consider the ground state of Cr atom (Z = 24). The numbers of electrons with the azimuthal quantum numbers, $\ell = 1$ and 2 are, respectively :

a) 16 and 5 **b)** 12 and 5 **c)** 16 and 4 **d)** 12 and 4

Q34 Which of the following value θ is correspond to the maximum dipole moment of the triatomic molecule XY_2



a) θ = 90º **b)** θ = 120º **c)** θ = 150º **d)** 180º

Q35 Lattice energy of $BeCO_3$ (I) , $MgCO_3$ (II) and $CaCO_3$ (III) are in the order -

a) I > II > III **b)** I < II < III **c)** I < III < II **d)** II < I < III

Q36 Among the interhalide species

IF_2^{Θ}, IF_3, IF_4^{Θ} and IF_7

a) All iodine centres are either sp^3d or sp^3d^2 hybridised

b) The minimum angular separation between fluorine atoms is 60°

c) The anionic species are both isoelectronic and isostructural to XeF_2 and XeF_4

d) There is no species having a single lone pair of electrons

Q37 Number of sigma bonds in P_4O_{10} is

a) 6 **b)** 7 **c)** 17 **d)** 16

Q38 Which of the following is generally true regarding effective nuclear charge (Z_{eff}) :

a) It increases on moving left to right in a period.

b) It remains almost constant on moving top to bottom in a group.

c) For isoelectronic species, as Z increases, Z_{eff} decreases.

d) Both (A) and (B).

Q39 The maximum covalency of representative elements is equal to (excluding 1st and 2nd period) :

a) the number of unpaired p-electrons

b) the number of paired d-electrons

c) the number of unpaired s and p-electrons

d) the actual number of s and p-electrons in the outermost shell.

Q40 Which of the following sequences represent the correct increasing order of bond angles in the given molecules ?

a) $ClO_2 < OF_2 < OCl_2 < H_2O$

b) $OF_2 < H_2O < OCl_2 < ClO_2$

c) $OCl_2 < ClO_2 < H_2O < OF_2$

d) $H_2O < OF_2 < OCl_2 < ClO_2$

Q41 Which of the following sets of quantum numbers can be correct for an electron in 4f-orbital :

a) $n = 4, \ell = 3, m = -2, s = 0$

b) $n = 4, \ell = 3, m = +4, s = -\frac{1}{2}$

c) $n = 4, \ell = 3, m = +1, s = +\frac{1}{2}$

d) $n = 4, \ell = 2, m = -4, s = +\frac{1}{2}$

Q42 The quantum numbers $+\frac{1}{2}$ and $-\frac{1}{2}$ for the electron spin represent :

a) Rotation of the electron in clockwise and anticlockwise direction respectively.

b) Rotation of the electron in anticlockwise and clockwise direction respectively.

c) Magnetic moment of the electron pointing up and down respectively.

d) Two quantum mechanical spin states which have no classical analogue.

Q43 Orbital angular momentum of an electron is $\sqrt{3}\frac{h}{\pi}$. Then, the number of orientations of this orbital in space are :

a) 3 **b)** 5 **c)** 7 **d)** 9

Q44 In the electronic configuration of Mn(Z = 25) is :

a) The number of electrons having $n + \ell = 4$ is 5

b) The number of electrons having m = 0 is 13

c) The magnetic moment is 1.73 BM

d) Mn belongs to IIIrd period and d-Block in periodic table.a

Q45 Which of the following molecules/ ions do not contain any unpaired electrons?

a) O_2^{2-} **b)** B_2 **c)** N_2^+ **d)** O_2

Q46 Which is correct about the cyclic silicate $[Si_6O_{18}]^{n-}$:

a) The value of n is 12

b) each Si atom is bonded with three oxygen atoms

c) each oxygen atom is bonded with two Si atoms

d) all the above are correct.

Q47 The no. of S-O-S bonds in the trimer of SO_3 is

a) 1 **b)** 2 **c)** 3 **d)** None of these

Q48 Which one of the following statements is incorrect in relation to ionisation enthalpy ?

a) Ionization enthalpy increases for each successive electron.

b) The greatest increase in ionization enthalpy is experienced on removal of electron from core of noble gas configuration.

c) End of valence electrons is marked by a big jump in ionization enthalpy.

d) Removal of electron from orbitals bearing lower n value is easier than from orbitals having higher n value.

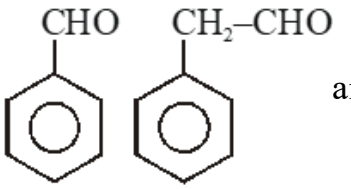
Q49 Match the column-I with the correct name column-II and choose the correct option.

Column-I	**Column-II**
(P) Na_3BO_3	(i) Sodium metaborate
(Q) $NaBO_2$	(ii) Magnesiumpermanganate
(R) $MgMnO_4$	(iii) Magnesiummanganate
(S) $Mg(MnO_4)_2$	(iv) Sodiumborate

a) P→(i); Q→ (ii); R→ (iii); S→ (iv) **b)** P→ (iv); Q→ (i); R→ (iii); S→ (ii)

c) P→ (iv); Q→ (i); R→ (ii); S→ (iii) **d)** P→ (i); Q→ (iv); R→ (iii); S→ (ii)

Q50



and can be distinguished by :

a) Iodoform test **b)** Tollen's test **c)** Fehling solution test **d)** 2,4-DNP test

Numerical

Q51 An excited hydrogen atom when comes directly to ground state, emits a photon which when falls on a metal surface causes the emission of a photoelectron with de Broglie wavelength 4.09Å. If work function of metal is 3.75 eV, then find out number of orbit of hydrogen atom in which electron was present in excited state.

Q52 If the lowest energy x-rays have $\lambda = 4.0 \times 10^{-8}$ m, at what z (minimum) would a transition from the second energy level to the first result in the emission of X-ray ? (Assuming that the electrons in other shells exert no influence)

Q53 Atoms of elements A, B and C combine to form a compound in the atomic ratio of 1 : 6 : 2. Atomic masses of A, B and C are 64, 9 and 16 amu, respectively. The maximum mass of the compound (in g) formed from 1.28 g of A, 3.0×10^{23} atoms of B and 0.04 mole atom of C is

Q54 $KO_2 + H_2O \longrightarrow KOH + H_2O_2 + O_2$

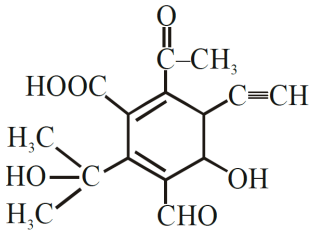
28.4g KO_2, when treated with excess H_2O, gives only 0.34g H_2O_2 according to the above reaction.

Determine the % yield of H_2O_2.

Q55 How many structural isomeric cyclic ether are possible having molcecular formula C_4H_8O :

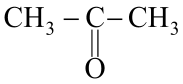
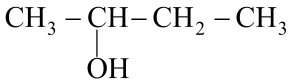
Q56 A mixture of methane, propane and carbon monoxide contain 36.5% propane by volume. If its 200 ml are burnt in excess of O_2, the volume (in ml) of CO_2 formed is :

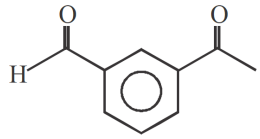
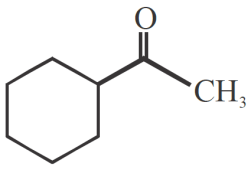
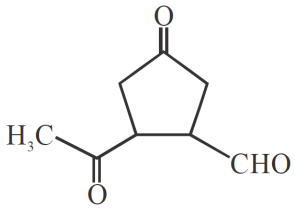
Q57 Consider the following molecule.



(a) moles of H_2 evolved after reaction with Na.
(b) number of site where lucas reagent will react.
(c) number of site where neutral $FeCl_3$ will react.
(d) moles of $-CO_2$ evolved on reaction with $NaHCO_3$.
(e) number of site where tollen's reagent will react.
Report your answer as a + b + c + d + e

Q58 How many compounds will give positive iodoform test but negative Tollen's test ?

(a) CH_3CHO (b)  (c) 

(d)  (e)  (f) 

Q59 A vessel of volume 5 litre contains 1.4 g of nitrogen at a temperature 1800 K. The pressure (in atm) of the gas if 30% of its molecules are dissociated into atoms at this temperature is : (nearest integer)

Q60 Calculate the molecular weight of the lowest hydrcarbon which contains sp & sp^2 hybridised carbon atoms only.

Mathematics

Single Choice Question

Q61 If the line ax + by = 1 passes through point of intersection of y = x tan α + p sec α, y sin (30° – α) – x cos (30° – α) = p and is inclined at 30° with y = tan α x, then the value of $a^2 + b^2$ can be -

a) $\frac{1}{p^2}$ **b)** $\frac{2}{p^2}$ **c)** $\frac{3}{2p^2}$ **d)** $\frac{3}{4p^2}$

Q62 If the straight line passes through the point P(3, 4) which makes an angle $\frac{\pi}{6}$ with X–axis and meets the line 12x + 5y + 10 = 0. Then the length of PQ is

a) $\frac{132}{12\sqrt{3}+5}$ **b)** $\frac{132}{12\sqrt{3}-5}$ **c)** $\frac{132}{\sqrt{3}+5}$ **d)** None of these

Q63 $\frac{cos20^o+8sin70^o sin50^o sin10^o}{sin^2 80^o}$ is equal to-

a) 1 **b)** 2 **c)** 3/4 **d)** 5/4

Q64 If $ax^2 + bx + c = 0$ and $cx^2 + bx + a = 0$ (a, b, c ∈ R) have a common non-real roots, then

a) $-2|a| < 5b < 2|a|$ **b)** $-2|c| < b < 2|c|$ **c)** $a = \pm c$ **d)** None of the above

Q65 Number of values of x for which $\frac{8^x+27^x}{12^x+18^x} = \frac{7}{6}$

a) 2 **b)** 3 **c)** 1 **d)** no value of x

Q66 If α and β are roots of the equation $ax^2 + bx + c = 0$ then roots of the equation $a(2x + 1)^2 – b(2x + 1)(3 – x) + c(3 – x)^2 = 0$ are:

a) $\frac{2\alpha+1}{\alpha-3}, \frac{2\beta+1}{\beta-3}$ **b)** $\frac{3\alpha+1}{\alpha-2}, \frac{3\beta+1}{\beta-2}$ **c)** $\frac{2\alpha-1}{\alpha-2}, \frac{2\beta+1}{\beta-2}$ **d)** None of these

Q67 $\left|x + \frac{2}{x}\right| < 3$, then x belongs to

a) $(-2, -1) \cup (1, 2)$ **b)** $(-\infty, -2) \cup (-1, 1) \cup (2, \infty)$ **c)** $(-2, 2)$ **d)** $(-3, 3)$

Q68 How many 6 digit number can be formed using the digit 1, 2, 3, 4, 5 and 6 that have at least two of the digits the same:

a) $6(6^5 – 5!)$ **b)** 6^6 **c)** 6! **d)** $6^6 – 5!$

Q69 If tan (cot x) = cot(tan x), then sin 2x =

a) $(2n + 1)\frac{\pi}{4}$ **b)** $\frac{4}{(2n+1)\pi}$ **c)** $4\pi(2n + 1)$ **d)** None of these

Q70 The sum to infinity of the series $1 + \frac{4}{5} + \frac{7}{5^2} + \frac{10}{5^3} + \ldots\ldots$ is

a) $\frac{16}{35}$ **b)** $\frac{11}{8}$ **c)** $\frac{35}{16}$ **d)** $\frac{8}{6}$

Q71 The maximum sum of the A.P. 40, 38, 36, 34,….is

a) 390 **b)** 420 **c)** 460 **d)** None of these

Q72 The sum of the series

$\frac{1}{3.5}+\frac{1}{5.7}+\frac{1}{7.9}+\ldots..$ upto ∞ is equal to-

a) 1/3 **b)** $\frac{1}{2}$ **c)** 1/6 **d)** 5/6

Q73 The number of terms in $\left(x^3+1+\frac{1}{x^3}\right)^{100}$ is

a) 300 **b)** 200 **c)** 100 **d)** 201

Q74 The expression $\left(x+\sqrt{x^3-1}\right)^5+\left(x-\sqrt{x^3-1}\right)^5$ is a polynomial of degree

a) 7 **b)** 6 **c)** 5 **d)** 15

Q75 The largest term in the expansion of $(3+2x)^{50}$, where x = 1/5, is

a) 5^{th} **b)** 6^{th} **c)** 8^{th} **d)** 9^{th}

Q76 The number of different words of three letters which can be formed from the word "PROPOSAL", if a vowel is always in the middle are

a) 53 **b)** 52 **c)** 63 **d)** 32

Q77 If x^2+px+1 is a factor of ax^3+bx+c $(c \neq 0)$ then

a) $a^2+c^2=-ab$ **b)** $a^2-c^2=-ab$ **c)** $a^2-c^2=ab$ **d)** None of these

Q78 Let t_n be n^{th} term of a sequence $\frac{1^3}{1}+\frac{1^3+2^3}{1+2}+\frac{1^3+2^3+3^3}{1+2+3}+\frac{1^3+2^3+3^3+4^3}{1+2+3+4}+\ldots\ldots.$ Then value of $\sum_{n=1}^{\infty}\frac{1}{t_n}$ is

a) 3 **b)** 2 **c)** 4 **d)** None of these

Q79 If $2\sin^2((\pi/2)\cos^2 x)=1-\cos(\pi\sin 2x)$, $x \neq (2n+1)\pi/2$, $n \in I$, then cos 2x is equal to

a) 1/5 **b)** 3/5 **c)** 4/5 **d)** 1

Q80 The general solution of the equation $1+\cot\theta=\operatorname{cosec}\theta$ is

a) $2n\pi \pm \frac{\pi}{4}+\frac{\pi}{4}$ **b)** $n\pi+(-1)^n\frac{\pi}{4}+\frac{\pi}{4}$ **c)** $2n\pi+\frac{\pi}{2}$ **d)** None of these

Numerical

Q81 ABC is a variable triangle such that A is (1, 2), B & C lie on the line $y=x+\lambda$ (λ is variable) then locus of orthocentre of ΔABC is $x+y=p$ than value of p is -

Q82 The area (in sq. units) enclosed by the graphs of $|x + y| = 2$ and $|x| = 1$ is

Q83 If x, y, z be positive real numbers such that $\log_{2x} z = 3$, $\log_{5y} z = 6$ and $\log_{xy} z = 2/3$ then the value of z is in the form of m/n in lowest form then find value of n – m

Q84 Find the sum to infinity of a decreasing G.P. with the common ratio x such that $|x| < 1$; $x \neq 0$. The ratio of the fourth term to the second term is $\frac{1}{16}$ and the ratio of third term to the square of the second term is $\frac{1}{9}$

Q85 No. of terms with integral coefficients in expansion of $(5^{1/3} - 3^{1/4} x^2)^{296}$ is 4k + 1 then k equals

Q86 If the fourth term in the binomial expansion of $\left(\sqrt{\frac{1}{x^{1+\log_{10} x}}} + x^{\frac{1}{12}}\right)^6$ is equal to 200, and $x > 1$, then the value of x is:

Q87 The term independent of 'x' in the expansion of $\left(\frac{1}{2}x^{1/3} + x^{-1/5}\right)^8$ will be

Q88 If both roots of equation $4x^2 - 20px + 25p^2 + 15p - 66 = 0$ are greater than 2, then sum of all possible integral values of p is ––

Q89 If a linear polynomial function f(x) with leading coefficient positive satisfying the condition $f(f(x)) = 4x + 9$ then $f(2) + 1$ will be equal to

Q90 Let range of expression $\frac{x-2}{x^2-x+2}$ is $[\alpha, \beta]$ $\forall$ $x \in R$, then value of $10|\alpha| + 7|\beta|$ is

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**B**	**A**	**D**	**A**	**A**	**A**	**C**	**B**	**C**	**C**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**B**	**B**	**B**	**D**	**C**	**D**	**A**	**D**	**C**	**B**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**7**	**3**	**4**	**5**	**2**	**4**	**3**	**5**	**2**	**6**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**C**	**C**	**B**	**A**	**A**	**C**	**D**	**D**	**D**	**B**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**C**	**D**	**C**	**B**	**A**	**A**	**C**	**D**	**B**	**C**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**4**	**2**	**3**	**5**	**6**	**346**	**7**	**3**	**2**	**40**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**D**	**A**	**B**	**B**	**A**	**B**	**A**	**A**	**B**	**C**
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	**B**	**C**	**D**	**A**	**B**	**A**	**C**	**B**	**B**	**C**
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	**3**	**8**	**9**	**12**	**6**	**10**	**7**	**7**	**8**	**11**