Competishun

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

Date: 01/07/2024

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

PRATHAM-1_(24-25)-MCT-2

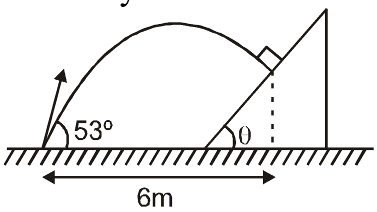
Physics

Single Choice Question

Q1 The maximum height attained by a projectile is increased by 5%, keeping the angle of projection constant, what is the percentage increase in horizontal range?

a) 5% **b)** 10% **c)** 20% **d)** 40%

Q2 A particle is projected with a speed 10 m/s as shown in figure. The particle strikes normally on the inclined plane. Then angle θ is : (g = 10 m/s^2)

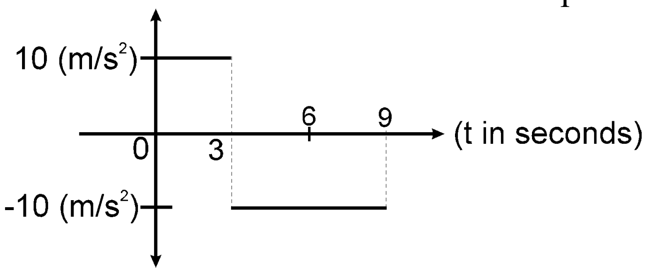


a) $\tan^{-1}1$ **b)** $\tan^{-1}3$ **c)** $\tan^{-1}2$ **d)** $\tan^{-1}\frac{4}{3}$

Q3 A block is kept on a smooth inclined plane of angle of inclination θ that moves with a constant horizontal acceleration so that the block does not slide relative to the inclined plane. If the inclined plane stops, the normal contact force offered by the plane on the block changes by the factor

a) $\cos\theta$ **b)** $\sec^2\theta$ **c)** $\sin^2\theta$ **d)** $\sin\theta$

Q4 A particle starts moving along a straight lines at t = 0. Its acceleration-time graph is shown. Correct relation between magnitudes of displacements between time durations t = 2s to t = 3s and t = 7s to t = 8s represented by S_{23} and S_{78} respectively is :

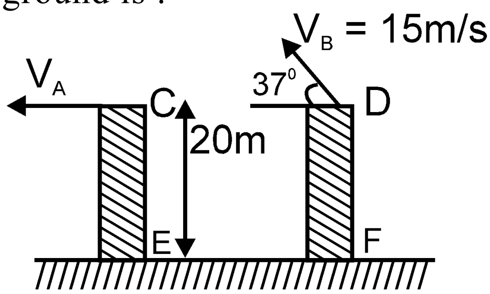


a) $S_{23} > S_{78}$ **b)** $S_{78} > S_{23}$ **c)** $S_{23} = S_{78}$ **d)** insufficient information to decide

Q5 The engine of a futuristic nuclear powered car for which power and speed can have fantastic values (say 600 kph) can produce a maximum acceleration of 5 m/s^2 and its brakes can produce a maximum retardation of 10 m/s^2. The minimum time in which a person can reach his workplace, located 1.5 km away from his home using this car

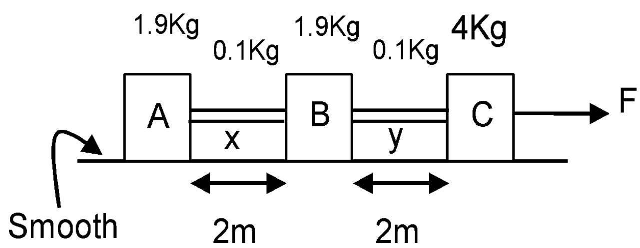
a) 5 sec **b)** 10 sec **c)** 15 sec. **d)** 30 sec

Q6 CE and DF are two walls of equal height (20 meter) from which two particles A and B of same mass are projected as shown in the figure. A is projected horizontally towards left while B is projected at an angle 37^0 (with horizontal towards left) with velocity 15 m/sec. If A always sees B to be moving perpendicular to EF, then the range of A on ground is :



a) 24 m **b)** 30 m **c)** 26 m **d)** 28 m

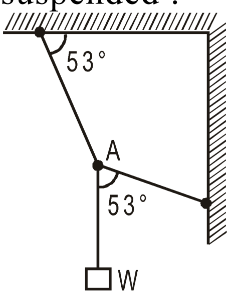
Q7 Three blocks A, B & C are connected by two strings x & y as shown in figure



The system is pulled in right direction by force F. If breaking strength of strings x & y are 100N & 220N respectively then maximum value of F for which none of strings will breaks is

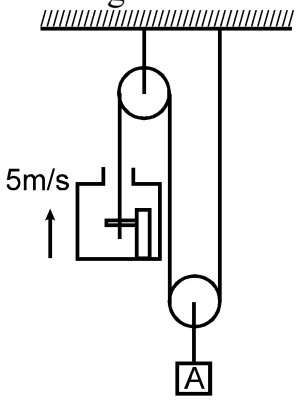
a) 400N **b)** 440N **c)** 300N **d)** 330N

Q8 For the equilibrium condition shown, the cords are strong enough to withstand a maximum tension 100 N. What is the largest value of W (in newton) that can be suspended :



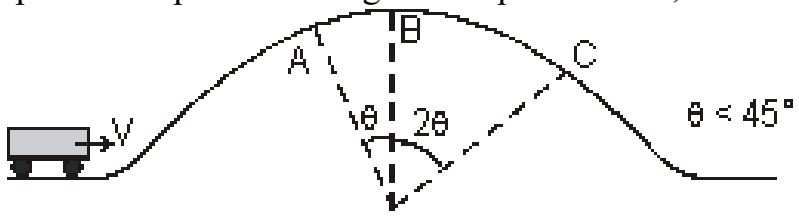
a) 100 N **b)** 35 N **c)** 80 N **d)** 55 N

Q9 A motor is fixed inside a box which is moving upwards with velocity 5 m/s. String is winding at the rate 3 m/s. Then the velocity of block A will be:



a) 2.5 m/s downwards **b)** 5 m/s downwards **c)** 1 m/s downwards
d) 2 m/s downwards

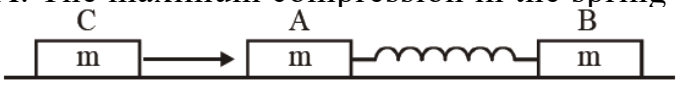
Q10 A self propelled vehicle (assume it as a point mass) runs on a track with constant speed V. It passes through three positions A, B and C on the circular part of the track.



Suppose N_A, N_B and N_C are the normal forces exerted by the track on the vehicle when it is passing through points A, B and C respectively then

a) $N_A = N_B = N_C$ **b)** $N_B > N_A > N_C$ **c)** $N_C > N_A > N_B$ **d)** $N_B > N_C > N_A$

Q11 Two identical blocks A and B each of mass m resting on the smooth horizontal floor are connected by a light spring of natural length L and spring constant K. A third block C of mass m moving with a speed v along the line joining A and B collides with A. The maximum compression in the spring is



a) $v\sqrt{\frac{M}{2K}}$ **b)** $\sqrt{\frac{mv}{2K}}$ **c)** $\sqrt{\frac{mv}{K}}$ **d)** $\sqrt{\frac{m}{2K}}$

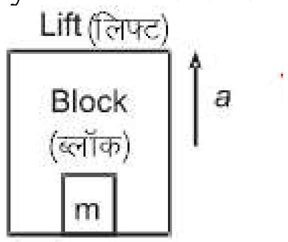
Q12 In an Atwood machine the sum of two masses is constant. The string & pulley are ideal. If the string can sustain tension equal to 15/32 of the weight of sum of two masses then the least acceleration of two masses will be:

a) g/4 **b)** g/2 **c)** g/5 **d)** None of these

Q13 A bird is flying towards east with a velocity 40 km/hr and a train is moving with a velocity 40 km/hr towards east. A man in train drops a food packet. The path of food packet as seen by bird till it falls on ground is (ignore air resistance)

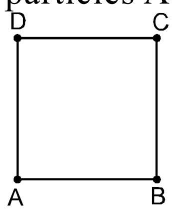
a) parabola **b)** circle **c)** hyperbola **d)** straight line

Q14 A body of mass m is placed inside a lift as shown in figure. If lift starts accelerating with acceleration a in upward direction starting from rest at t = 0, then the work done by normal reaction during time duration t = 0 to t = t as seen from frame of the lift is –



a) $\frac{1}{2}$ ma (g + a) t^2 b) Zero   c) $\frac{1}{2}$m (g + a) t^2 d) $\frac{1}{2}$mgat^2

Q15 Four particles A,B,C and D are initially at the four corners of a square as shown. They move with constant speed u. A is always moving towards B, B is moving towards C, C is moving towards D and D is moving towards A. Then the distance between the particles A and B.



a) is decreasing with constant rate

b) is decreasing initially at faster rate and the rate is continuous decreasing

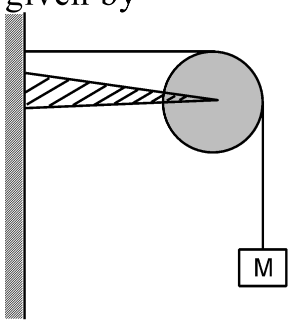
c) is decreasing initially at faster rate and the rate is continuously increasing

d) is decreasing but nothing can be concluded about the rate of decrease

Q16 The position vector of particle at any time t is $\vec{r} = 3t\hat{i} + 3t^2\hat{j}$. The velocity vector makes an angle θ with positive x–axis. The rate of change of θ at time t = 3 sec will be (in rad/sec) :

a) $\frac{2}{37}$ b) $\frac{2}{33}$ c) $\frac{2\sqrt{2}}{37}$ d) $\frac{5}{37}$

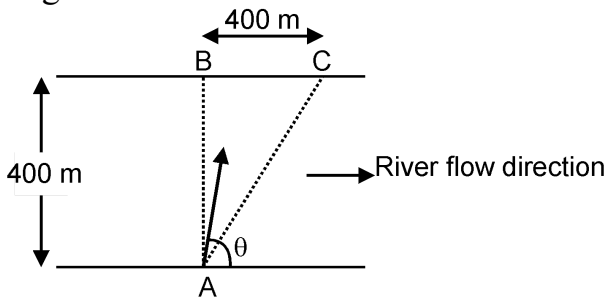
Q17 A string of negligible mass goes over a clamped pulley of mass m supports a block of mass M as shown in figure. The magnitude of force on the pulley by the clamp is given by



a) $\sqrt{2}$Mg   b) $\sqrt{2}$ mg   c) $\left(\sqrt{(M+m)^2+m^2}\right)g$

d) $\left(\sqrt{(M+m)^2+M^2}\right)g$

Q18 A river is flowing with a speed of 1 km h^{-1}. A swimmer wants to go to point C starting from A. He swims with a speed of 5 km h^{-1} at an angle θ w.r.t. the river flow, at what angle with the river bank should the swimmer swim ?



a) 30º **b)** 37º **c)** 53º **d)** 60º

Q19 A standing man observes rain falling with speed 20 m/s at an angle 30º with vertical, with what velocity man should run so that rain appears to fall vertically :

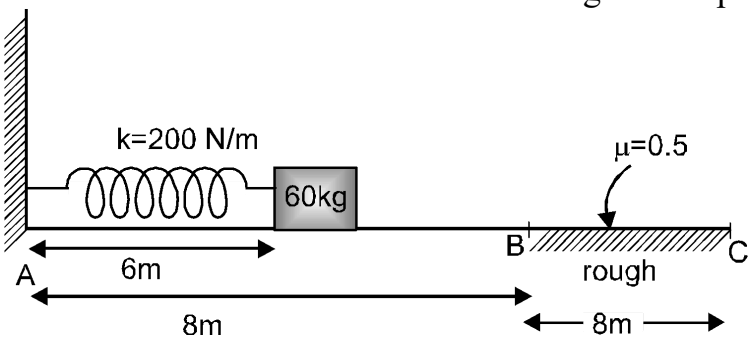
a) 10 m/s **b)** $10\sqrt{3}$ m/s **c)** 5 m/s **d)** 20 m/s

Q20 A simple pendulum is oscillating in a vertical plane. If resultant acceleration of bob of mass m at a point A is in horizontal direction, find the tangential force at this point in terms of tension T and mg.

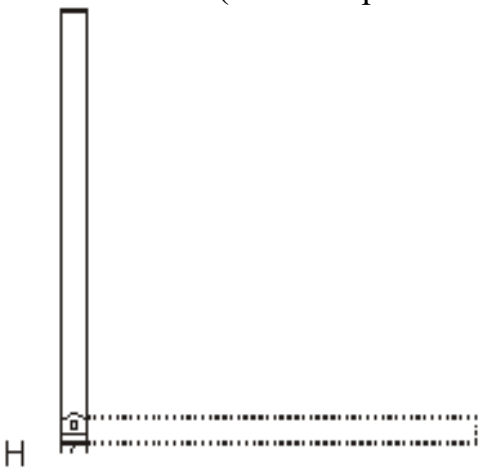
a) mg **b)** $\frac{mg}{T}\sqrt{T^2-(mg)^2}$ **c)** $\frac{\text{mg}}{\text{T}}\sqrt{(\text{mg})^2+\text{T}^2}$ **d)** $\frac{T}{mg}\sqrt{(mg)^2+T^2}$

Numerical

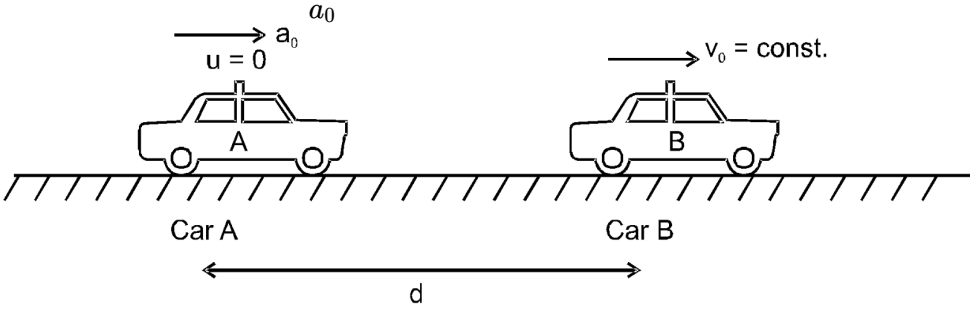
Q21 A block of mass 60 kg is released from rest when compression in the spring is 2m (natural length of spring is 8m). Surface AB is smooth while surface BC is rough. Block travels x distance before coming to complete rest. Value of x is : [g = 10 m/s^2]



Q22 A thin rod of length 1 m is kept vertical and is hinged from the lower end 'H'. Its linear mass density varies with the distance (x) from the end 'H' as $\lambda = (12\ x)$ kg/m, where x is distance along rod from point H. The potential energy (in Joules) of the rod is 5N. Find N (at H the potential energy is zero) ($g = 10\ m/s^2$)

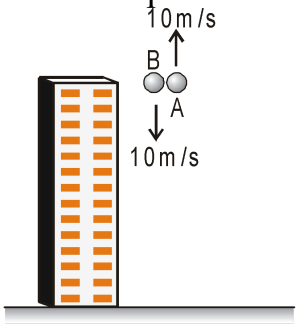


Q23 The car B is moving with constant velocity V_0 on a long straight road. Another car A starts moving with constant acceleration a_0 to catch the car B. Initial separation between the cars is 'd'. The minimum time for which the car A should accelerate to catch the car B is $\frac{x \times V_0}{a_0}$. Find the value of x:



Q24 A particle which is initially at rest has time–dependent acceleration given as $a = 3t^2$. Velocity (in m/s) of the particle at t = 2 sec. is :

Q25 Both A & B are thrown simultaneously as shown from a very high tower. Find distance between the two balls after 1 seconds. (Assume that the balls are thrown from the same point simultaneously)



Q26 Some persons hired a boat for 3 hours. The river flows at a speed of 2.5 km/hr and the speed of the boat is 7.5 km/hr relative to the water. How far (in km) can they get from the port rowing along the river flow if they want to be back in 3 hrs. Fill the value of α if distance is (4 + α)km

Q27 A particle is projected from horizontal surface of earth at speed u making an angle θ = $\cos^{-1}\left(\sqrt{\frac{5}{72}}\right)$ with the horizontal. If equation of trajectory for the particle is y = kx – $2x^2$ (where k is a constant) then what is the speed (in m/s) of projection. (Assume that particle was projected from origin and motion of particle is in xy plane, where x-axis is along the horizontal direction and +y-axis is vertically upward) [Take g = 10 m/s^2]

Q28 A particle projected from ground at some angle with verticle has displacement (w.r.t. point of projection) $\overrightarrow{S}_1 = 6\hat{i} + 8\hat{j}$ and $(8\hat{i} + 6\hat{j})$ at some moment t_1 and t_2 respectely. If the range of the projectile is $\frac{37x}{7}$ m then calculate x

Q29 A body of mass 1 kg rests on a horizontal floor with which it has a coefficient of static friction $\frac{1}{\sqrt{3}}$. It is desired to make the body move by applying the minimum possible force F N. The value of F will be ___________. (Round off to the Nearest Integer) [Take g = 10 ms^{-2}]

Q30 A particle of mass 2kg starts to move at position x = 0 and time t = 0 under the action of force F = (10 + 4x) N along the x-axis on a frictionless horizontal track. Find the power delivered by the force in watts at the instant the particle has moved by the distance 5m.

Chemistry

Single Choice Question

Q31 The nucleus of an atom is located at x = y = z = 0. If the probability of finding an electron in $d_{x^2-y^2}$ orbital in a tiny volume around x=a , y =0 , z = 0 is 1×10^{-5}, what is the probablility of finding the electron in the same size volume around x = 0 ,y = a, z = 0 ?

a) 1×10^{-5} **b)** $1 \times 10^{-5} \times a$ **c)** $-1 \times 10^{-5} \times a$ **d)** zero

Q32 B has a smaller first ionization enthalpy than Be. Consider the following statements.
(I) It is easier to remove 2p electron than 2s electron
(II) 2p electron of B is more shielded from the nucleus by the inner core of electrons than the 2s
electrons of Be
(III) 2s electron has more penetration power than 2p electron
(IV) Atomic radius of B is more than Be (atomic number B = 5, Be = 4)
The correct statements are

a) (I), (II) and (IV) **b)** (I), (III) and (IV) **c)** (I), (II) and (III)
d) (II), (III) and (IV)

Q33 Calculate the minimum and maximum number of electrons which may have magnetic quantum number, m = +1 and spin quantum number, $s = -\frac{1}{2}$ in chromium (Cr) :

a) 0, 1 **b)** 1, 2 **c)** 4, 6 **d)** 2, 3

Q34 Consider the following statements :
1. If all the reactants are not taken in their stoichiometric ratio, then at least one reactant will be left behind.
2. 2 moles of $H_2(g)$ and 3 moles of $O_2(g)$ produce 2 moles of water.
3. equal wt. of carbon and oxygen are taken to produce CO_2 then O_2 is limiting reagent.
The above statements 1, 2, 3 respectively are (T = True, F = False)

a) T T T **b)** F T F **c)** F F F **d)** T F T

Q35 Which of the following equations is a balanced one

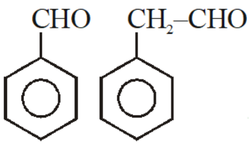
a) $5BiO_3^- + 22H^+ + Mn^{2+} \longrightarrow 5Bi^{3+} + 7H_2O + MnO_4^-$
b) $5BiO_3^- + 14H^+ + 2Mn^{2+} \longrightarrow 5Bi^{3+} + 7H_2O + 2MnO_4^-$
c) $2BiO_3^- + 4H^+ + Mn^{2+} \longrightarrow 2Bi^{3+} + 2H_2O + MnO_4^-$
d) $6BiO_3^- + 12H^+ + 3Mn^{2+} \longrightarrow 6Bi^{3+} + 6H_2O + 3MnO_4^-$

Q36 The strength of 10^{-2} M Na_2CO_3 solution in terms of molality will be (density of solution = 1.10 g mL^{-1}). (Molecular weight of Na_2CO_3 = 106 g mol^{-1})

a) 9.00×10^{-3} **b)** 1.5×10^{-2} **c)** 5.1×10^{-3} **d)** 11.2×10^{-3}

Q37 The ionic radii of F^- and O^{2-} respectively are 1.33 Å and 1.4 Å, while the covalent radius of N is 0.74 Å.
The correct statement for the ionic radius of N^{3-} from the following is :

a) It is smaller than F^- and N
b) It is bigger than O^{2-} and F^-
c) It is bigger than F^- and N, but smaller than of O^{2-}
d) It is smaller than O^{2-} and F^-, but bigger than of N

Q38 

and can be distinguished by

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

Q39 For the following reaction if equal mass of A and B are taken :
$A + 2B \rightarrow C$
Which of the following is **correct**? (M_A and M_B are molar masses of A and B respectively)

a) If $M_A = 2M_B$, then none of the reactant will be left.
b) If $M_B > \frac{M_A}{2}$, then A will be limiting reagent
c) If $M_A = M_B$, then A will be limiting reagent
d) All are correct

Q40 6 gm of silver salt of tribasic acid gives 4.32 gm silver on strong heating. The molar mass of acid is

a) 126 gm **b)** 129 gm **c)** 123 gm **d)** 252 gm

Q41 The distance of closest approach of an α-particle projected towards a nucleus with momentum p is r. What will be the distance of closest approach, when the momentum of projected α-particle is 2p?

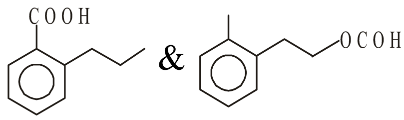
a) 2r **b)** 4r **c)** $\frac{r}{2}$ **d)** $\frac{r}{4}$

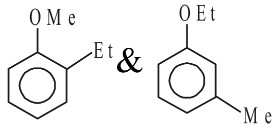
Q42 Orbital angular momentum associated with 2p - electron is :

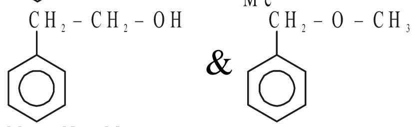
a) $\frac{\sqrt{2}h}{\pi}$ **b)** 0 **c)** $\sqrt{6} \times \frac{h}{2\pi}$ **d)** $\frac{h}{\sqrt{2}\pi}$

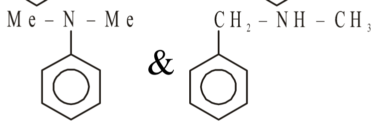
Q43 2 litres of moist hydrogen were collected over water at 26°C at a total pressure of one atmosphere. On analysis, it was found that the quantity of H_2 collected was 0.0788 mole. What is the mole fraction of H_2 in the moist gas

a) 0.989 **b)** 0.897 **c)** 0.953 **d)** 0.967

Q44  functional isomer

 metamers

 metamers

 functional isomers

a) TFTF b) FTTF c) TTFT d) TFFT

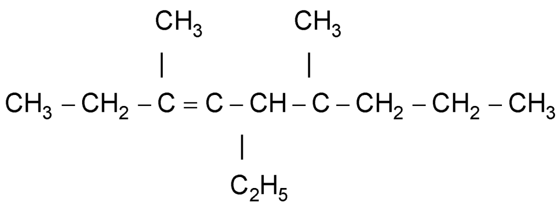
Q45 C_7H_7Cl shows how many benzenoid aromatic isomers ?

a) 4 b) 3 c) 5 d) 6

Q46 How many structural isomers of C_5H_{10} are possible.

a) 10 b) 11 c) 12 d) 13

Q47 The correct IUPAC name of the compound :



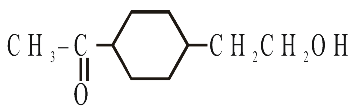
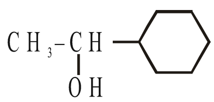
a) 5-Ethyl-3, 6-dimethyl non-3-ene b) 5-Ethyl-4, 7-dimethyl non-3-ene

c) 4-Methyl-5, 7-diethyl oct-2-ene d) 2,4-Ethyl-5-methyl oct-2-ene

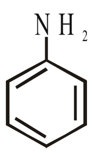
Q48 The test that can not be used to distinguish between 1-propanol and 2-propanol

a) Lucas test b) Iodoform test c) Victor mayer test d) Carbyl amine test

Q49 Which of the following will not give positive iodoform test.

a) $CH_3-C(=O)-OH$ b) $Ph-C(=O)-CH_3$ c)  d) 

Q50 Compound does not give offensive smell on heating with chloroform and alkali

a) $CH_3–NH_2$ b)  c) $CH_3–NO_2$ d) $Ph–CH_2–NH_2$

Numerical

Q51 A 12.6 g sample of Na_2SO_3 is mixed with 30 g sample of $MgSO_4$. What is total mass of oxygen (in g) present in the mixture? (Answer to be round off to nearest integer)

Q52 A doubly ionised lithium atom is hydrogen like with atomic number z = 3. Find the wavelength (in nano meter) of the radiation required to excite the electron in Li^{2+} from the first to the third Bohr orbit.
[Given : $\frac{1}{R_H}$ = 912 Å] (Answer to be round off to nearest integer)

Q53 Maximum number of moles of barium phosphate formed when 0.9 mole of barium chloride is mixed with 0.4 mole of sodium phosphate is x then what will be the value of 10x

Q54 How many benzenoid isomer are possible for cresol

Q55 Calculate the total number of structural isomers of 3°-amines for the molecular formula $C_6H_{15}N$ are?

Q56 The reaction Cl_2 (g) + $S_2O_3^{2-} \longrightarrow SO_4^{2-} + Cl^-$ is to be carried out in basic medium. Starting with 1.5 mole of Cl_2, 0.1 mole $S_2O_3^{2-}$ and 3 mole of OH^-. How many moles of OH^- will be left in solution after the reaction is complete. Assume no other reaction occurs.

Q57 Aluminum carbide (Al_4C_3) liberates methane on treatment with water. The grams of aluminum carbide required to produce 11.2 L of methane under STP conditions is :
[Given : Al = 27]

Q58 If 240 g of carbon is taken in a container to convert it completely to CO_2 but in industry it has been found that 280 g of CO was also formed along with CO_2. Find the mole percentage yield of CO_2. The reactions occurring are :
$C + O_2 \longrightarrow CO_2$; $C + O_2 \longrightarrow CO$

Q59 An electron in an atom jumps in such a way that its kinetic energy changes from x to $\frac{x}{4}$. The change in potential energy will be if your answer is p then what will be value of $\frac{2p}{x}$:

Q60 The number of 4*f* electrons in the ground state electronic configuration of Gd^{2+} is ________.
[Atomic number of Gd = 64]

Mathematics

Single Choice Question

Q61 If both roots of the equation $x^2 - 6ax + 2 - 2a + 9a^2 = 0$ exceed 3, then

a) $a < 1$ **b)** $a > \frac{11}{9}$ **c)** $a > \frac{3}{2}$ **d)** $a < \frac{3}{2}$

Q62 If $\tan\theta$ and $\cot\theta$ are the roots of the equation $x^2 + 2x + 1 = 0$ then the least value of $x^2 + \tan\theta x + \cot\theta$, is

a) $\frac{3}{4}$ **b)** $\frac{5}{4}$ **c)** $\frac{-5}{4}$ **d)** $\frac{-3}{4}$

Q63 Let $P = \cos\frac{\pi}{20}\cos\frac{3\pi}{20}\cos\frac{7\pi}{20}\cos\frac{9\pi}{20}$ and $Q = \cos\frac{\pi}{15}\cos\frac{2\pi}{15}\cos\frac{4\pi}{15}\cos\frac{8\pi}{15}$, then which of the following hold good?

a) $P + Q = 0$ **b)** $P = -\frac{1}{16}$ **c)** $Q = \frac{1}{16}$ **d)** $P - Q = -\frac{1}{8}$

Q64 Let α, β, γ are roots of the equation $x^3 + qx + q = 0$ then the value of $(\alpha+\beta)^{-1} + (\beta+\gamma)^{-1} + (\gamma+\alpha)^{-1}$ is equal to

a) 0 **b)** -1 **c)** 1 **d)** 2

Q65 Consider the quadratic equation $(c - 5)x^2 - 2cx + (c - 4) = 0$, $c \neq 5$. Let S be the set of all integral values of c for which one root of the equation lies in the interval (0, 2) and its other root lies in the interval (2, 3). Then the number of elements in S is

a) 11 **b)** 18 **c)** 12 **d)** 10

Q66 The value of K for which the quadratic equation $(1 - 2k)x^2 - 6kx - 1 = 0$ and $kx^2 - x + 1 = 0$ have at least one root in common is/are

a) $\left\{\frac{1}{2}\right\}$ **b)** $\left\{\frac{1}{3}, \frac{2}{9}\right\}$ **c)** $\left\{\frac{2}{9}\right\}$ **d)** $\left\{\frac{1}{2}, \frac{2}{9}\right\}$

Q67 If λ be the ratio of the roots of the quadratic equation in x, $3m^2x^2 + m(m - 4)x + 2 = 0$, then the least value of m for which $\lambda + \frac{1}{\lambda} = 1$, is

a) $4 - 2\sqrt{3}$ **b)** $4 - 3\sqrt{2}$ **c)** $2 - \sqrt{3}$ **d)** $-2 + \sqrt{2}$

Q68 If α and β are the roots of the quadratic equation, $x^2 + x\sin\theta - 2\sin\theta = 0$, $\theta \in \left(0, \frac{\pi}{2}\right)$, then $\frac{\alpha^{12} + \beta^{12}}{(a^{-12} + \beta^{-12})\cdot(\alpha - \beta)^{24}}$ is equal to :

a) $\frac{2^{12}}{(\sin\theta - 8)^6}$ **b)** $\frac{2^{12}}{(\sin\theta - 4)^{12}}$ **c)** $\frac{2^6}{(\sin\theta + 8)^{12}}$ **d)** $\frac{2^{12}}{(\sin\theta + 8)^{12}}$

Q69 The number of real roots of the equation $5 + |2^x - 1| = 2^x(2^x - 2)$ is :

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

Q70 Let S be the set of all real roots of the equation, $3^x(3^x - 1) + 2 = |3^x - 1| + |3^x - 2|$. Then S

a) Contains at least four elements **b)** Is a singleton
c) Contains exactly two elements **d)** Is an empty set

Q71 If $\tan\left(\frac{P\pi}{4}\right) = \cot\left(\frac{q\pi}{4}\right)$ and n∈I and n ∈ I then

a) $p + q = n$ **b)** $p + q = 2n + 1$ **c)** $p + q = 2n$ **d)** $p + q = 2(2n + 1)$

Q72 The sum of the roots of the equation $x + 1 - 2\log_2 (3 + 2^x) + 2\log_4 (10 - 2^{-x}) = 0$, is :

a) $\log_2 14$ **b)** $\log_2 11$ **c)** $\log_2 12$ **d)** $\log_2 13$

Q73 If $a + b = 3 - \cos 4\theta$ and $a - b = 4\sin 2\theta$ then ab is always less than or equal to

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

Q74 A circle has a radius of $\log_{10}(a^2)$ and a circumference of $\log_{10}(b^4)$. The value of $\log_a b$ is equal to

a) $\frac{1}{4\pi}$ **b)** $\frac{1}{\pi}$ **c)** π **d)** 2π

Q75 The value of $(2^{\log_{70} 9800})(5^{\log_{70} 140})(7^{\log_{70} 2})$ is equal to

a) 20 **b)** 60 **c)** 18 **d)** 40

Q76 Let $f : R - \{2, 6\} \to R$ be real valued function defined as $f(x) = \frac{x^2 + 2x + 1}{x^2 - 8x + 12}$. Then range of f is

a) $\left(-\infty, -\frac{21}{4}\right] \cup [0, \infty)$ **b)** $\left(-\infty, -\frac{21}{4}\right) \cup (0, \infty)$ **c)** $\left(-\infty, -\frac{21}{4}\right] \cup \left[\frac{21}{4}, \infty\right)$ **d)** $\left(-\infty, -\frac{21}{4}\right] \cup [1, \infty)$

Q77 The number of integral values of k, for which one root of the equation $2x^2 - 8x + k = 0$ lies in the interval (1, 2) and its other root lies in the interval (2, 3), is :

a) 2 **b)** 0 **c)** 1 **d)** 3

Q78 If $0 \le x < \frac{\pi}{2}$, then the number of values of x for which $\sin x - \sin 2x + \sin 3x = 0$, is

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

Q79 Let m(b) be the minimum value of $f(x) = (2 + b + b^2)x^2 - 2\sqrt{2}(2b + 1)x + 8$. The maximum value of m(b) is (where $b \in [-3, 10]$)

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

Q80 Let S be the set of all $\alpha \in R$ such that the equation, $\cos 2x + \alpha \sin x = 2\alpha - 7$ has a solution. Then S is equal to:

a) [1, 4] **b)** R **c)** [2, 6] **d)** [3, 7]

Numerical

Q81 Let α and β are the roots of quadratic equation $x^2 - x - 1 = 0$, if $a_n = \frac{\alpha^n - \beta^n}{\alpha - \beta}$, n = 1, 2, 3 ....
Then the value of $\frac{a_{2012} - a_{2010}}{a_{2011}}$ is equal to

Q82 The number of real roots of the equation $e^{4x} - e^{3x} - 4e^{2x} - e^x + 1 = 0$ is equal to____ .

Q83 The sum of all real values of x for which $\frac{3x^2 - 9x + 17}{x^2 + 3x + 10} = \frac{5x^2 - 7x + 19}{3x^2 + 5x + 12}$ is equal to _____ .

Q84 Number of solutions of equation $\sin x.\sqrt{8cos^2 x} = 1$ in $[0, 2\pi]$ is

Q85 If $h(x) = \log_{10} x$, then the value of $\sum_{n=1}^{89} h(\tan n^o)$ is

Q86 If $\sqrt{3}(\cos^2 x) = (\sqrt{3} - 1)\cos x + 1$, the number of solutions of the given equation when $x \in \left[0, \frac{\pi}{2}\right]$ is

Q87 The number of solutions of the trigonometric equation $\sin 3\theta = 4 \sin\theta . \sin 2\theta . \sin 4\theta$ in $[0, \pi]$, is

Q88 The number of solution of the equation sinx + sin2x + sin3x = cosx + cos2x + cos3x in $x \in [0, 2\pi]$, is

Q89 The exact value of $\text{cosec}10^0 + \text{cosec}50^0 - \text{cosec}70^0$ is

Q90 If value of $\frac{4sin9^o\ sin21^o\ sin39^o\ sin51^o\ sin69^o\ sin81^o}{sin54^o}$ is 1/K, K∈N, then value of K is equal to

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**A**	**B**	**C**	**A**	**D**	**A**	**A**	**B**	**C**	**B**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**A**	**A**	**D**	**B**	**A**	**A**	**D**	**C**	**A**	**B**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**8**	**1**	**8**	**20**	**6**	**6**	**2**	**5**	**300**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**A**	**C**	**D**	**A**	**B**	**A**	**B**	**C**	**A**	**B**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**D**	**D**	**D**	**C**	**A**	**A**	**A**	**D**	**A**	**C**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**21**	**11**	**2**	**5**	**7**	**2**	**24**	**50**	**3**	**7**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**B**	**C**	**A**	**C**	**A**	**C**	**B**	**D**	**C**	**B**
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	**D**	**B**	**B**	**C**	**D**	**A**	**C**	**A**	**D**	**C**
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	**1**	**2**	**6**	**4**	**0**	**1**	**8**	**6**	**6**	**8**