Competishun

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

Date: 06/01/2025

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

Match The Column Related PCM Test_(24-25)

Physics

Single Choice Question

Q1 In a series RLC AC circuit, the frequency of source can be varied. When frequency is varied gradually in one direction from f_1 to f_2, the power is found to be maximum at f_1. When frequency is varied gradually at the other direction from f_1 to f_3 , the power is found to be same at f_1 and f_3. Then match the following :

Column–I When the frequency is equal to (AM : arithmetic mean ; GM : geometric mean)	**Column–II** The circuit is or can be
(a) AM of f_1 and f_2	(p) capacitative
(b) GM of f_1 and f_2	(q) inductive
(c) AM of f_1 and f_3	(r) resistive
(d) GM of f_1 and f_3	(s) at resonance

a) (a) – p,q ; (b) – r,s ; (c) – p ; (d) – p,s. **b)** (a) – p,q ; (b) – p,q ; (c) – q ; (d) – r,s.

c) (a) – r,q ; (b) – s,p ; (c) – r ; (d) – p,q. **d)** (a) – s,r ; (b) – q,r ; (c) – s ; (d) – r,q.

Q2 Column I gives certain situations in which capacitance of a capacitor is changed by different means. Column II gives resulting effect under different conditions. Match the statements in column I with the corresponding statements in column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in ORS.

Column I **Column II**

(a) The plates of a plane parallel capacitor are (p) Increases if the capacitor is maintained
slowly pulled apart. Then the magnitude of at constant charge.
electric field intensity inside the capacitor.

(b) The plates of a plane parallel plate capacitor (q) Decreases if the capacitor is
are slowly pulled apart. Then the potential maintained at constant charge
energy stored in the capacitor.

(c) The capacitance of an air filled plane parallel (r) Increases if the capacitor is maintained
plate capacitor on insertion of dielectric at constant potential difference.

(d) A dielectric slab is inserted inside an air (s) Decreases if the capacitor is maintained
filled plane parallel plate capacitor. The at constant potential difference.
potential energy stored in the capacitor.

a) (a) p; (b) p, s; (c) r, s; (d) p, q

b) (a) q; (b) r, p; (c) q, s; (d) s, r

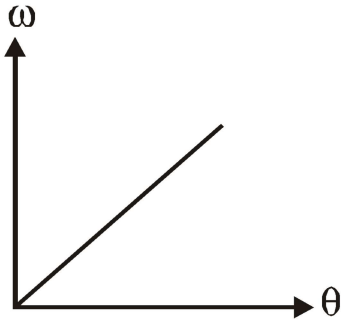
c) (a) s; (b) p, s; (c) p, r; (d) q, r

d) (a) r; (b) r, q; (c) q, s; (d) s, p

Q3 Each situation in column I gives graph of a particle moving in circular path. The variables ω,θ and t represent angular speed (at any time t) , angular displacement (in time t) and time respectively. Column II gives certain resulting interpretation. Match the graphs in column I with statements in column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the OMR.

Column I **Column II**

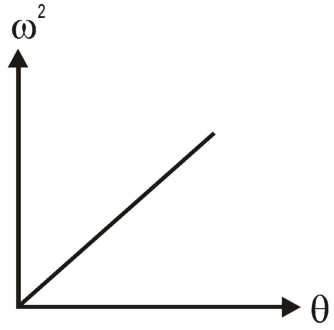
(a)



ω - θ graph

(p) Angular acceleration of particle is uniform

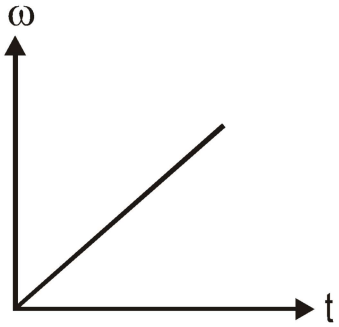
(b)



ω² - θ graph

(q) Angular acceleration of particle is non-uniform

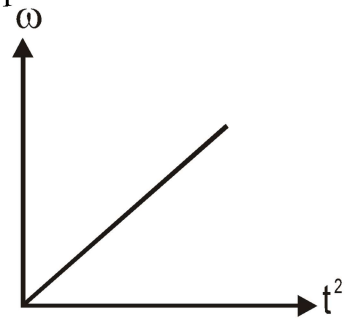
(c)



ω - t graph

(r) Angular acceleration of particle is directly proportional to t.

(d)

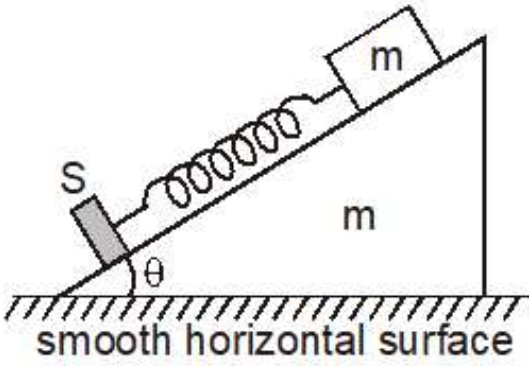


ω - t² graph

(s) Angular acceleration of particle is directly proportional to θ

a) (a) p,q; (b) p; (c) q ; (d) s,r
b) (a) s,r; (b) q; (c) r ; (d) q,r
c) (a) p,s; (b) r; (c) s ; (d) p,q
d) (a) q,s; (b) p; (c) p ; (d) q,r

Q4 A block of mass m is placed on wedge also of mass m. The wedge is placed on sooth horizontal fixed surface. One end of a light spring is connected to block and the other end to a light support S rigidly fixed to wedge as shown. Friction is absent every where. The system is initially released from rest with spring unstressed. Match statements in column-I with corresponding statements in column-II.



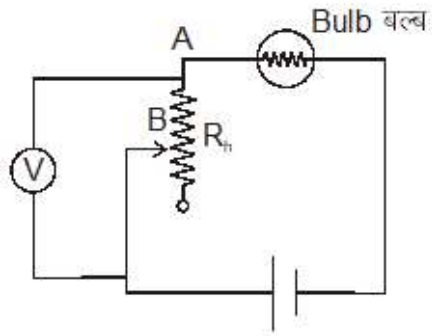
Column-I	**Column-II**
(a) At the instant compression in spring is maximum	(p) speed of block is zero
(b) At the instant spring has natural length, that is, it is unstressed.	(q) speed of block is non zero
(c) At the instant net force on wedge is zero	(r) speed of block is maximum
(d) At the instant elastic potential energy stored in spring is least	(s) speed of block is minimum

a) (a) p,q; (b) p,s; (c) r,s; (d) p,r
b) (a) p,s; (b) p,s; (c) q,r; (d) p,s
c) (a) r,p; (b) r,q; (c) q,r; (d) p,q
d) (a) s,r; (b) p,r; (c) q,p; (d) r,s

Q5 In column-I, some situations are given, and in column-II, their result are given. Assume the batteries and voltmeters used are ideal. Aslo assume that the resistance of bulb doesn't change due to heating. Match the situations given in column-I according to proper results in column-II.

Column-I **Column-I**

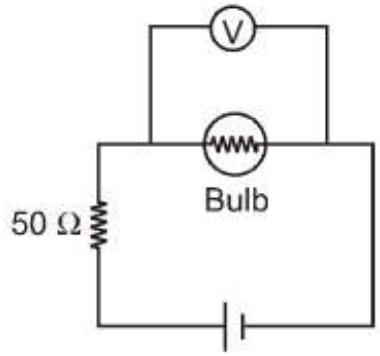
(a)



(p) The brightness of the bulb will increase

If the resistance of rehostate between A and B is increased, then :

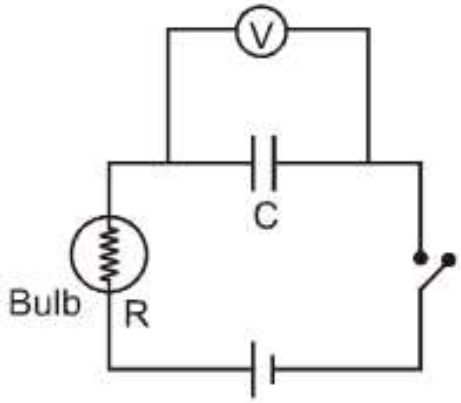
(b)



(q) The brightness of the bulb will decrease.

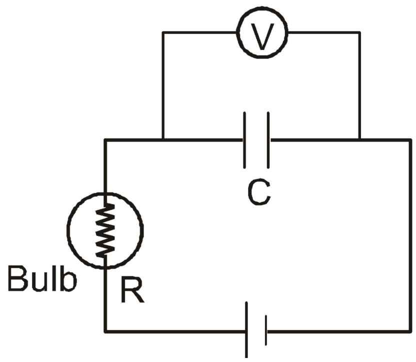
If resistance of the bulb is gradually increased from 10 Ω to 50 Ω, then :

(c)



(r) The reading of the voltmeter will increase

Switch is on at t = 0. From t = 0 to the steady state

(d) 

(s) The reading of the voltmeter will decrease.

The system has achieved steady state. Now the distance between the plates of the capacitor is suddenly halved. After that, as the time passes :

a) (a) – p,q ; (b) – p,s ; (c) – q, r ; (d) – s, r

b) (a) – s,r ; (b) – p,q ; (c) – s, q ; (d) – p, q

c) (a) – q,r ; (b) – p,r ; (c) – q, r ; (d) – q, r

d) (a) – s,p ; (b) – r,s ; (c) – p, q ; (d) – p, s

Q6 Consider a uniform wire of length ℓ, cross-sectional area A. Young's modulus of the material of the wire is Y. Some information related to the wire is given in column-I and dependence of the result is given in column-II. Then match the appropriate choice between the columns and match the list given in options :

Column-I	**Column-II**
(a) Let us suspend the wire vertically from a rigid supported and attach a mass m at its lower end. If the mass is slightly pulled down and released, it executes S.H.M. of a time period which will depend on	(p) Young's Modulus
(b) Work done in stretching the wire up to length ℓ + x will depend on	(q) elongation (x)
(c) If the given wire is fixed between two rigid supports and its temperature is decreased, thermal stress that develops in the wire will depend on	(r) length (ℓ)
(d) If the wire is pulled at its ends equal and opposite forces of magnitude F so that it undergoes an elongation x, according to Hook's law, F = kx, where k is the force constant. Force constant (k) of the wire will depend on	(s) area of cross-section (A)
	(t) force applied by the wire

a) (a) – p, r, s ; (b) – p, q, r, s, t (c) – p, t ; (d) – p, r, s

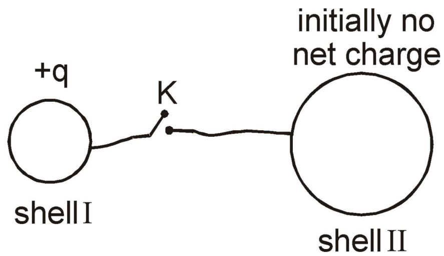
b) (a) – p, q, r ; (b) – p, q, r, s, t (c) – s, t ; (d) – q, r, t

c) (a) – q, r, s, t ; (b) – p, r, t (c) – p, r, t ; (d) – p, r, s

d) (a) – q, s, t ; (b) – p, q, r, s, t (c) – p, t ; (d) – p, r, q, t

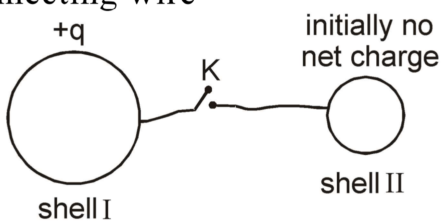
Q7 Column I gives certain situations involving two thin conducting shells connected by a conducting wire via a key K. In all situations one sphere has net charge +q and other sphere has no net charge. After the key K is pressed, column II gives some resulting effect. Match the figures in Column I with the statements in Column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the ORS.

Column I **Column II**

(a) 

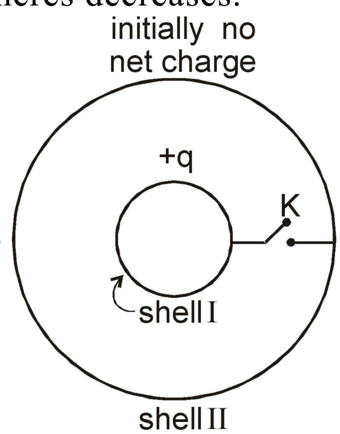
(p) charge flows through

connecting wire

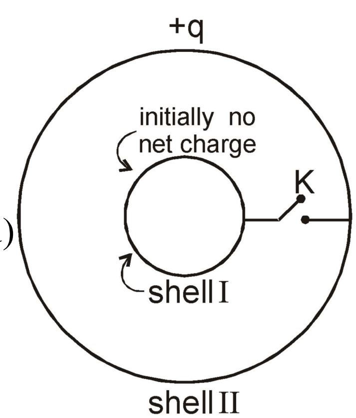
(b) 

(q) Potential energy of system of

spheres decreases.

(c) 

(r) No heat is produced.

(d) 

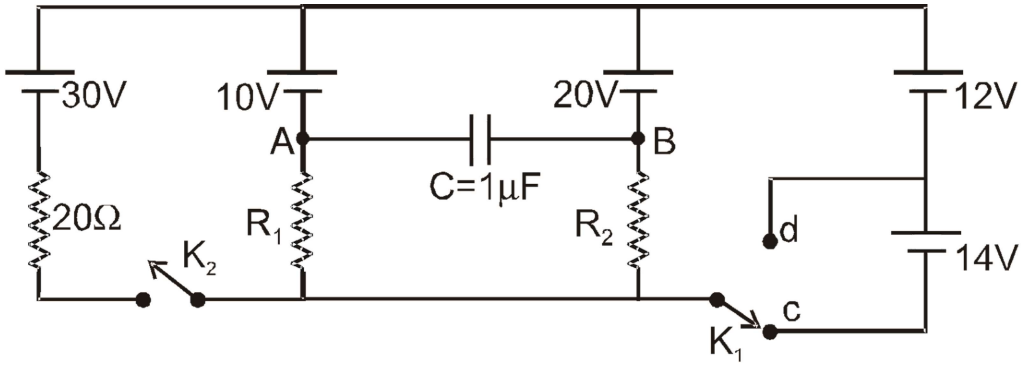
(s) The sphere I has no charge after

equilibrium is reached.

a) (a) p, q; (b) r, s; (c) p, q, r; (d) r, s **b)** (a) r, q; (b) s, q; (c) r, q, s; (d) p, q

c) (a) p, q; (b) s, r; (c) s, r, q; (d) r, q **d)** (a) p, q; (b) p, q; (c) p, q, s; (d) r, s

Q8 A circuit involving five ideal cells , three resistors (R_1, R_2 and 20Ω) and a capacitor of capacitance C = 1 μF is shown. Match the conditions in column-I with results given in column-II.



column-I

(a) K_2 is open and K_1 is in position C

(b) K_2 is open and K_1 is in position D

(c) K_2 is closed and K_1 is in position C

(d) K_2 is closed and K_1 is in position D

column-II

(p)Potential at point A is greater than potential at B

(q) Current through R_1 is downward

(r) Current through R_2 is upward

(s) Charge on capacitor is 10μC.

a) (a) p,q,s; (b) p,q,r,s; (c) p,q,s; (d) p,q,r,s

b) (a) p,q,r; (b) p,q,s; (c) p,r,s; (d) q,r,s

c) (a) p,q,s; (b) q,r,s; (c) s,r,q; (d) p,q

d) (a) p,s; (b) p,q,r; (c) p,q,s,r; (d) p,r,q

Q9 There are four situations given in column **I** involving a magnetic dipole of dipole moment $\vec{\mu}$ placed in uniform external magnetic field $\vec{B}$. Column **II** gives corresponding results. Match the situtations in column **I** with the corresponding results in column **II**

Column - I	**Column - II**
(a) Magnetic dipole moment $\vec{\mu}$ is parallel to uniform external magnetic field $\vec{B}$ (angle between both vectors is zero)	(p) force on dipole is zero
(b) Magnetic dipole moment $\vec{\mu}$, is perpendicular to uniform external magnetic field $\vec{B}$	(q) torque on dipole is zero
(c) Angle between magnetic dipole moment $\vec{\mu}$ and uniform external magnetic field $\vec{B}$ is acute	(r) magnitude of torque is (μB)
(d) Angle between magnetic dipole moment due to and uniform external magnetic field $\vec{B}$ is 180^{o}.	(s) potential energy of dipole external magnetic field is (μB)

a) (a) p, q ; (b) r, s; (c) q; (d) p, q, r

b) (a) p, q ; (b) p, r ; (c) p; (d) p, q, s

c) (a) r, s ; (b) q, s ; (c) r; (d) p, q, s

d) (a) s, q ; (b) r, p ; (c) s; (d) p, q, r, s

Q10 Match the statements in Column I with the results in Column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the OMR.

Column – I	**Column – II**
(a) A variable resistor is connected across a non-ideal cell . As the resistance of the variable resistor is continuously then increased from zero to a very large value, the electric power consumed by the variable resistor	(p) first increases for some time and decreases.
(b) A circular ring lies in space having uniform and constant some magnetic field. Initially the direction of magnetic field is increases. parallel to plane of the ring. Keeping the centre of ring fixed, the ring is rotated by 180^0 about one of its diameter with constant angular speed. For the duration the ring rotates, the magnitude of induced emf in the ring	(q) first decreases for time and then
(c) A thin rod of length 1 cm lies along principal axis of a constant convex lens of focal length 5 cm. One end of rod is at a distance 10 cm from optical centre of the lens. The convex lens is moved (without rotation) perpendicular to initial principal axis by 5 mm and brought back to its initial position.The length of the image of the rod	(r) is always
(d) A bulb (of negligible inductance) and a capacitor in series are connected across an ideal ac source of constant peak voltage and variable frequency. As frequency of ac source is interval continuously increased, the brightness of bulb	(s) increases or may increase over some time

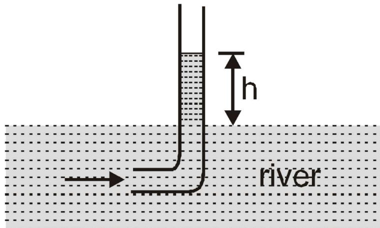
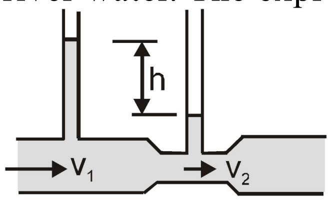
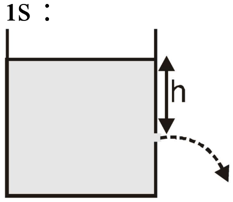
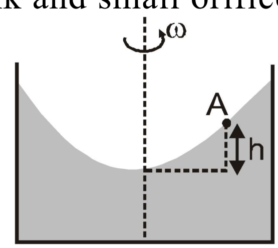
a) (a) p,q; (b) r,s; (c) r,q; (d) p

b) (a) p,s; (b) q,s; (c) p,s; (d) s

c) (a) p,s; (b) q,s; (c) p,s; (d) s

d) (a) p,s; (b) q,s; (c) p,s; (d) s

Q11 In **Column I**, position of a water level are shown in certain cases and certain things are given and certain quantities are asked.Correctly match the asked quantity with the quantities given in column II.

Column–I	**Column–II**
(a)  Pitot tube is used to find the speed v of the flow of the river water. The expression for v^2 is :	(p) 2gh
(b)  Area of cross section of the narrower part of the venturi tube is 1/2 of that of the wider part. If the velocity in the wider part is v_1 and that in the narrower part is v_2 then v_1^2 is :	(q) $\frac{2gh}{3}$
(c)  If the velocity of the efflux from a wide stationary tank and small orifice is v then v^2 is :	(r) 4gh
(d)  A cylindrical beaker containing some liquid is rotated with constant angular speed about its axis. If the speed of the point A is v then v^2 is :	(s) 6gh

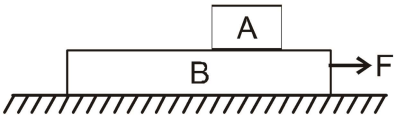
a) (a) –p ; (b) – q ; (c) – r ; (d) – s

b) (a) –r ; (b) – s ; (c) – q ; (d) – p

c) (a) –p ; (b) – q ; (c) – p ; (d) – p

d) (a) –s ; (b) – p ; (c) – q ; (d) – r

Q12 A block A of mass m kg lies on block B of mass m kg. B in turn lies on smooth horizontal plane. The coefficient of friction between A and B is μ. Both the blocks are initially at rest. A horizontal force F is applied to lower block B at t = 0 such that there is relative motion between A and B. In the duration from t = 0 second till the lower block B undergoes a displacement of magnitude L, match the statements in column-I with results in column-II.



Column-I	**Column-II**
(a) Work done by friction force on block A is	(p) positive
(b) Work done by friction force on block B is	(q) negative
(c) Work done by friction on block A plus work done by friction on block B is	(r) less than μ mgL in magnitude
(d) Work done by force F on block B is	(s) equal to μ mgL in magnitude

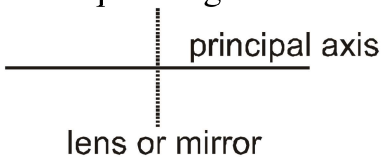
a) (a) p, q; (b) r, s; (c) q, s; (d) s
b) (a) s, r; (b) p, r; (c) s, q; (d) r
c) (a) p, s; (b) r, s; (c) q, s; (d) q
d) (a) p, r; (b) q, s; (c) q, r; (d) p

Q13 In each situation of column-I a statement regarding a point object and its image is given. In column-II four optical instruments are given which form the image of that object. Match the statement in column-I with the optical instruments in column-II.

Column-I	**Column-II**
(a) Real image of a real point object may be formed by	(p) concave mirror
(b) Virtual image of a real point object may be formed by	(q) convex mirror
(c) Real image of a virtual point object may be formed by (surrounded by air)	(r) convex lens
(d) Virtual image of a virtual point object may be formed by (surrounded by air)	(s) concave lens

a) (a) p,q; (b) p,q,r; (c) p,q,r,s; (d) r,s
b) (a) p,r; (b) p,q,r,s; (c) p,q,r,s; (d) q,s
c) (a) s,q; (b) p,q,r,s; (c) q,r,p; (d) q,s,r
d) (a) p,r; (b) p,q,r,s; (c) p,q,r,s; (d) q

Q14 Column-I gives certain situations regarding a point object and its image formed by an optical instrument. The possible optical instruments are concave and convex mirrors or lenses as given in Column-II. Same side of principal axis means both image and object should either be above the principal axis or both should be below the principal axis as shown in figure. Same side of optical instrument means both image and object should be either left of the optical instrument or both should be on right of the optical instrument as shown in figure. Match the statements in column-I with the corresponding statements in column-II .



Column I	**Column II**
(a) If point object and its image are on same side of principal axis and opposite sides of the optical instrument then the optical instrument is	(p) Concave mirror
(b) If point object and its image are on opposite side of principal axis and same sides of the optical instrument then the optical instrument is	(q) Convex mirror
(c) If point object and its image are on same side of principal axis and same sides of the optical instrument then the optical instrument is	(r) Concave lens
(d) If point object and its image are on opposite side of principal axis and opposite sides of the optical instrument then the optical instrument is	(s) Convex lens

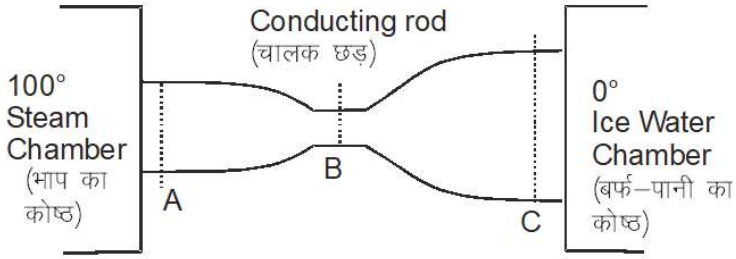
a) (a) p, q; (b) r, s; (c) r, q; (d) p, s
b) (a) r, s; (b) s, q; (c) p, q; (d) s, p
c) (a) p, q; (b) p, q; (c) r, s; (d) r, s
d) (a) q; (b) p, r; (c) p, s; (d) p,r, s

Q15 Let V and E denote the gravitational potential and gravitational field respectively at a point due to certain uniform mass distribution described in four different situations of column-I. Assume the gravitational potential at infinity to be zero. The value of E and V are given in column-II. Match the statement in column-I with results in column-II.

Column-I	**Column-II**
(a) At centre of thin spherical shell	(p) $E = 0$
(b) At centre of solid sphere	(q) $E \neq 0$
(c) A solid sphere has a non-concentric spherical cavity. At the centre of the spherical cavity	(r) $V \neq 0$
(d) At centre of line joining two point masses of equal magnitude	(s) $V = 0$

a) (a) p,r; (b) p,r; (c) q,r; (d) p,r
b) (a) p,q; (b) p,s; (c) q,r; (d) s,r
c) (a) s,r; (b) p,q; (c) r,s; (d) q,s
d) (a) p,s; (b) p,r; (c) q,s; (d) p,q

Q16 A copper rod (initially at room temperature 20°C) of non-uniform cross section is placed between a steam chamber at 100°C and ice-water chamber at 0°C.



Column-I	Column-II
(a) Initially rate of heat flow $\left(\frac{dQ}{dt}\right)$ will be	(p) maximum at section A
(b) At steady state rate of heat flow $\left(\frac{dQ}{dt}\right)$ will be	(q) maximum at section B
(c) At steady state temperature gradient $\left\lvert\left(\frac{dT}{dx}\right)\right\rvert$ will be	(r) minimum at section C
(d) At steady state rate of change of temperature $\left(\frac{dT}{dt}\right)$ at a certain point will be	(s) minimum at section B
	(t) same for all section

a) (a) p, q ; (b) r (c) q, s (d) t

b) (a) p, r ; (b) t (c) q, r (d) t

c) (a) r, t ; (b) p (c) s, q (d) q

d) (a) s, q ; (b) s (c) q, t (d) s

Q17 **Match the following :**

Two particles A and B moving in x-y plane are at origin at t = 0 sec. The initial velocity vectors of A and B are $\vec{u}_A = 8\hat{i}$ m/s and $\vec{u}_B = 8\hat{j}$ m/s. The acceleration of A and B are constant and are $\vec{a}_A = -2\hat{i}$ m/s^2 and $\vec{a}_B = -2\hat{j}$ m/s^2. Column I gives certain statements regarding particle A and B. Column I gives corresponding results. Match the statements in column I with corresponding results in Column II.

Column I	**Column II**
(a) The time (in seconds) at which velocity of A relative to B is zero	(p) $16\sqrt{2}$
(b) The distance (in metres) between A and B when their relative velocity is zero.	(q) $8\sqrt{2}$
(c) The time (in seconds) after t = 0 sec, at which A and B are at same position	(r) 8
(d) The magnitude of relative velocity of A and B at the instant they are at same position.	(s) 4

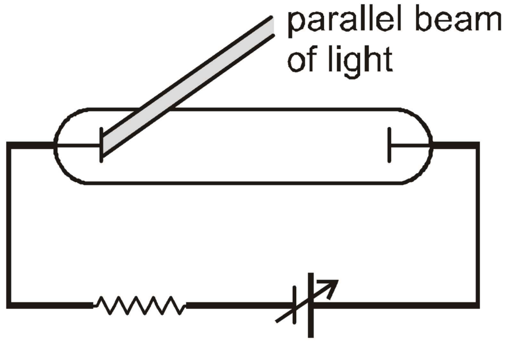
a) (a) s ; (b) p; (c) r; (d) q

b) (a) p ; (b) q; (c) r; (d) s

c) (a) r ; (b) s; (c) p; (d) q

d) (a) s ; (b) r; (c) q; (d) p

Q18 In the shown experimental setup to study photoelectric effect, two conducting electrodes are enclosed in an evacuated glass-tube as shown. A parallel beam of monochromatic light, falls on photosensitive electrodes. The emf of battery shown is high enough such that all photoelectrons ejected from left electrode will reach the right electrode. Under initial conditions photoelectrons are emitted. As changes are made in each situation of column I; Match the statements in column I with results in column II.



Column I	**Column II**
(a) If frequency of incident light is increased keeping its intensity constant	(p) magnitude of stopping potential will increase
(b) If frequency of incident light is increased and its intensity is decreased.	(q) current through circuit may stop
(c) If work function of photo sensitive electrode is increased	(r) maximum kinetic energy of ejected photoelectrons will increase
(d) If intensity of incident light is increased keeping its frequency constant	(s) saturation current will increase

a) (a) p,r; (b) p,r; (c) q; (d) s

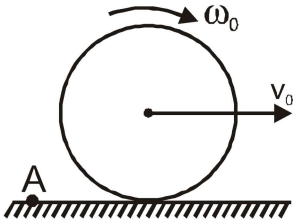
b) (a) p,q; (b) s,q; (c) p; (d) r

c) (a) s,r; (b) p,q; (c) r; (d) s

d) (a) s,q; (b) q,s; (c) s; (d) q

Q19 In each situation of column-I, a uniform disc of mass m and radius R rolls on a rough fixed horizontal surface as shown. At t=0 (initially) the angular velocity of disc is ω_o and velocity of centre of mass of disc is v_o(in horizontal direction). The relation between v_o and ω_o for each situation and also initial sense of rotation is given for each situation in column-I . Then match the statements in column-I with the corresponding results in column-II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the OMR.

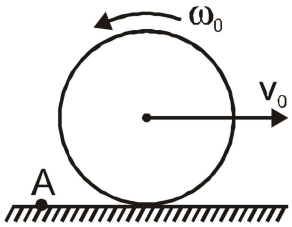
Column-I

(a) 

($v_o > R\,\omega_o$)

about point A

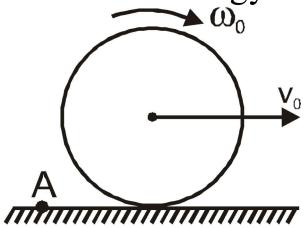
conserved.

(b) 

($v_o > R\,\omega_o$)

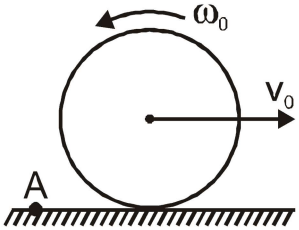
starts rolling

initial kinetic energy.

(c) 

($v_o < R\,\omega_o$)

slipping, the

(d) 

($v_o < R\,\omega_o$)

slipping, the friction acts

for some time to left.

Column-II

(p) The angular momentum of disc (as shown in figure) remains

(q) The kinetic energy of disc after it without slipping is less than its

(r) In the duration disc rolls with friction acts on disc towards left.

(s) In the duration disc rolls with on disc for some time to right and

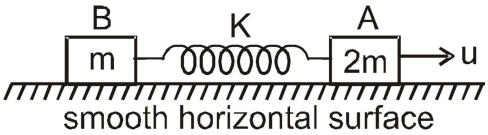
a) (a) p,q,r; (b) p,r,s; (c) r,s; (d) p,q

b) (a) p,q,r; (b) p,q,r; (c) p,q; (d) p,q,r

c) (a) q,r,s; (b) s,r,p; (c) r,s; (d) p,q,s

d) (a) p,s,r; (b) p,r,s; (c) s,q; (d) p,q,r,s

Q20 Two blocks A and B of mass m and 2m respectively are connected by a massless spring of spring constant K. This system lies over a smooth horizontal surface. At t = 0 the block A has velocity u towards right as shown while the speed of block B is zero, and the length of spring is equal to its natural length at that instant. In each situation of column I, certain statements are given and corresponding results are given in column II. Match the statements in column I corresponding results in column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the OMR.



Column I	**Column II**
(a) The velocity of block A	(p) can never be zero
(b) The velocity of block B	(q) may be zero at certain instants of time
(c) The kinetic energy of system of two blocks	(r) is minimum at maximum compression of spring
(d) The potential energy of spring	(s) is maximum at maximum extension of spring

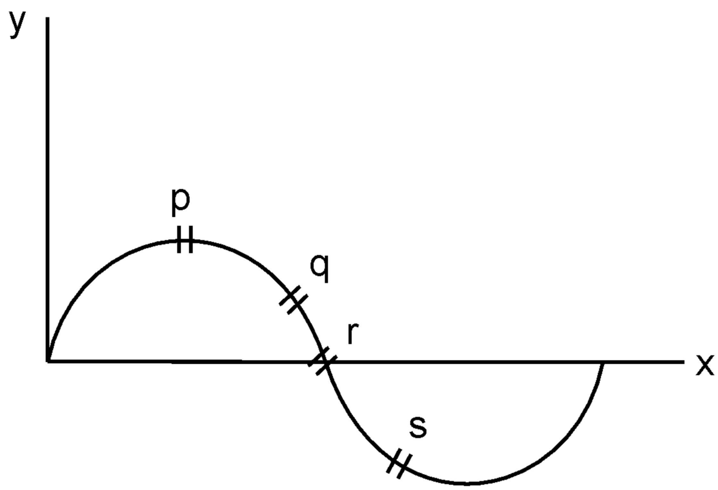
a) (a) p; (b) q; (c) p,r; (d) q,s
b) (a) q; (b) r; (c) p,r; (d) r,s
c) (a) r; (b) s; (c) p,q; (d) r,q
d) (a) s; (b) p; (c) q,s; (d) r,s

Q21 Match the statements in column-I with the statements in column-II.

Column-I	**Column-II**
(a) A tight string is fixed at both ends and formed sustaining standing wave	(p) At the middle, antinode is in odd harmonic
(b) A tight string is fixed at one end and free at the other end	(q) At the middle, node is formed in even harmonic
(c) Standing wave is formed in an open organ pipe. End correction is not negligible.	(r) At the middle, neither node nor antinode is formed
(d) Standing wave is formed in a closed of any organ pipe. End correction is not negligible.	(s) Phase difference between SHMs two particles will be either π or zero.

a) (a) p,r,s; (b) q,r; (c) r; (d) p,q
b) (a) p,q,s; (b) r,s; (c) s; (d) r,s
c) (a) r,s,q; (b) p,q; (c) p; (d) s,p
d) (a) p,q,s; (b) s,p; (c) q; (d) p,r,s

Q22 The figure here shows a snapshot of a taut string carrying a wave traveling in positive x direction. Also shown are four identical elements named p, q, r and s on the string. Column-I lists name of the elements, while column-II lists different characteristics. Considering upwards as positive, match entries in column-I to all possible entries in column-II.



Column-I	**Column-II**
(a) p	(p) Acceleration is negative
(b) q	(q) Velocity is positive
(c) r	(r) Kinetic Energy is maximum
(d) s	(s) P.E. is maximum

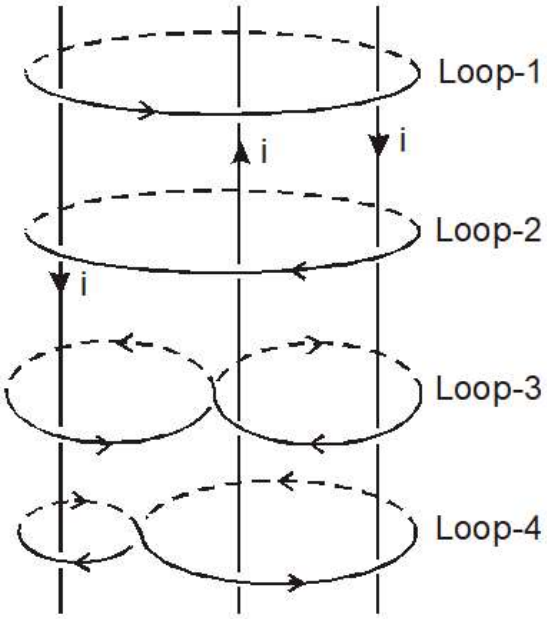
a) (a) s; (b) r,s; (c) q,r,s; (d) r

b) (a) r; (b) s,q; (c) q,p,s; (d) s

c) (a) q; (b) s,r; (c) p,q,r; (d) p

d) (a) p; (b) p,q; (c) q,r,s; (d) q

Q23 Three wires are carrying same constant current i in different directions. Four loops enclosing the wires in different manners are shown. The direction of $d\vec{\ell}$ is shown in the figure :



Column I	**Column II**
(a) Along closed Loop-1	(p) $\oint \vec{B} \cdot d\vec{\ell} = \mu_0 i$
(b) Along closed Loop-2	(q) $\oint \vec{B} \cdot d\vec{\ell} = -\mu_0 i$
(c) Along closed Loop-3	(r) $\oint \vec{B} \cdot d\vec{\ell} = 0$
(d) Along closed Loop-4	(s) net work done by the magnetic force to move a unit charge along the loop is zero.

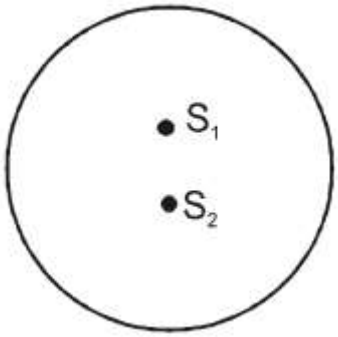
a) (a) q,s; (b) p,s; (c) q,s; (d) p,s

b) (a) p,q; (b) r,s; (c) s,r; (d) p,q

c) (a) r,s; (b) q,r; (c) p,q; (d) q,s,r

d) (a) p,q; (b) p,s; (c) r,q; (d) p,s

Q24 Two coherent point sources of light having wavelength λ are seperated by a distance d. A circle is drawn in space surrounding both the point sources as shown. The plane of circle contains both the point sources. The distance d between both the sources is given in column-I and the total number of corresponding points of maximum intensity and minimum intensity on the periphery of the shown circle are given in column-II. Match each situation of column-I with the results in column-II.



Column-I	Column-II
(a) d = 99.4 λ	(p) 398 points of maximum intensity
(b) d = 99.6 λ	(q) 400 points of maximum intensity
(c) d = 100 λ	(r) 396 points of minimum intensity
(d) d = 100 .4 λ	(s) 400 points of minimum intensity

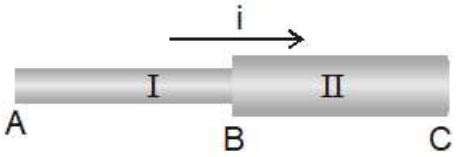
a) (a) p,q; (b) r,s; (c) s,r; (d) p

b) (a) q,s; (b) r,p; (c) q,s; (d) q

c) (a) r,s; (b) p,s; (c) s,p; (d) r

d) (a) p,r; (b) p,s; (c) q,s; (d) s

Q25 Column I gives physical quantities of a situation in which a current i passes through two rods I and II of equal length that are joined in series. The ratio of free electron density (n), resistivity (ρ) and cross-section area (A) of both are in ratio $n_1 : n_2 = 2 : 1$, $\rho_1 : \rho_2 = 2 : 1$ and $A_1 : A_2 = 1 : 2$ respectively. Column II gives corresponding results. Match the ratios in Column I with the values in Column II and indicate your answer by darkening appropriate bubbles in the 4 × 4 matrix given in the OMR.



Column I	Column II
(a) $\frac{\text{Drift velocity of free electron in rod I}}{\text{Drift velocity of free electron in rod II}}$	(p) 0.5
(b) $\frac{\text{Electric field in rod I}}{\text{Electric field in rod II}}$	(q) 1
(c) $\frac{\text{Potential difference across rod I}}{\text{Potential difference across rod II}}$	(r) 2
(d) $\frac{\text{Average time taken by free electron to move from A to B}}{\text{Average time taken by free electron to move from B to C}}$	(s) 4

a) (a) p; (b) q; (c) s; (d) r

b) (a) r; (b) s; (c) q; (d) p

c) (a) q; (b) s; (c) s; (d) q

d) (a) s; (b) r; (c) p; (d) q

Chemistry

Single Choice Question

Q26 Match the following Column I with Column II and choose the correct codes from the option given below.

	Column I		Column II
A.	46 g of Na	1.	0.01 mol
B.	6.022×10^{23} molecules of H_2O	2.	2 mol
C.	0.224 L of O_2 at STP	3.	1 mol
D.	84 g of N_2	4.	6.022×10^{23} atom/molecules
E.	1 mole of any gas	5.	3 mol.

a) A → 2 ; B → 3; C →1; D → 5; E → 4

b) A → 1; B → 2; C →3; D → 4; E → 5

c) A → 4 ; B → 2; C →1; D → 3; E → 4

d) A → 5 ; B → 4 ; C →3; D → 1; E → 2

Q27 Match the Column I with Column II and select the correct answer using given codes.

Column I		Column II
A.	F	1. Maximum electron affinity
B.	Cl	2. Maximum electronegativity
C.	Br	3. Exists as X_2 in liquid state
D.	I	4. X_2 sublimates on heating.

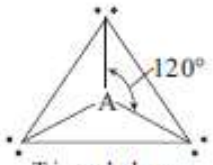
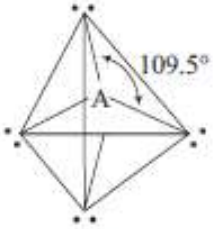
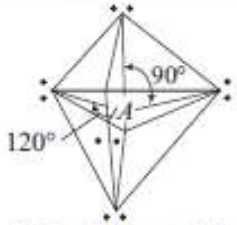
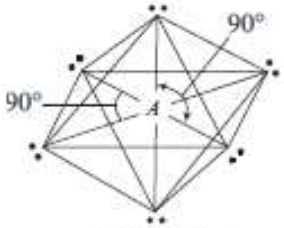
a) A → 2; B → 1; C → 4; D → 3

b) A → 2; B → 1; C → 3; D → 4

c) A → 2; B → 3; C → 1; D → 4

d) A → 3; B → 1; C → 4; D → 2

Q28 Match the following columns and choose the correct option from the codes given below :

Column I		Column II
A.	 Trigonal planar	1. PCl_5
B.	 Tetrahedral	2. NH_4^+
C.	 Trigonal bipyramidal	3. SF_6
D.	 Octahedral	4. BF_3

a) A → 1; B → 2; C → 3; D → 4

b) A → 4; B → 3; C → 2; D → 1

c) A → 4; B → 2; C → 1; D → 3

d) A → 3; B → 1 ; C → 2; D → 4

Q29 Match the Column I with Column II and choose the correct option from the codes given below.

	Column I (Hydrolysis of the salts)		Column II (Example)
A.	Weak acid and strong base	1.	NH_4Cl
B.	Strong acid and weak base	2.	CH_3COONH_4
C.	Weak acid and weak base	3.	CH_3COONa

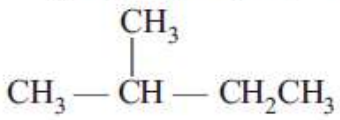
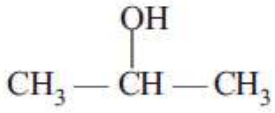
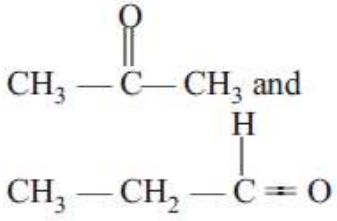
a) A → 3; B → 2; C → 1
b) A → 1; B → 2; C → 3
c) A → 2; B → 3; C → 1
d) A → 3; B → 1; C → 2

Q30 Match the Column I with Column II and select the correct option from the codes given below.

	Column I (Compounds)	Column II (Oxidation number of nitrogen)	
A.	N_2O_3	1.	– 3
B.	HNO_3	2.	+5
C.	NO	3.	+3
D.	NH_4OH	4.	+2

a) A → 2; B → 3; C → 4; D → 1
b) A → 1; B → 2 ; C → 3; D → 4
c) A → 4; B → 1 ; C → 2 ; D → 3
d) A → 3; B → 2 ; C → 4 ; D → 1

Q31 Match the items of Column I with the Column II andchoose the correct option from the codes given below.

	Column I (Structure of compounds)		Column II (Type of isomerism)
A.	$CH_3CH_2CH_2CH_2CH_3$ and 	1.	Chain isomerism
B.	$CH_3CH_2CH_2OH$ and 	2.	Position isomerism
C.		3.	Metamerism
D.	$CH_3OC_3H_7$ and $C_2H_5OC_2H_5$	4.	Functional group isomerism

a) A → 1; B → 2; C → 3; D → 4

b) A → 2; B → 3; C → 1; D → 4

c) A → 4; B → 1; C → 2; D → 3

d) A → 1; B → 2; C → 4 D → 3

Q32 Match the Column I with Column II and choose the correct option from the codes given below.

Column I		Column II	
A.	$RC\equiv CR \xrightarrow[CH_3COOH]{BH_3,\ THF}$	1.	$CH_3-C\equiv C-Na$
B.	$RC\equiv CR \xrightarrow[H_2]{Pd/Ni}$	2.	$R-CH_2-\overset{\overset{O}{\|}}{C}-R$
C.	$\overset{\overset{Br}{\|}}{CH_2}\ CH_2Br \xrightarrow[NaNH_2]{Alc.\ KOH}$	3.	$CH_3-C\equiv C-OH$
D.	$CH_3C\equiv CH \xrightarrow{NaNH_2}$	4.	$R-CH_2-CH_2-R$
		5.	$CH\equiv CH$

a) A → 2; B → 4; C → 5; D → 1
b) A → 2; B → 4; C → 5; D → 3
c) A → 2; B → 5; C → 4; D → 1
d) A → 2; B → 4; C → 3; D → 5

Q33 Match the following reactants in Column I with the corresponding reaction products in Column II and choose the correct option from the codes given below.

Column I		Column II	
A.	Benzene + $Cl_2 \xrightarrow{AlCl_3}$	1.	Benzene sulphonic acid
B.	Benzene + $CH_3Cl \xrightarrow{AlCl_3}$	2.	Methyl phenyl ketone
C.	Benzene + $CH_3COCl \xrightarrow{AlCl_3}$	3.	Toluene
D.	Benzene $\xrightarrow{H_2SO_4}$	4.	Chlorobenzene

a) A → 4; B → 3; C → 2; D → 1
b) A → 4; B → 3; C → 1; D → 2
c) A → 3; B → 4; C → 1; D → 2
d) A → 3; B → 4; C → 2; D → 1

Q34 Match the following columns and choose the correct option from the codes given below.

Column I (Solution example)	**Column II** (Type of solution)
A. Chloroform mixed with nitrogen gas	1. Gaseous solution
B. Ethanol dissolved in water	2. Solid solution
C. Amalgam of mercury with sodium	3. Liquid solution

a) A → 1; B → 2; C → 3
b) A → 1; B → 3; C →2
c) A → 2; B → 1; C → 3
d) A → 2; B → 3; C → 1

Q35 Match the terms given in Column I with the units given in Column II.

Column I	**Column II**
A. Λ_m	1. S cm^{-1}
B. E_{cell}	2. Ω^{-1}
C. κ	3. S cm^2 mol^{-1}
D. G	4. V

a) A → 3; B → 4; C → 1; D → 2
b) A → 4; B → 3; C → 2; D → 1
c) A → 3; B → 4; C → 2; D → 1
d) A → 4; B → 3; C → 1; D → 2

Q36 Match the terms of Column I with Column II and choose the correct option from the codes given below.

Column I	**Column II**
A. Inversion of cane sugar.	1. Zero order reaction
B. Decomposition of N_2O	2. First order reaction
C. Thermal decomposition of HI on gold surface.	3. Pseudo first order reaction

a) A → 1; B → 2; C → 3
b) A → 2; B → 3; C → 1
c) A → 3; B → 2; C → 1
d) A → 2; B → 1; C → 3

Q37 Match the compounds given in Column I with the hybridization and shape given in Column II and mark the correct option

Column I	Column II
A. XeF_6	1. sp^3d^3 -distorted octahedral
B. XeO_3	2. sp^3d^2 -square planar
C. $XeOF_4$	3. sp^3 -pyramidal
D. XeF_4	4. sp^3d^2 -square pyramidal

a) A → 1; B → 3; C → 4; D → 2
b) A → 1; B → 2; C → 4; D → 3
c) A → 4; B → 3; C → 1; D → 2
d) A → 4; B → 1; C → 2; D → 3

Q38 Match the symbols of actinoid with Column I withcorrect electronic configuration given in Column II and choose the correct option from the codes given below.
(Atomic number) Pa = 91, Np = 93, Am = 95, Es = 99, Cf = 98, No = 102.

Column I (Actinoid)		Column II [(Electronic configuration (*M*)]	
A.	Pa	1.	$5f^{10}7s^2$
B.	Np	2.	$5f^{14}7s^2$
C.	Am	3.	$5f^{11}7s^2$
D.	Es	4.	$5f^{7}7s^2$
E.	Cf	5.	$5f^{4}6d^{1}7s^2$
F.	No	6.	$5f^{2}6d^{1}ns^2$

a) A → 4 ; B → 6 ; C → 3 ; D → 5 ; E → 2 ; F → 1
b) A → 1 ; B → 4 ; C → 2 ; D → 6 ; E → 5 ; F → 3
c) A → 6 ; B → 5 ; C → 4 ; D → 3 ; E → 1 ; F → 2
d) A → 3 ; B → 5 ; C → 4 ; D → 2 ; E → 3 ; F → 1

Q39 Match the columns (formulation of cobalt III chloride ammonia complexes) and choose the correct option from the codes given below.

Column I (Colour)		Column II (Formula)	Column III (Solution conductivity corresponds to)	
A. Yellow	1.	$[Co(NH_3)_6]^{3+}\,3Cl^-$	I.	1 : 2 electrolyte
B. Green	2.	$[CoCl(NH_3)_5]^{2+}\,2Cl^-$	II.	1 : 1 electrolyte
C. Purple	3.	$[CoCl_2(NH_3)_4]^{+}\,Cl^-$	III.	1 : 3 electrolyte

a) A → 2(I); B → 1(II) ; C → 3(III)
b) A → 3(II) ; B → 2(III) ; C → 1(I)
c) A → 1(III) ; B → 3(II) ; C → 2(I)
d) A → 2(III) ; B → 3(I) ; C → 1(II)

Q40 Match the following columns and choose the correct option from the codes given below.

Column I		Column II
A. $[Co(NH_3)_6]^{3+}$	1.	Tetrahedral
B. $[Ni(CO)_4]$	2.	Octahedral
C. $[PtCl_4]^{2-}$	3.	Square planar

a) A → 1; B → 2; C → 3
b) A → 2; B → 1; C → 3
c) A → 3; B → 2; C → 1
d) A → 3; B → 1; C → 2

Q41 Match the columns.

Column I	Column II
(A) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$	(P) $K_P = K_C\,(RT)$
(B) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$	(Q) $K_P = K_C\,(RT)^2$
(C) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$	(R) $K_P = K_C\,(RT)^{-2}$
(D) $NH_4HS(s) \rightleftharpoons NH_3(g) + H_2S(g)$	(S) $K_P = K_C$

a) A → Q; B → R; C → P; D→ S

b) A → S; B → P; C → R; D→ Q

c) A → S; B → R; C → P; D→ Q

d) A → P; B → R; C → S; D→ Q

Q42 Match the alkyl halide reacting with reagent given in Column I with their respective substituted product given in Column II and choose the correct option from the codes given below.

Column I (Reagent)	Column II (Substituted product)
A. KCN	1. *R*H
B. AgCN	2. *R*CN
C. KNO_2	3. *R*NC
D. $LiAlH_4$	4. *R*—O—N ==O
E. $AgNO_2$	5. *R*—NO_2

a) A → 2; B → 3; C → 5; D → 1; E → 4

b) A → 3; B → 2; C → 5; D → 1; E → 4

c) A → 2; B → 3; C → 4; D → 1; E → 5

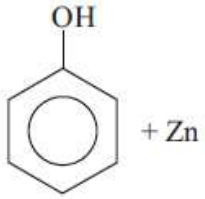
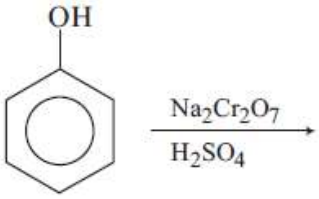
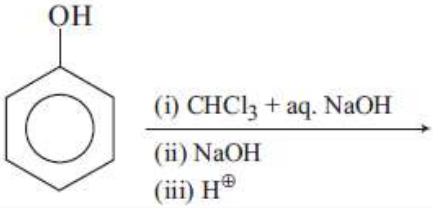
d) A → 3; B → 2; C → 4; D → 1; E → 5

Q43 Match the following column I which represents statements to the Column II representing
corresponding compounds.

Column I	Column II
A. The compounds that rotates the plane polarised light to the right, i.e. clockwise.	1. Enantiomers
B. The compounds that rotate the plane polarised light to the left, i.e. anti-clockwise.	2. Dextrorotatory
C. The stereoisomers related to each other as non-superimposable mirror images	3. Laevorotatory

a) A → 3; B → 1; C → 2
b) A → 1; B → 2; C → 3
c) A → 2; B → 3; C → 1
d) A → 2; B → 1; C → 3

Q44 Match the following reactants and reagents given in Column I with the products given in Column II and choose the correct option from the codes given below.

Column I	Column II
A.  + Zn	1. Benzene
B.  $\xrightarrow[H_2SO_4]{Na_2Cr_2O_7}$	2. Salicylaldehyde
C.  $\xrightarrow[(ii)\ NaOH]{(i)\ CHCl_3 + aq.\ NaOH}$ $\xrightarrow{(iii)\ H^{\oplus}}$	3. Benzoquinone

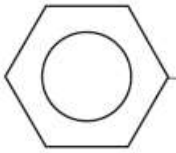
a) A → 3 B → 1 C → 2
b) A → 1 B → 3 C → 2
c) A → 1 B → 2 C → 3
d) A → 3 B → 2 C → 1

Q45 Match the reactions given in Column I with the suitable reagents given in Column II and choose the correct option from the codes given below

Column I (Reactions)	**Column II** (Reagents)
A. Ethane nitrile to ethanal	1. O_3 / H_2O - Zn dust
B. Allyl alcohol to propanal	2. (DIBAL-H)
C. But-2-ene to ethanal	3. PCC

a) A → 1; B → 2; C → 3
b) A → 3; B → 2; C → 1
c) A → 2; B → 3; C → 1
d) A → 2; B → 1; C → 3

Q46 Match the following Column I (reactant) with their products given in Column II and choose the correct option from the codes given below.

Column I	**Column II**
A. $H_5C_2NH_2 + H_3CCOCl$	1. Acetanilide
B. H_5C_2—NH—C_2H_5 + H_3CCOCl	2. N,N-diethylethanamide
C.  —NH_2 + $H_3CCO)_2O$	3. N-ethylethanamide

a) A → 1; B → 3; C → 2
b) A → 3; B → 1; C → 2
c) A → 1; B → 2; C → 3
d) A → 3; B → 2; C → 1

Q47 Match the following enzymes given in Column I with the reactions they catalyse given in Column II and select the correct option from the codes given below.

Column I (Enzymes)	**Column II** (Reactions)
A. Invertase	1. Decomposition of urea into NH_3 and CO_2.
B. Maltase	2. Conversion of glucose into ethyl alcohol.
C. Pepsin	3. Hydrolysis of maltose into glucose.
D. Urease	4. Hydrolysis of cane sugar
E. Zymase	5. Hydrolysis of proteins into peptides

a) A → 4; B → 1; C → 5 ; D → 3; E → 2

b) A → 4; B → 3; C → 5 ; D → 1; E → 2

c) A → 4; B → 1; C → 3 ; D → 5 ; E → 2

d) A → 4; B → 5; C → 1 ; D → 3 ; E → 2

Q48 Match the terms mentioned in Column I with the terms in Column II and choose the correct option from codes given below.

Column I	**Column II**
A. Carbocation	1. Conjugation of Electrons of C-H σ–bond with empty p-orbital present at adjacenet positively charged carbon.
B. Nucleophile	2. sp^2 hybridised carbon with empty p-orbital.
C. Hyperconjugation	3. Ethyne
D. sp-hybridisation	4. Species athat can receive a pair of electrons.
E. Electrophile	5. Species that can supply a pair of electrons.

a) A → 2; B → 5; C → 4 ; D → 3 ; E → 1

b) A → 2; B → 5; C → 1 ; D → 3 ; E → 4

c) A → 2; B → 5; C → 3 ; D → 1 ; E → 4

d) A → 3; B → 5; C → 2 ; D → 4 ; E → 1

Q49 Match the process of Column I with entropy or enthalpy change in ColumnII.

	Column I		Column II
(A)	$N_2(g) + O_2(g) \rightarrow 2NO(g)$	(P)	$\Delta S \approx 0$
(B)	$2KI(aq) + HgI_2(aq) \rightarrow K_2[HgI_4](aq)$	(Q)	$\Delta S < 0$
(C)	$PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$	(R)	$\Delta H > 0$
(D)	$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$	(S)	$\Delta H < 0$

a) (A → P, R; B → Q, S; C → R; D → Q, S)

b) (A → Q, S; B → P,R; C → R; D → Q, S)

c) (A → P, R; B → P; C → S; D → P,S)

d) (A → P,S; B → Q ; C → R; D → Q, P)

Q50 Match the columns.

Column I	Column II
(A) Ratio of speed of electron in the fifth and third excited state of H-atom.	(P) $\frac{4}{1}$
(B) Ratio of wavelength of series limit of Balmer and Lyman series of H-spectrum.	(Q) $\frac{3}{5}$
(C) Ratio of wavelength of photon corresponding to β-line of Lyman series and γ -line of Paschen series of H-spectrum.	(R) $\frac{1}{4}$
(D) Ratio of energy difference between 3rd and 1st orbits of H–atom and He^+ ion.	(S) $\frac{3}{32}$

a) A → R; B → P; C → S; D→ Q

b) A → Q; B → R; C → S; D→ P

c) A → Q; B → P; C → R; D→ S

d) A → Q; B → P; C → S; D→ R

Mathematics

Single Choice Question

Q51

Column – I		Column – II	
(A)	Set of values of x satisfying $\frac{5x+1}{(x+1)^2} < 1$ is	(P)	$[-3, 6)$
(B)	Value of x satisfying $\|x\| + \|x-3\| > 3$ is	(Q)	$(-\infty,-1)\cup(-1,0)\cup(3,\infty)$
(C)	Set of solution for $\left(\frac{1}{3}\right)^{\log_{1/9}\left(x^2-\frac{10}{3}x+1\right)} \le 1$ is	(R)	$(-\infty, 0)\cup(3,\infty)$
(D)	$\|2 - \|[x] - 1\|\| \le 2$ then ([·] represent greatest integer)	(S)	$[0,\frac{1}{3})\cup(3,\frac{10}{3}]$
		(T)	false

a) A→P,Q ; B→ R; C→ S ; D → T **b)** A→S ; B→R; C→P ; D→T
c) A→T ; B→R; C→P ; D→P **d)** A→ Q ; B→R; C→S ; D →P

Q52 Match the following :

Column I (Number of positive integers for which)		Column II	
(a)	one root is positive and the other is negative for the equation $(m-2)x^2-(8-2m)x-(8-3m)=0$	**(p)**	0
(b)	exactly one root of equation $x^2-m(2x-8)-15=0$ lies in interval (0, 1)	**(q)**	Infinite
(c)	the equation $x^2+2(m+1)x+9m-5=0$ has both roots negative	**(r)**	1
(d)	the equation $x^2+2(m-1)x+m+5=0$ has both roots lying on either sides of 1	**(s)**	2

a) a → p; b → r; c → q; d → p **b)** a → p; b → q; c → r; d → s
c) a → p; b → r; c → s; d → q **d)** a → r; b → p; c → p; d → s

Q53 Match the following equations with the number of real roots

Column – I		Column – II	
(A)	$x^7 + x^5 + x^3 - 1 = 0$	(P)	none
(B)	$4(x^4 + x^2 + 1) = 5(x^2 + x + 1)$	(Q)	One
(C)	$x^3 - x + 1 = 0$	(R)	Two
(D)	$x^2 + 5\|x\| + 6 = 0$	(S)	Three

a) A→P ; B→Q; C→R ; D→S
b) A→S ; B→R; C→P ; D→Q
c) A→S ; B→R; C→Q ; D→P
d) A→Q; B→R ; C→Q; D→P

Q54 Match the following : Consider all possible arrangement of letters of word 'SUCCESS'

Column – I		Column – II	
(A)	Number of words in which both 'C' are together	(P)	42
(B)	Number of words in which both 'C' as well as all 'S' are together	(Q)	120
(C)	Number of words in which order of consonants remain same	(R)	24
(D)	Number of words in which both 'C' together but no 'S' are together is N then value of 2N is	(S)	48

a) A→Q ; B→R ; C→P ; D→S
b) A→Q ; B→S ; C→P ; D→ R
c) A→R ; B→S ; C→P ; D→ Q
d) A→S ; B→R ; C→P ; D→ Q

Q55 Match the following :

Column- I	Column- II
(A) If three unequal numbers a, b, c are in A.P. and b – c, c – b, a are in G.P., then $\frac{a^3+b^3+c^3}{3abc}$ is equal to	**(P)** 1/3
(B) Let x be the arithmetic mean and y,z be two geometric means between any two positive numbers, then $\frac{y^3+z^3}{xyz}$ is equal to	**(Q)** 1
(C) If a, b, c be three positive number which form three successive terms of a G.P. and c> 4b –3a, then the common ratio of the G.P. can be equal to	**(R)** 2
(D) $\lim_{n\to\infty} \tan\left\{\sum_{r=1}^{n} \tan^{-1}\left(\frac{1}{2r^2}\right)\right\}$ is equal to	**(S)** 3

a) A→P ; B→Q ; C→R ; D→S
b) A→Q ; B→R ; C→S ; D→P
c) A→P ; B→R ; C→P; D→Q
d) A→R ; B→R ; C→P; D→Q

Q56 Match the following :

Column – I		Column – II	
(A)	$\arg\left(\frac{z^2-1}{z^2+1}\right)=0;\ z\neq\pm i,\pm 1$	(P)	Portions of a Line
(B)	$\|\|z-\cos^{-1}\cos 12\|-\|z-\sin^{-1}\sin 12\|\|=8(\pi-3)$	(Q)	Point of intersection of hyperbola
(C)	$z^2+k_1=i\|z_1\|^2+k_2;\ k_1\neq k_2\in R-\{0\}$ and z_1 is fixed $\neq 0$	(R)	Pair of open rays
(D)	$\left\|z-1-\sin^{-1}\frac{1}{\sqrt{3}}\right\|+\left\|z+\cos^{-1}\frac{1}{\sqrt{3}}-\frac{\pi}{2}\right\|=1$	(S)	Line Segment

a) A→ P,Q ; B→P,Q ; C→P,Q ; D→P,Q **b)** A→Q ; B→R ; C→S ; D→P

c) A→P ; B→R ; C→P; D→Q **d)** A→R ; B→P ; C→Q ; D→S

Q57 Match the following items of column-I with column-II

Column – I		Column – II	
(A)	Let X be the set all 13 digit integers where each digit can take values from [0, 9]. An integer is chosen at random from X. The probability that it is a palindrome, is $\frac{1}{10^n}$. The value of n is	(P)	8
(B)	If the coefficient of x^n in the expansion of $\frac{(1+x)^2}{(1-x)^2}$ is 32 then the value of $n\geq$	(Q)	6
(C)	Let a function is defined as f: R→R, with $f(x)=\frac{6}{1+31e^x}$. then f(x) is less than	(R)	7
(D)	If $5f(x)+3f\left(\frac{1}{x}\right)=x+2$ and $y=xf(x)$ then $\left.\frac{dy}{dx}\right\|_{x=1}$ is less than	(S)	1

a) A→ P,Q ; B→P,Q ; C→P,Q ; D→P,Q

b) A→Q ; B→R ; C→S ; D→P

c) A→P ; B→R ; C→P; D→Q

d) A→Q ; B→P,Q,R,S ; C→P,Q,R ; D→P,Q,R,S

Q58 Match the following:

Column I		Column II	
(a)	Coefficient of x in $f(x)=\begin{vmatrix} 1 & (1+\sin x)^3 & \cos x \\ 1 & \log(1+x) & 2 \\ x^2 & 1+x^2 & 0 \end{vmatrix}$	**(p)**	10
(b)	Maximum Value of $\begin{vmatrix} 1 & 3\cos\theta & 1 \\ \sin\theta & 1 & 3\cos\theta \\ 1 & \sin\theta & 1 \end{vmatrix}$ is	**(q)**	0
(c)	If a,b,c are in A.P. and $f(x)=\begin{vmatrix} x+a & x^2+1 & 1 \\ x+b & 2x^2-1 & 1 \\ x+c & 3x^2-2 & 1 \end{vmatrix}$, then $f'(0)$ is	**(r)**	−12
(d)	If $\begin{vmatrix} x & 2 & x \\ 1 & x & 6 \\ x & x & x+1 \end{vmatrix} = a_4x^4+a_3x^3+a_2x^2+a_1x+a_0$, then a_0 is.	**(s)**	−2

a) a→ q; b→p; c→q; d→s
b) a→q; b→r; c→s; d→p
c) a→p; b→r; c→p; d→q
d) a→r; B→p; c→q; d→s

Q59 Consider the matrix $A=\begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$; $B=\begin{bmatrix} \frac{1}{2} & 3 \\ 0 & 1 \end{bmatrix}$. Let P be an orthogonal matrix and Q = PAP^T, $R_K = P^TQ^KP$, $S = PBP^T$ & $T_K = P^TS^KP$. Where $K \in N$.

COLUMN I		COLUMN II	
(A)	$\sum_{K=1}^{5} a_K$, where a_K represents the element of first row & first column in matrix R_K	(P)	-9
(B)	$\sum_{K=1}^{3} b_K$, where b_K represents the element of second row & second column in matrix R_K	(Q)	10
(C)	$\sum_{K=1}^{\infty} x_K$, where x_K represents the element of first row & first column in matrix T_K	(R)	35
(D)	$\sum_{K=1}^{10} y_K$, where y_K represents the element of second row & second column in matrix T_K	(S)	1

a) A→S ; B→R ; C→P ; D→Q
b) A→Q ; B→R ; C→P ; D→P
c) A→P ; B→R ; C→Q ; D→S
d) A→R ; B→P ; C→S ; D→Q

Q60 Match of the column

COLUMN I		COLUMN II	
(A)	Fundamental period of $f(x) = [x] + [2x] + [3x] + \dots \dots + [nx] - \frac{n(n+1)}{2}x$ is (where [.] is represent greatest integer function)	(P)	$\sin^2 x - \cos^2 x$ when $x = \pi/4$
(B)	$\lim\limits_{x\to0} \frac{\sin(\pi\cos^2 x)}{\pi x^2}$ is	(Q)	$\sin^2 x + \cos^2 x$ when $x = \pi/4$
(C)	Let A and B are square matrices of order 3 × 3 which satisfy AB = A and BA = B. If $(A - B)^5 = k(A - B)$ then k =	(R)	$\lim\limits_{x\to0} \frac{\sin x}{x}$
(D)	If $A = \begin{bmatrix} 0 & x & x \\ 2y & y & -y \\ z & -z & z \end{bmatrix}$ and $AA' = I$, then $x^2 + y^2 + z^2 =$	(S)	HCF of (3, 4)

a) A→ Q,R,S ; B→ Q,R,S ; C→ Q,R,S ; D→ Q,R,S

b) A→Q,R,S ; B→Q,R,S; C→ Q,R,S ; D→ P

c) A→Q,R,S ; B→P; C→ Q,R,S ; D→ P

d) A→Q,R,S ; B→Q,R,S; C→P ; D→Q,R,S

Q61 Match the following :

Column – I		Column - II	
(A)	The number of complex numbers satisfying $\lvert z + 2i\rvert + \lvert z - 2i\rvert = 8$ and $\lvert z - i\rvert + \lvert z + i\rvert = 2$ is	(P)	5
(B)	The value of 3 + (cot14º – 1) (cot 31º – 1) is	(Q)	0
(C)	Any chord of the conic $x^2 + y^2 + xy = 1$ through (0, 0) is bisected at (p, q) then p + q is equal to	(R)	9
(D)	Line L_1 : 3x + 4y + 12 = 0 is rotated by an angle of $\tan^{-1}\left(\frac{24}{7}\right)$ in anticlockwise direction with respect to the point, where it cuts the x-axis. If line obtained in new position is shown by $L_2 = 0$. If the incentre of the triangle Formed by $L_1 = 0$, $L_2 = 0$ and y-axis is (4λ, 3k) then 10k – 24λ is equal to	(S)	4

a) A→S ; B→R ; C→P ; D→Q

b) A→S; B→Q; C→P ; D→R

c) A→P ; B→R ; C→Q ; D→S

d) A→Q ; B→P ; C→Q ; D→R

Q62 Consider the lines given by
$L_1 : x + 3y - 5 = 0,$
$L_2 : 3x - ky - 1 = 0$
$L_3 : 5x + 2y - 12 = 0$
Now match the following

Column – I		Column - II	
(A)	L_1, L_2, L_3 are concurrent, if	(P)	$k = -9$
(B)	One of L_1, L_2, L_3 is parallel to at least one of the other two, if	(Q)	$k = -\frac{6}{5}$
(C)	L_1, L_2, L_3 form a triangle, if	(R)	$k = \frac{5}{6}$
(D)	L, L_2, L_3 do not form a triangle, if	(S)	$k = 5$

a) A→S ; B→R ; C→P ; D→Q
b) A→S; B→Q; C→P ; D→R
c) A→P ; B→R ; C→Q ; D→S
d) A→S ; B→P, Q ; C→R ; D→P,Q,S

Q63

Column - I		Column - II	
(A)	The differential equation $y = x\frac{dy}{dx} + \frac{dx}{dy}$ represents	(P)	Pair of Straight Line
(B)	If an ellipse slides between two perpendicular straight lines, then the locus of its centre is	(Q)	Straight Line
(C)	If a, b are real numbers and c > 0, then the locus of represented by the equation $\|ay - bx\| = c\sqrt{(x-a)^2 + (y-b)^2}$	(R)	Circle
(D)	If $h \neq 0$ and $\frac{a}{h} = \frac{c}{b}$, then the equation $hxy + ax + by + c = 0$ represents	(S)	Parabola

a) A→S ; B→R ; C→P ; D→Q
b) A→S; B→Q; C→P ; D→R
c) A→P ; B→R ; C→Q ; D→S
d) A→S ; B→R ; C→Q ; D →P

Q64

	Column – I		Column – II
(A)	The maximum value of 12 $\sin\theta - 9\sin^2\theta$ is	(P)	$-\sqrt{2}$
(B)	Minimum value of $5\sin^2\theta + 4\cos^2\theta$	(Q)	$4-\sqrt{10}$
(C)	The minimum value of $\cos\theta - \sin\theta$ is	(R)	$4+\sqrt{10}$
(D)	The least value of $\cos^2\theta - 6\sin\theta\cos\theta + 3\sin^2\theta + 2$	(S)	4
(E)	The max value of $\sin\left(\theta+\frac{\pi}{6}\right)+\cos\left(\theta+\frac{\pi}{6}\right)$ is attained at $\theta =$	(T)	$\frac{\pi}{12}$

a) A→S ; B→S ; C→P ; D→Q ; E → T

b) A→S; B→Q; C→P ; D→R ; E → T

c) A→P ; B→R ; C→Q ; D→S ; E → T

d) A→Q, R, S ; B→P ; C→S ; D→P, R ; E→T

Q65

	Column –I		Column –II
(A)	$\int_0^{\pi/2} \frac{\cos}{(1+\sin x)(2+\sin x)} dx =$	(P)	$\frac{\pi}{6}$
(B)	$\int_0^{\frac{41\pi}{4}} \lvert\cos x\rvert dx =$	(Q)	$20+\frac{1}{\sqrt{2}}$
(C)	$\int_{-1/2}^{1/2} \left([x]+\ln\left(\frac{1+x}{1-x}\right)\right)dx =$ where [•] greatest integer function	(R)	Ln 4 –ln3
(D)	$\int_0^{\pi/2} \frac{2\sqrt{\cos\theta}}{3\left(\sqrt{\sin\theta}+\sqrt{\cos\theta}\right)} d\theta$	(S)	$-\frac{1}{2}$

a) [A → R; B →Q; C → P; D → S]

b) [A → P; B → Q; C → S; D → R]

c) [A →R; B → P; C → S; D → R]

d) [A → R; B → Q; C → S; D → P]

Q66 The set of all points of continuity of f(x) where f is given by

Column – I		Column – II	
(A)	$[x] + \sqrt{x - [x]}$	(P)	$\pm\sqrt{n}$, $n \in I^+ \cup 0$
(B)	$[x] + [-x]$	(Q)	$(0, \infty)$
(C)	$\cos \log x$	(R)	$R - I$
(D)	$x^2 + [x^2]$	(S)	R

a) A→Q ; B→Q ; C→Q ; D→Q

b) A→S ; B→R ; C→Q ; D→P

c) A→P ; B→R ; C→Q ; D→S

d) A→Q ; B→R ; C→S ; D→P

Q67 Match the following :

Column – I (Functions)		Column – II (Properties at x = 0)	
(A)	$f(x) = \begin{cases} \frac{\sin^2 x}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$	(P)	Continuous
(B)	$f(x) = \begin{cases} x^3 - 2x, & x < 0 \\ x^2 - 2\sin(x), & x \geq 0 \end{cases}$	(Q)	Discontinuous
(C)	$f(x) = \begin{cases} 4 - x^2, & x < 0 \\ 5 - x^2, & x \geq 0 \end{cases}$	(R)	Differentiable
(D)	$f(x) = \begin{cases} 3 - 2x, & x < 1 \\ 7 - 6x, & x \geq 1 \end{cases}$	(S)	Non-differentiable

a) A → P,R,S ; B → S ; C → P ; D → Q, R

b) A → R, S ; B → S ; C → P, Q ; D → Q, R

c) A → P, R, S ; B → S ; C → P, Q ; D → Q, R

d) A→P,R ; B→P,R ; C→Q,S ; D→P,R

Q68 Match of the column

Column – I (Functions)		Column – II (Continuity and differentiability)	
(A)	Domain of $\sin^{-1}[2x-1]$ is (where [.] denotes greatest integer function)	(P)	[0, 3/2]
(B)	Range of $\frac{1}{\ln(e\{x\})}$ is (where {.} represent fractional part function)	(Q)	$(-\infty, 0]$ or $[1, \infty)$
(C)	Greatest interval, in which $f(x) = 4x^3 - 9x^2 + 13$ is decreasing, in	(R)	$(-\infty, 0) \cup (1, \infty)$
(D)	An interval in which f(x), where $f'(x) = x(x-2)^2(x-1)^{79}(1+\sin^2 x)$ is strictly increasing	(S)	[0, 3/2)

a) $A \rightarrow P,R,S$; $B \rightarrow S$; $C \rightarrow P$; $D \rightarrow Q, R$

b) $A \rightarrow R, S$; $B \rightarrow S$; $C \rightarrow P, Q$; $D \rightarrow Q, R$

c) $A \rightarrow P, R, S$; $B \rightarrow S$; $C \rightarrow P, Q$; $D \rightarrow Q, R$

d) $A \rightarrow S$; $B \rightarrow R$; $C \rightarrow P$; $D \rightarrow Q$

Q69

	Column-I		Column-II
(A)	Lines $\frac{x-1}{-2}=\frac{y+2}{3}=\frac{z}{-1}$ and $\vec{r}=(3\hat{i}-\hat{j}+\hat{k})+t(\hat{i}+\hat{j}+\hat{k})$ are	(P)	Intersecting
(B)	Lines $\frac{x+5}{1}=\frac{y-3}{7}=\frac{z+3}{3}$ and $x-y+2z-4=0=2x+y-3z+5$ are	(Q)	Perpendicular
(C)	Lines $(x=t-3, y=-2t+1, z=-3t-2)$ and $\vec{r}=(t+1)\hat{i}+(2t+3)\hat{j}+(-t-9)\hat{k}$ are	(R)	Parallel
(D)	$\vec{r}=(\hat{i}+3\hat{j}-\hat{k})+t(2\hat{i}-\hat{j}-\hat{k})$ and $\vec{r}=(-\hat{i}-2\hat{j}+5\hat{k})+s\left(\hat{i}-2\hat{j}+\frac{3}{4}\hat{k}\right)$ are	(S)	Skew
		(T)	Coincident

a) $[A \rightarrow S, T; B \rightarrow R; C \rightarrow P; D \rightarrow Q]$

b) $[A \rightarrow Q, S; B \rightarrow R; C \rightarrow P,Q; D \rightarrow P]$

c) $[A \rightarrow Q, S; B \rightarrow P; C \rightarrow R; D \rightarrow Q]$

d) $[A \rightarrow P; B \rightarrow R; C \rightarrow S; D \rightarrow P, Q]$

Q70 Match the following lists:

	List I		List II
(a)	If $\lvert\vec{a}+\vec{b}\rvert=\lvert\vec{a}+2\vec{b}\rvert$, then angle between $\vec{a}$ and $\vec{b}$ is	(p)	90°
(b)	If $\lvert\vec{a}+\vec{b}\rvert=\lvert\vec{a}-2\vec{b}\rvert$, then angle between $\vec{a}$ and $\vec{b}$ is	(q)	Obtuse
(c)	If $\lvert\vec{a}+\vec{b}\rvert=\lvert\vec{a}-\vec{b}\rvert$, then angle between $\vec{a}$ and $\vec{b}$ is	(r)	0°
(d)	Angle between $\vec{a}\times\vec{b}$ and a vector perpendicular to the vector $\vec{c}\times(\vec{a}\times\vec{b})$ is	(s)	actue

a) $a \rightarrow q; b \rightarrow s; c \rightarrow p; d \rightarrow r$

b) $a \rightarrow q; b \rightarrow r; c \rightarrow q; d \rightarrow p$

c) $a \rightarrow r; b \rightarrow q; c \rightarrow s; d \rightarrow p$

d) $a \rightarrow r; b \rightarrow s; c \rightarrow q; d \rightarrow p$

Q71 A bag contains some white and some black balls, all combinations being equally likely. The total number of balls in the bag is 12. Four balls are drawn at random from the bag at random without replacement.

Column I		Column II	
(a)	Probability that all the four balls are black is equal to	**(p)**	14/33
(b)	If the bag contains 10 black and 2 white balls then the probability that all four balls are black is equal to	**(q)**	1/3
(c)	If all the four balls are black, then the probability the bag contains 10 black balls is equal to	**(r)**	70/429
(d)	Probability that two balls are black and two are while is	**(s)**	13/165

a) $a \to r;\ b \to s;\ c \to q;\ d \to p$ **b)** $a \to q;\ b \to r;\ c \to q;\ d \to s$

c) $a \to s;\ b \to p;\ c \to q;\ d \to r$ **d)** $a \to q;\ b \to p;\ c \to r;\ d \to q$

Q72 Match the relation for derivatives given in List II with the relation given in List I and then choose the correct code.

List I		List II	
(a)	$xy - \log y = 1$	**(p)**	$xy_2 - \frac{1}{2}y_1 - \frac{1}{4}y = 0$
(b)	$y = (\sin^{-1}x)/\sqrt{1-x^2}$	**(q)**	$(1-x^2)y_1 - xy = 1$
(c)	$y = \sqrt{2x - x^2}$	**(r)**	$y^2 + (xy-1)y_1 = 0$
(d)	$y = e^{\sqrt{x}} + e^{-\sqrt{x}}$	**(s)**	$y^3y_2 + 1 = 0$

a) $a \to s;\ b \to r;\ c \to q;\ d \to p$ **b)** $a \to q;\ b \to r;\ c \to q;\ d \to p$

c) $a \to r;\ b \to q;\ c \to s;\ d \to p$ **d)** $a \to r;\ b \to s;\ c \to q;\ d \to p$

Q73 Match the following lists: (where [.] is greatest integral function)

List I		List II	
(a)	$\lim_{x\to 0}\left(\left[100\frac{\sin x}{x}\right] + \left[100 + \frac{\tan x}{x}\right]\right)$	**(p)**	198
(b)	$\lim_{x\to 0}\left(\left[100\frac{x}{\sin x}\right] + \left[100 + \frac{\tan x}{x}\right]\right)$	**(q)**	199
(c)	$\lim_{x\to 0}\left(\left[100\frac{\sin^{-1}x}{x}\right] + \left[100 + \frac{\tan^{-1}x}{x}\right]\right)$	**(r)**	200
(d)	$\lim_{x\to 0}\left(\left[100\frac{x}{\sin^{-1}x}\right] + \left[100 + \frac{\tan^{-1}x}{x}\right]\right)$	**(s)**	201

a) $a \to s;\ b \to r;\ c \to q;\ d \to p$ **b)** $a \to q;\ b \to r;\ c \to q;\ d \to p$

c) $a \to p;\ b \to p;\ c \to q;\ d \to r$ **d)** $a \to r;\ b \to s;\ c \to r;\ d \to q$

Q74 Match the columns:

Column -I	Column -II
(A) $\int \frac{dx}{\sin^4 x+\cos^4 x}=$	(p) $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{\tan 2x}{\sqrt{2}}\right)$
(B) $\int \frac{\sin 2x}{(3+4\cos x)^3}dx=$	(q) $\frac{3+8\cos x}{16(3+4\cos x)^2}$
(C) $\int \frac{\sqrt{1-\sin x}}{1+\cos x}e^{\frac{-x}{2}}dx=e^{\frac{-x}{2}}P(x)$ then $P(x)$ is	(r) $\sec\frac{x}{2}$
(D) $\int \frac{dx}{\sqrt{-2x^2+3x+4}}=\frac{1}{\sqrt{2}}\sin^{-1}f(x)$ then $f(x)$ is	(s) $\frac{4x-3}{\sqrt{41}}$

a) (A) → (p); (B)→ (q); (C)→ (r); (D)→ (s)

b) (A) → (s); (B)→ (q); (C)→ (p); (D)→ (r)

c) (A)→ (p); (B)→ (p); (C)→ (q); (D)→ (s)

d) (A)→ (s); (B)→ (p); (C)→ (r); (D)→ (q)

Q75 Match the columns:

COLUMN – I	COLUMN - II
(A) The sum of the binomial coefficients of $\left[2x+\frac{1}{x}\right]^n$ is equal to 256 . The constant term in the expansion is	(p) 10
(B) The coefficient of x^4 in 256. $\left[\frac{x}{2}-\frac{3}{x^2}\right]^{10}$ is	(q) 1120
(C) If the 6^{th} term in the expansion of the binomial $\left[\frac{1}{x^{8/3}}+x^2\log_{10}x\right]^8$ is 5600 , then x is	(r) 5050
(D) $(1+x)(1+x+x^2)(1+x+x^2+x^3)\ldots\ \ldots\ (1+x+x^2+\ldots\ldots+x^{100})$, when written in the ascending power of x then the highest power of x is	(s) 405

a) (A) → (q); (B)→ (q); (C)→ (r); (D)→ (s)

b) (A) → (s); (B)→ (q); (C)→ (p); (D)→ (r)

c) (A)→ (q); (B)→ (s); (C)→ (p); (D)→ (r)

d) (A)→ (r); (B)→ (p); (C)→ (s); (D)→ (q)

Answer Key

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