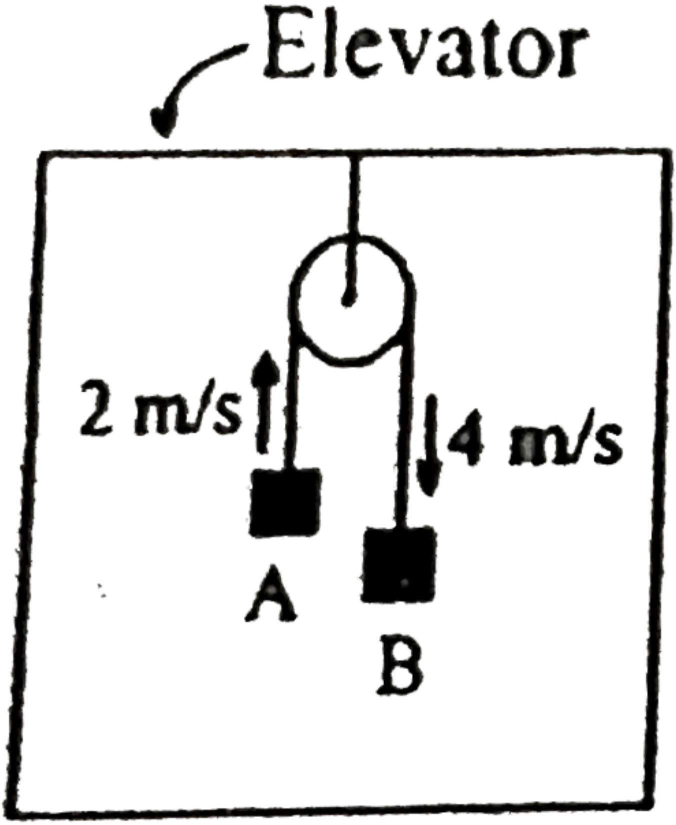
MATHS

FOR IIT JEE ASPIRANTS OF CLASS 12 FOR MATHS

MASTER PRACTICE PROBLEM

Match The Column

1. On LHS certain observations regarding a moving elevator are given. On RHS possible deductions about motion of elevator are given. More than one option may be correct



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2. Trajectory of a particle in a projectile motion is given by $y = x - \frac{x^2}{80}$ where x and y are in meters. Match the column-1 and column-2.

Column-I	Column-II
(A) x coordinate at height of 15 m	(P) 20 m
(B) vertical distnce of particle from point of projection at x= 100 m	(Q) 80 m
(C) Horizontal range	(R) 60 m
	(S) 25 m

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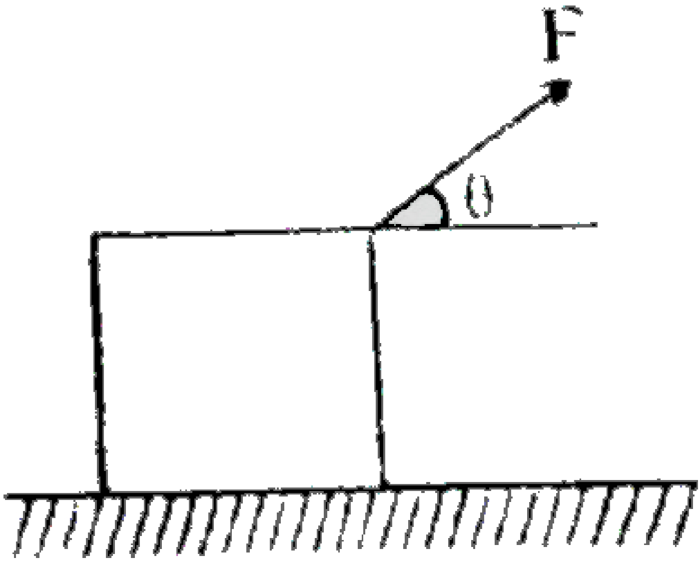
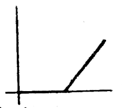
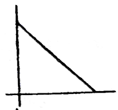
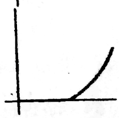
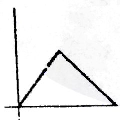
3. A block is placed on a rough horizontal surface having coefficient of friction mu. A variable force $F = kt, \left(0 < t < \frac{mg}{k \sin \theta}\right.$ acts on it at an angle θ to



Quantities	Variation as a function of time
(A) Normal reaction	(P) 
(B) Friction	(Q) 
(C) Acceleration	(R) 
(D) Velocity	(S) 

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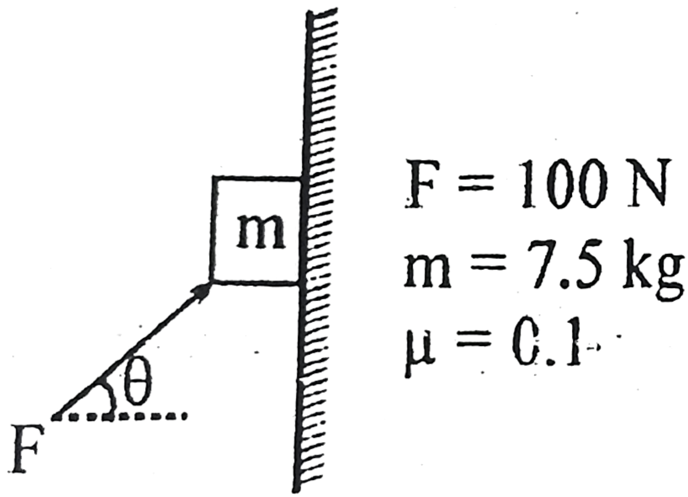
4. Figure shows a block pressed against a rough vertical wall with a force F as shown in side view. Column I shows angle at which force F is applied and column -II gives information about corresponding friction force. Match them



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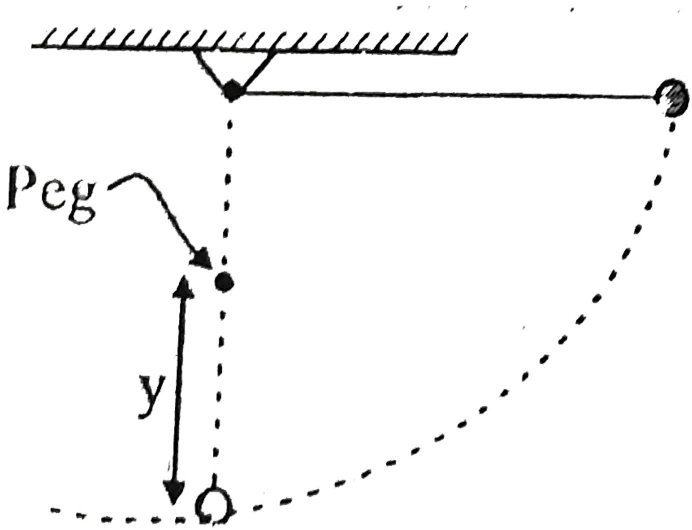
5. A bob tied to an ideal string of length l is released from the horizontal position shown. A peg P whose height is adjustable, can arrest the free swing of the pendulum, as shown in Figure.



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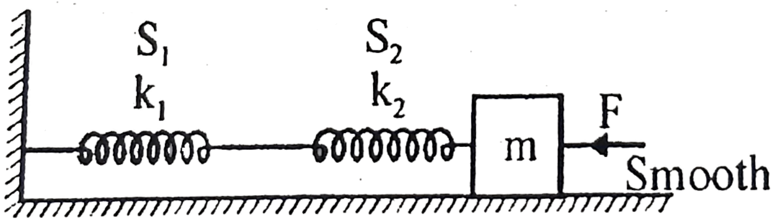
6. Initially springs are in natural length. An application of external varying force F causes the block to move slowly towards the wall, on smooth floor by a distance x.



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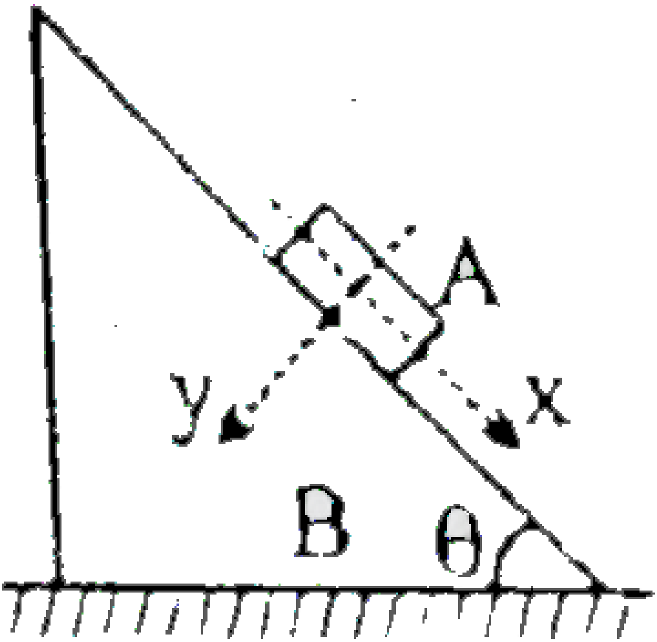
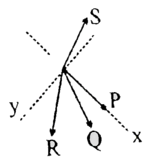
7. In the system shown, there is some friction at all surfaces but it is not sufficient to prevent slipping. Match the quantities in column I with their possible direction (s) as shown in column II.



Column I

(A) Acceleration of A
(B) Net force applied by A on B
(C) Acceleration of A relative to B
(D) Net force applied by ground on B

Column II



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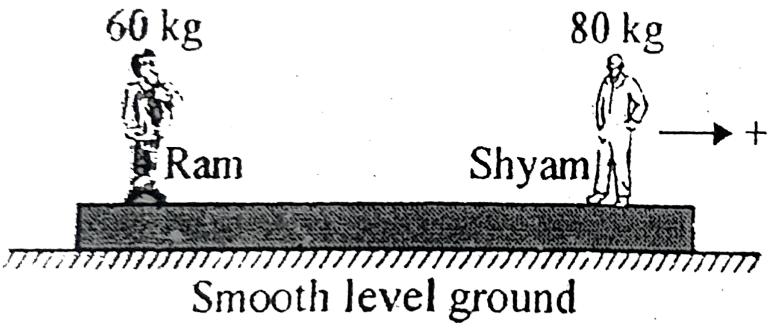
8. Two men of mass 60kg and 80 kg stand on a plank of mass 20 kg Both of them can jump with a velocity of 1 m//s relative to the plank In each event shown in column-I, match the velocity of plank after the event, given in column II



(, Column-I, , Column-II), $\left((A), \text{Ram alone jumps to the left}, , (P) -\frac{17}{40}\right.$

$\left((C), \underset{\text{jumps to right simultaneously}}{\text{Ram jumps to left and shyam}}, , (R)\frac{3}{8}m/s\right)$, (

"(D)",underset("that shyam jumps to right")"Ram jumps to left and after",,

(S)-1/8m//s):}`

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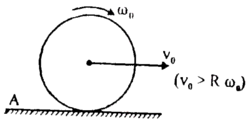
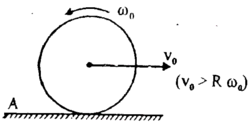
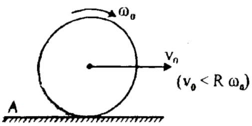
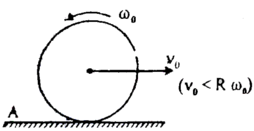
9. In each situation of column -I a uniform disc of mass m and radius R rolls on a rough fixed horizontal surface as shown At $t = 0$ (initially)the angular velocity of disc is omega_(0) and velocity of centre of mass of disc is v_(0) (in horizontal direction). The relation between v_(0) and ω_0 and the initial sense of rotation is given for each situation in column-I then match the statement in column-I with the corresponding results in column-II.

Column-I		Column-II
(A)		(P) The angular momentum of disc about point A (as shown in figure remains conserved.)
(B)		(Q) The kinetic energy of disc after it starts rolling without slipping is less than its initial kinetic energy.
(C)		(R) In the duration disc rolls with slipping, the friction acts on disc for sometime to right and for sometime to left.
(C)		

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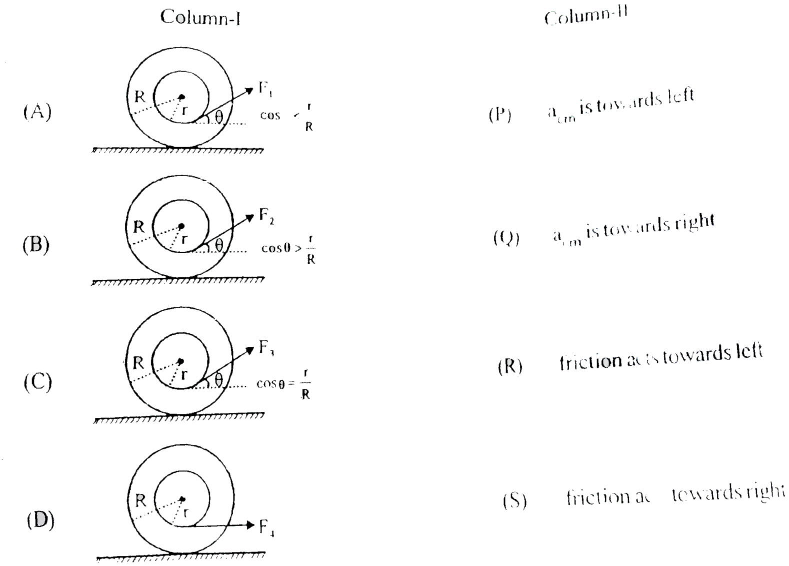
10. A spool is lying on a rough horizontal surface. In the following question. Some situations, are given in column I and some conclusions or relevent data in column-II Match the columnI with column II



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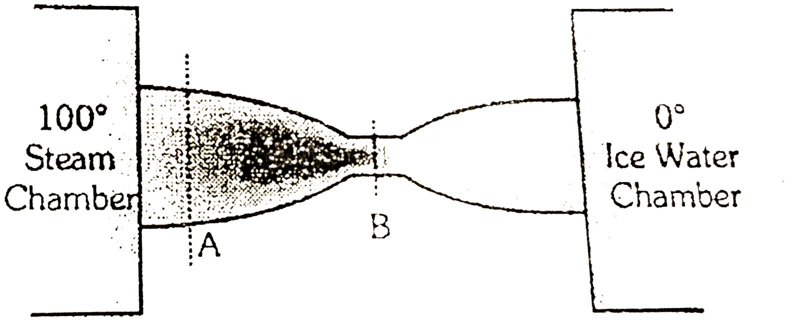
11. A copper rod (initially at room temperature $20^\circ C$) of non-uniform cross section is placed between a steam chamber at $100^\circ C$ and ice-water chamber at $0^\circ C$. A and B are cross sections are as shown in figure. Then match the statements in column -I with results in columns-II using comparing only between cross section A and B. (The mathematical expressions in column-I have usual meaning in heat transfer).



Column-I

(A) initially rate of heat flow $\left(\frac{dQ}{dt}\right)$ will be

(B) At steady state rate of heat flow $\left(\frac{dQ}{dt}\right)$ will be

(C) At steady state temperature gradient $\left|\left(\frac{dT}{dx}\right)\right|$ will be

(D) At steady state rate of change of temperature $\left(\frac{dT}{dt}\right)$ at a certain poin

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12. A satellite is a circular orbit radius 7000 km around the Earth. If it is transferred to circular orbit of double the radius,

	Column I		Column II
(A)	Angular momentum	(P)	increase.
(B)	Area of Earth covered by satellite signal	(Q)	decreases.
(C)	potential energy	(R)	becomes double.
(D)	kinetic energy	(S)	becomes half.

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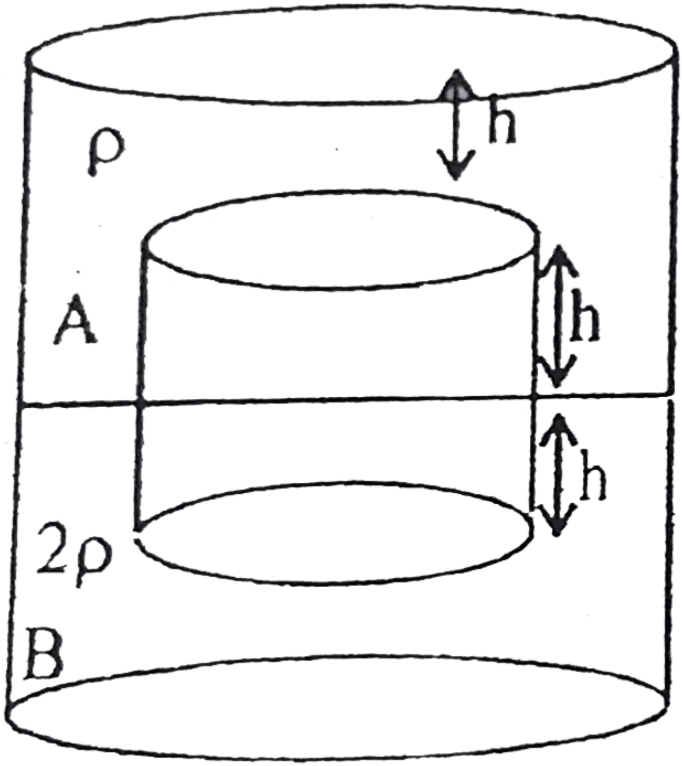
13. Shown below is a cylinder of radius R floating in vessel containning liquids A and B Neglecting atmospheric pressure match the quantities mentioned in column-I with corresponding expression in column-II.



	Column-I	Column-II
(A)	Net force exerted by liquid A of density rho on the cylinder	$(P) 9\rho g R h^2$
(B)	Net force exerted by liquid B of density 2rho on the cylinder	$(Q) \pi\rho g R^2 h$
(C)	Net force exerted by liquids A and B on the left half of the curved part of cylinder	$(R) 4\pi\rho g R^2 h$
(D)	Net force exerted by liquids A and B on the cylinder	$(S) 3\pi\rho g R^2 h$

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14. A sine wave y=sin $(2\pi x - 2\pi t + \pi / 3)$ is propagating in the medium. Match the description of the motion of particles of the medium with entries in columnI

	Column-I	Column-II
(A)	$x = \frac{1}{3}$m, t $= \frac{1}{3}$sec	(P) Velocity is in positive y direction
(B)	$x = \frac{1}{3}$m, t $= 1$ sec	(Q) Velocity is in negative y direction
(C)	$x = 1$m, t $= \frac{1}{3}$sec	(R) Particle is stationary
(D)	$x = 1$m, t $= 1$ sec	(S) Particle has positive displacement
		(T) Particle has negative displacement

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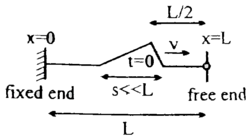
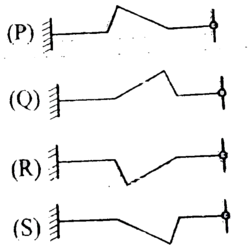
15. A small pulse travelling with speed v in a string is shown at t=0 moving towards free end. Select the shape of string column-II at moments shown in column-I



Column-I		Column-II
(A)	$t = \frac{L}{v}$	(P)
(B)	$t = \frac{2L}{v}$	(Q)
(C)	$t = \frac{3L}{v}$	(R)
		(S)



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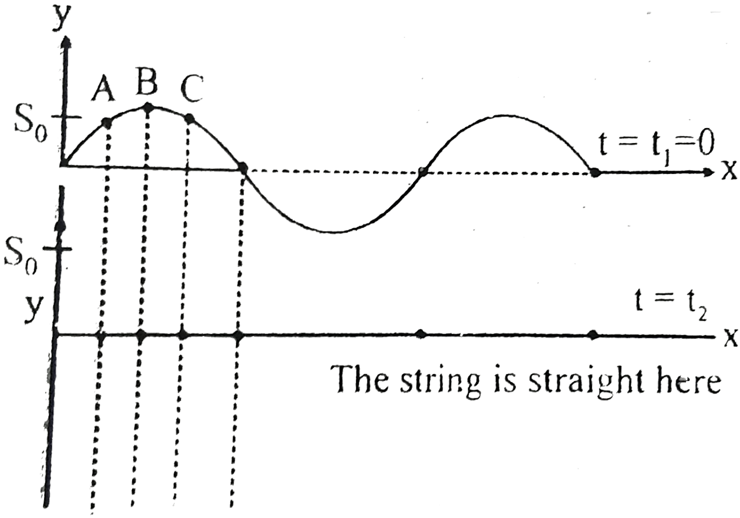
16. The graphs show the standing wave on a string at two successive instants of time t_1, t_2.A,B,C are points on the string (S_(0) is the maximum displacement amplitude of the standing wave) column-II gives observations about net mechanical energy for the time interval between t_(1) & t_(2) Match the column



	Column-I	Column-II
(A)	A	(P) kinetic energy at this element is increasing
(B)	B	(Q) Energy is flowing towards right through this point
(C)	C	(R) Energy is flowing left through this point
		(S) No net energy ever crosses this point

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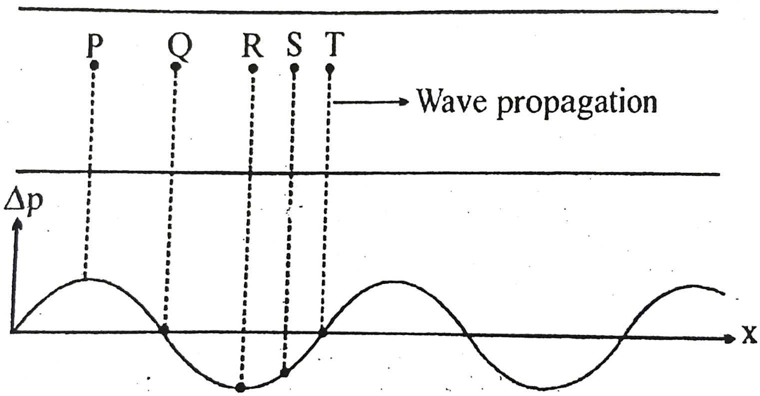
17. Sound is travelling in a long tube towards right and the graph of excess pressure variation Vs position (at some instant) is given below.



Match velocities in column-I with column-II P,Q,R,S,T are medium particles inside the tube.

	Column-I	Column-II
(A)	velocity is towards right	(P)P
(B)	velocity is towards left	(Q)Q
(C)	velocity is zero	(R)R
(D)	Speed is maximum	(S)S
		(T)T

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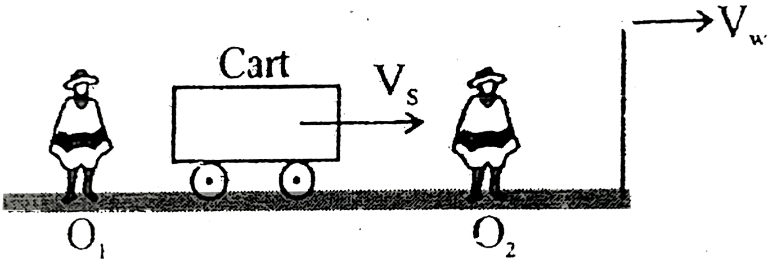
18.



Observers O_1 and O_2 are at rest and the wall is moving with velocity V_(w) Cart is moving with constant velocity V_(s) towards wall. The source of sound is in the cart, the original frequency of the wave is f. sound has velocity C w.r.t. ground (medium is stationary) Then match the column -I with column-II

	Column-I	Column-II
(A)	Wavelength received by O_1 directly from cart	(P) $\left(\frac{C-V_w}{C+V_w}\right)\frac{(C-V_s}{f}$
(B)	Wavelength received by O_2 directly from cart	(Q) $\frac{C+V_s}{f}$
(C)	Wavelength received by driver of the cart after reflection from wall	(R) $\left(\frac{C+V_w}{C-V_w}\right)\frac{(C-V_s}{f}$
(D)	Wavelength received by O_1 after reflection from wall	(S) $\frac{C-V_s}{f}$
		(T) None of these

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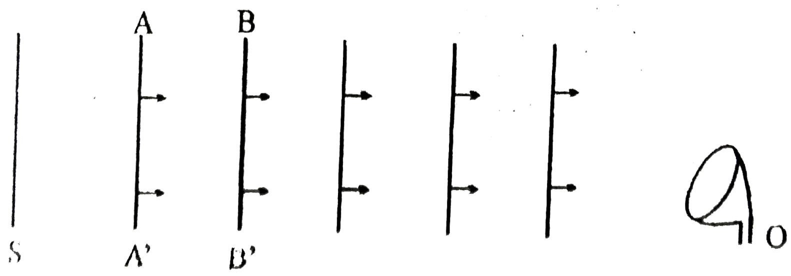
19.



The diagram shows plane wavefronts for sound wave travelling in air towards right Each of these wavefronts represent successive pressure maxima for the pressure wave. Initally the source S, observer O and medium are all at rest. The source is a large plane diaphragm and observer is a detector Wave fronts being considered in column-II have been emitted after the action in column-II has taken place.

Column-I	Column-II
(A) Source starts moving towards right	(P) distance between any two
(B) Air starts moving towards right	(Q) distance between any two
(C) Observer and source both move towards left with same speed	(R) the time needed by sound point A to B in space will incre
(D) Source and medium air both move towards right with same speed	(S) time needed by sound to m point A to B in spce will decre
	(T) frequency received by obs

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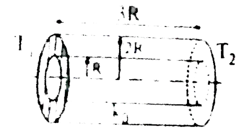
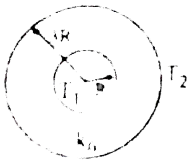
20. Entries in column I consist of diagrams of thermal conductors. The type of conductor & direction of heat flow are listed below Entries in column-II consist of the magnitude of rate of heat flow belonging to any of the entries in column I if temperature difference in all the cases is $(T_1 - T_2)$ then match the columns

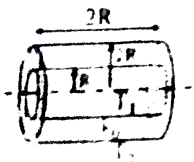
Column I

(A) 

Thick cylindrical shell, heat flow along axis

(B) 

Thick spherical shell, radial flow

(C) 

Thick cylindrical shell, radial flow

Column II

(P) $6\pi k_0 R(T_1 - T_2)$

(Q) $\dfrac{\pi k_0 R}{3 \ln 2}(T_1 - T_2)$

[illegible] $(T_1 - T_2)$

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21. In column-I some situations have been described and in column-II corresponding graph is given. Match the entries in column-I with appropriate entries in column-II.

Column-I

(A) A ball is thrown up on rough inclined plane. It rolls up without slipping. During its upward motion graph between angular speed and time.

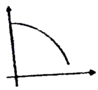
(B) T_1 and T_2 ($T_1 > T_2$) is the temperature maintained at two ends of lagged rod of uniform cross-sectional area. In steady state variation of temperature of a point on the rod with distance from higher temperature end.

(C) A uniform rod is rotated in horizontal plane about one of its end. Variation of strain developed in rod with distance from axis of rotation.

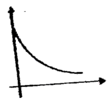
Column-II

(P)

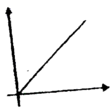
(Q)



(R)



(S)



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22. We have three solid bodies of same material A rightarrow a solid cube of edge length 'r' Brightarrow a solid sphere of radius 'r' and C rightarrow a solid hemisphere of radius 'r' In coloumnI certain situation related to these bodies are given Match the appropriate outcome indicated in column-II

Column-I

(A) All 3 bodies are heated to some temperature of 350k and kept in a roo
300k Then rate of fall of temperature with time

(B) All 3 bodies are kept on level ground
C is kept with base on ground height of centre of mass from ground

(C) All 3 bodies are rotated about an axis passing through their repective
for cube and hemisphere is perpendicular to the fase and base respectively M

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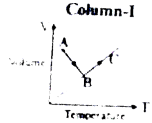
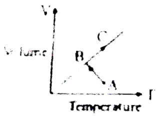
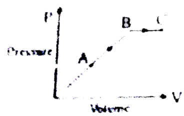
23. In each situation of column-I a process A rightarrow B rightarrow C is given for an ideal gas. Match each situation of column-I with correct result in column II

Column-I

(A)


(B)


(C)


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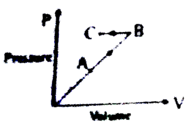

Column-II

(P) Temperature increases continuously

(Q) Pressure first increases & then remains constant

(R) Temperature first decreases & then increases

(S) Pressure first decreases & then remains constant

(T) Volume increases continuously

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24. A spherical metallic conductor has a spherical cavity. A positive charge is placed inside the cavity at its centre. Another positive charge is placed

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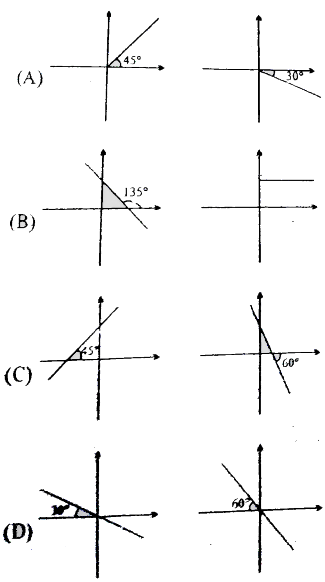
25. Column I shows graphs of electric potential V versus x and Y in a certain region for four situations Column II shows the range of angle which the electric field vector makes with positive x-direction.

Column I
(V versus x) (V versus y)



Column II

(P) $0 \le \theta < 45^\circ$

(Q) $45^\circ \le \theta < 90^\circ$

(R) $90^\circ \le \theta < 135^\circ$

(S) $135^\circ \le \theta \le 180^\circ$

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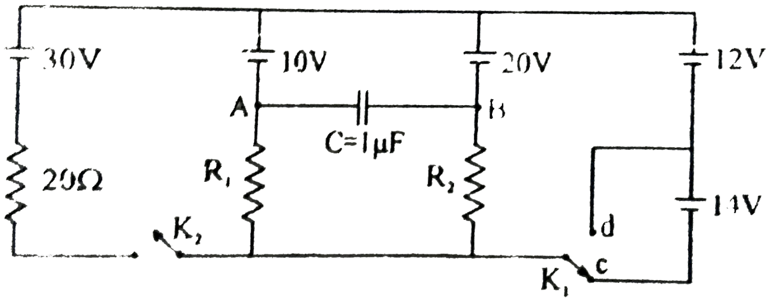
26. A circuit involving five ideal cells, three resistance (R_(1),R_(2) and 20Omega) and a capacitor of capacitance $C=1\mu F$ is shown Match the conditions in column-I with results given in Column-II [Assuming circuit is in steady state]



Column-I	Column-II
(A) K_2 is open and K_1 is in position C	(P)Potential at point A is
(B) K_2 is open and K_1 is in position D	(Q)Current through R_1
(C) K_2 is closed and K_1 is in position C	(R)Current through R_2
(D) K_2 is closed and K_1 is in position D	(S)Charge on capacitor is

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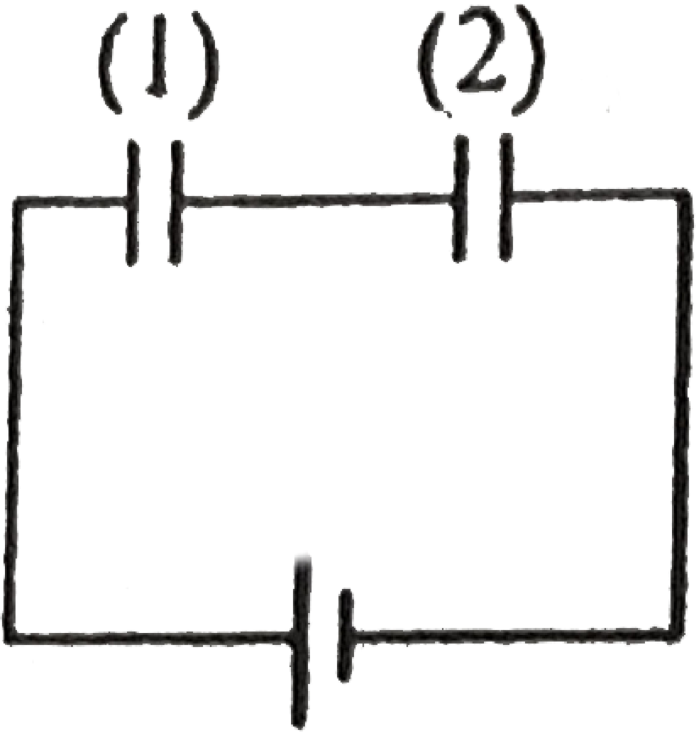
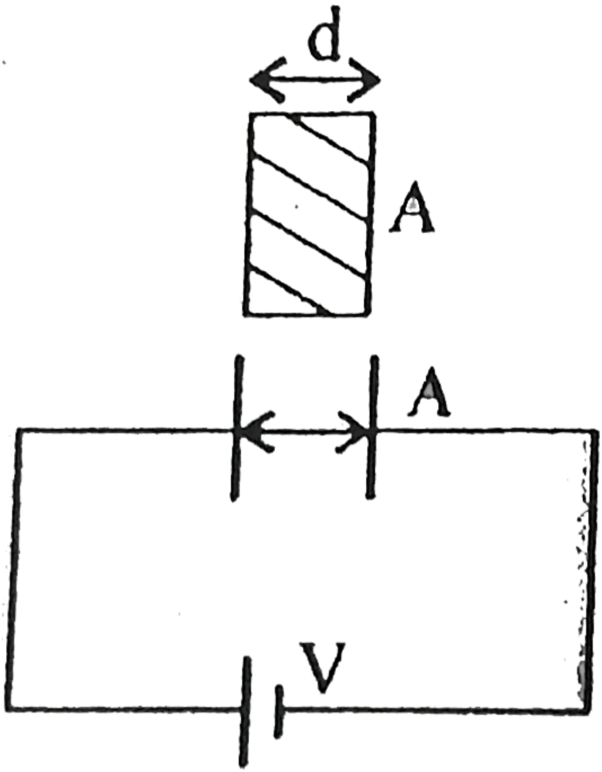
27. In the circuit, both capacitors are identical. Column-I indicates action done on capacitor and Column II indicates effect on capacitor 2. Select correct alternative.



`{:(,"Column-I",,"Column-II"),("(A)","Plates are moved further apart",," (P)Amount of charge on left plate increases"),("(B)","Area increased",," (Q)Potential difference increases"),("(C)","Left plate is earthed",,"(R)Amount of charge on right plate decreases"),("(D)","It's plates are short circuited",," (S)None of the above effects"):}'

28. Some events related to a capacitor are listed in column-I Match these events with their effect (s) is column-II



`{:(,"Column-I",,"Column-II"),("(A)","Insertion of dielectric while battery remain attached",,"(P)Electric field between plates changes"),("(B)","Removal of dielectric while battery is not present",,"(Q)Charge present on plates changes"),("(C)","Slow decrease in separation between plates while battery is attached",,"(R)Energy stored in capacitor increases"),("(D)","Slow increase of separation between plates while battery is not present",,"(S)Work done by external agent is positive"):}'

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29.

Column-I

(A) Plates of an isolated charged parallel Plate air core capacitor are slowly pulled apart

(B) A dielectric is slowly inserted inside an isolated and charged parallel air cored capacitor to completely fill the space between plates

(C) Plates of a parallel plate capacitor connected across a battery are slowly pulled apart

(D) A dielectric slab is slowly inserted inside a parallel plate capacitor co a battery to completely fill the space between plates

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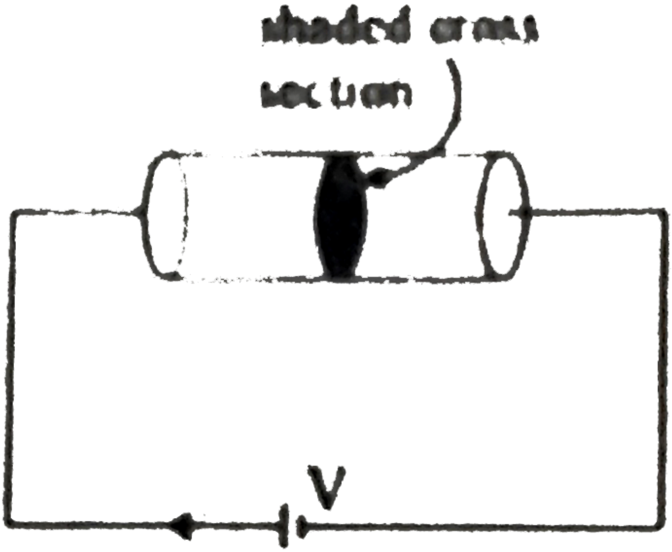
30. Column I gives physical quantities based on a situation in which an ideal cell of emf V is connected across a cylindrical rod of uniform cross-section area and conductivity (sigma) as shown in figure E, J, phi and I are electric field at, current density through, electric flux through and current through shaded cross section repectively as shown in figure. Physical quantities in column-II are equal to those in column i Match the expression in Column I with the statement in Column II



	Column-I	Column-II
(A)	$\frac{\phi}{i}$	(P) Conductivity of rod
(B)	$\frac{E}{J}$	(Q) Resistance of rod
(C)	$\sigma\phi V$	(R) Resistivity of rod
(D)	$\frac{V}{\sigma}\phi$	(S) Power delivered to rod

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31. A charged particle having non zero initial velocity is subjected to certain conditions given in column -I column-II gives possible trajectories of the particle Match the conditions in column-I with the results in column-II

	Column-I	Column-II
(A)	In only uniform electric field	(P)the path of the
(B)	in only uniform magnetic field	(Q)the path of the
(C)	in uniform magnetic and uniform electric field	(R)the path of the
(D)	Subjected to a net force of constant magnitude	(S)the path of the
		(T)the path of the

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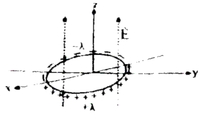
32. Column-I shows some charge distributions and current distributions accompanied by their descriptions Column-II shows the instantaneous characteristic Here alpha symbolizes the system on which results are to be obtained.

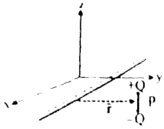
Column I

(A)



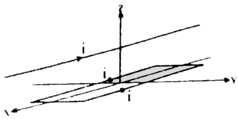
Circular ring (α) half positive and other half negative placed in a uniform electric field, with centre at origin.

(B)



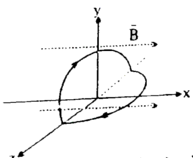
Dipole (α) is placed infront of a long uniformly negatively charged wire parallel to x-axis, such that $\vec{p}$ is perpendicular to $\vec{r}$ and dipole is kept parallel to z-axis

(C)



A square current carrying coil (α) is placed in xy-plane with centre at origin and sides parallel to x-axis and y-axis, and a long wire placed parallel above square on z-axis and parallel to x-axis.

(D)



A circular current coil (α) with one half in yz-plane other half in xz-plane, placed in a uniform magnetic field in x-direction.

Column II

(P) Net force on α is zero.

(Q) Net force on α have no x-component.

(R) Net torque on α is along x-axis

(S) Net torque on α is zero.

(T) Direction of magnetic dipole moment or electric dipole moment is in x-y plane.

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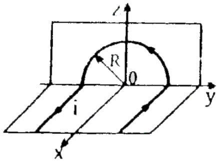
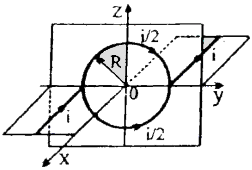
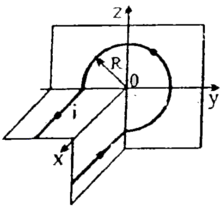
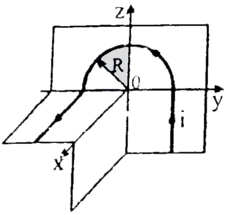
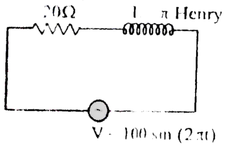
33. Column I shows four current configurations Match each entry of column I with those axes in column II along which the magnetic field at origin has positive component

Column I	Column II [+ve component ($\neq 0$) of magnetic field at origin]
(A) 	(P) x
(B) 	(Q) y
(C) 	(R) z
(D) 	(S) none

34. in column - I certain situations are shown Column-II has different values of phase difference Match them [take $\pi^2 = 10$ wherever required]

Column-I	Column-II
(A) Phase difference between current through circuit and voltage across source	(P) $\frac{\pi}{3}$
(B) Two pendulum of length 1m and 4m start oscillating in same phase The phase difference between them after 1 sec. is.	(Q) $\frac{\pi}{4}$
(C) A progressive wave of frequency 100 Hz is travelling in a taut string with tension 100N and mass/length 10gm/m. The phase difference between two points at a distance of 0.5m.	(R) $\frac{\pi}{2}$
	(S) π



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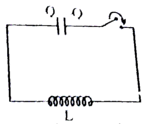
35. Column-I describe the value of variables indicated in column-II Assume potential energy in gravitation and electrostatics to be zero at infinity if the quantity mentioned in columnII is a vector positive and negative refer to the direction and increasing or decreasing refer to magnitude Match the appropriate entries.

Column-I		Column-II
(A) Positive and increasing.	(P)	A body of mass m is projected upward from surface of a planet. The gravitational potential energy of the system
(B) Positive and decreasing.	(Q)	 In the situation shown, energy of the magnetic field just after closing.
(C) Negative and increasing.	(R)	An air bubble is released from middle of a column of viscous liquid. Upward direction is assumed to be positive. The velocity of the air bubble
(D) Negative and decreasing.	(S)	A point source is moving along the principal axis of a stationary convex lens. The direction of velocity of the source is positive. The velocity of image
	(T)	Two balls of opposite charge are released in vacuum. As time passes, their electrostatic potential energy

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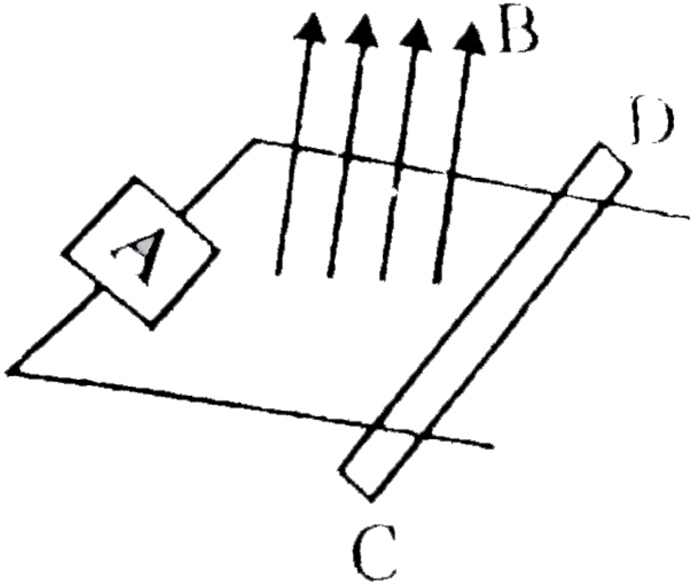
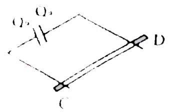
36. A homogeneous magnetic field B is perpendicular to a sufficiently long trach of width l which is horizontal A frictionless conducting resistanceless rod of mass m stradless the two rails of the track as shown in the figure. Entire arrangement lies in horizontal plane. For the situation suggested in column-II match the appropriate entries in column-I the rails are also resistancesless.

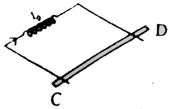


(B) A is a charged capacitor. The system has no resistance. The rod is initially at rest.



(Q) The rod moves with a constant velocity after a long time.

(C) A is an inductor with initial current i_0. It is having no resistance.



(R) After a certain time interval rod will change its direction of motion.

(D) A is a resistance. The rod is projected to the right with a velocity V_0

(S) If a constant force is applied on the rod to the right, it can move with a constant velocity.

(T) The rod stops after some time in absence of an external force.

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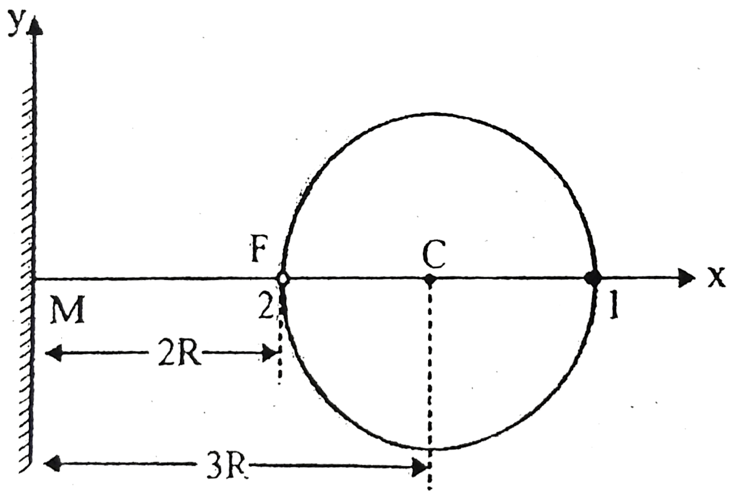
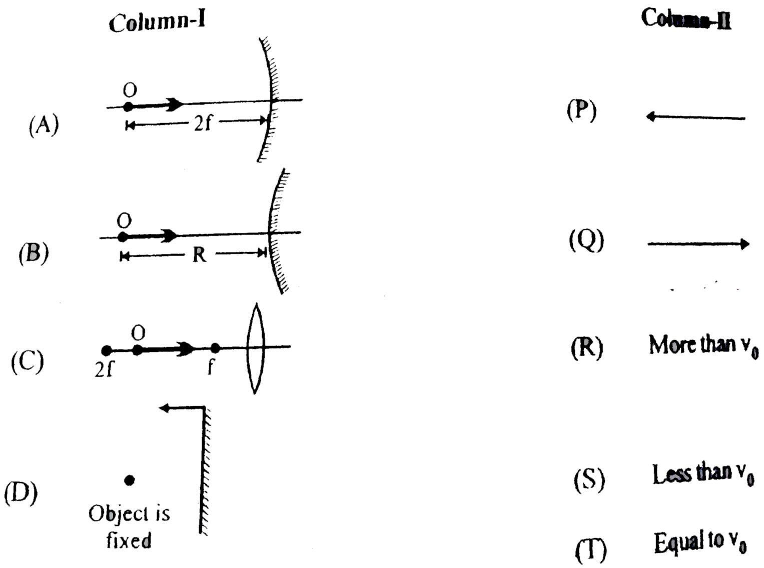
37. A spherical fish bowl of radius R is placed in front of a plane vertical mirror (M) The thickness of the wall of the fish bowl is very thin The centre (C) of the spherical bowl is at distance of 3R from the plane mirror. The bowl is filled with water and contains a fish (F) Fish(F) is at a distance of R from the centre of the spherical bowl as shown in the figure Refractive index of water is 4/3 two surfaces are indicated in the bowl as first surface (1) and second surface(2)



Column-I Optical Event	Column-I Nature o
(A) Refraction at first surface	(P) Virtu
(B) Refraction at second surface after reflection from mirror	(Q) Real
(C) Refraction at first surface after reflection from mirror and refraction from second surface	(R) Magn
	(S) Dimi

View Text Solution

38. Consider the situation shown in column-I a real object is moving towards a fixed optical component or an optical component is moving towards a fixed object. Match the possible direction and magnitude to velocity of image as shown in Column-II (All velocities in column-II are equal to v_(0))



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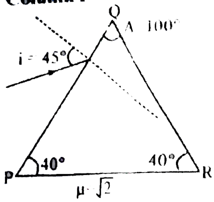
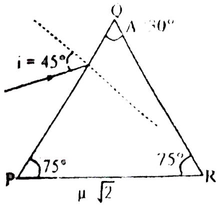
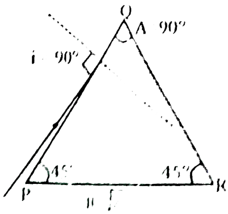
39. Light is incident at surface PQ of prism as shown in column I then match the column I with column II (Surrounding medium is air in all cases)

Column I		Column II
(A) 	(P)	Total internal reflection takes place at Surface QR
(B) 	(Q)	Light emerges normally from the surface QR
(C)  Grazing incidence	(R)	Light emerges parallel to surface QR
	(S)	When light ray passes through the prism it is parallel to the base PR

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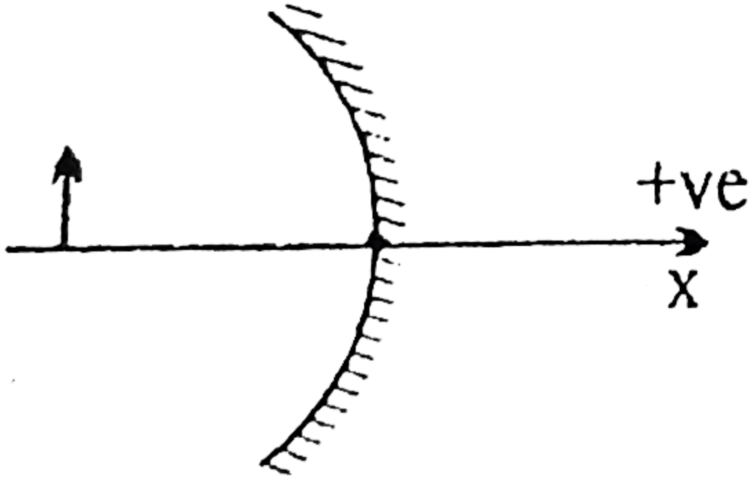
40. An extended object is moving in front of concave mirror as shown in figure On L.H.S velocity of object and position is given On R.H.S some properties of image and its velocity is given Consider velocity along x-axis only



Object

(A) +ve velocity and object is between focus and centre of curvature

(B) -ve velocity and object is between focus and pole

(C) -ve velocity and object is beyond centre of curvature

(D) -ve velocity and object is virtual

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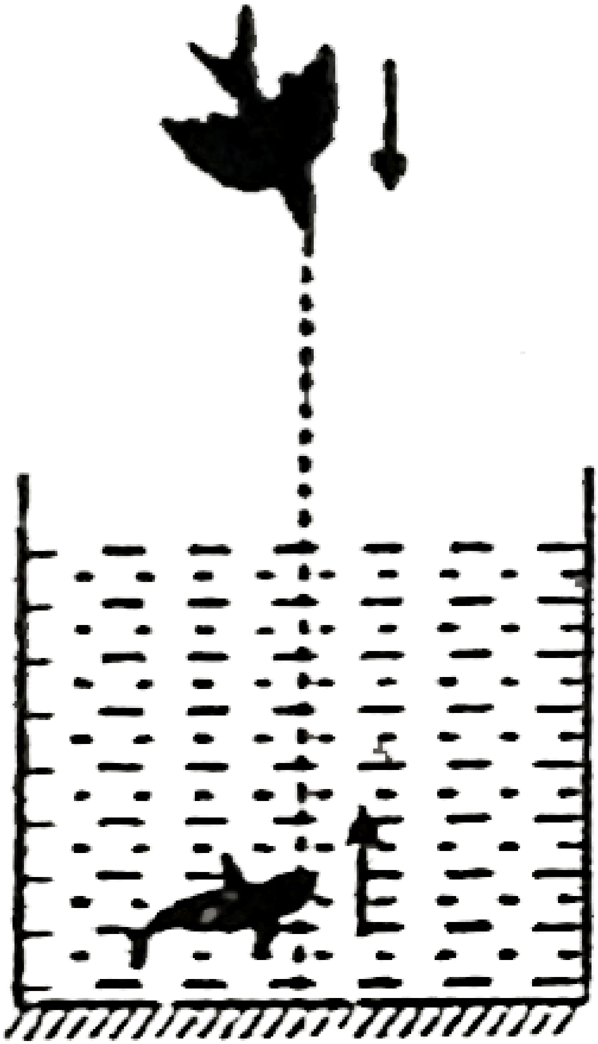
41. A bird in air is diving vertically over a tank with speed 6 cm//s Base of the tank is silvered A fish in the tank is rising upward along the same line with speed 4 cm//s[Take:mu_(water)=4//3]



	Column-I	Colum
(A)	Speed of the image of fish as seen by the bird directly	(P) 12
(B)	Speed of the image of fish formed after reflection from the mirror as seen by the bird	(Q) 4
(C)	Speed of image of bird relative to the fish looking upwards	(R) 9
(D)	Speed of image of bird relative to the fish looking downwards in the mirror	(S) 3

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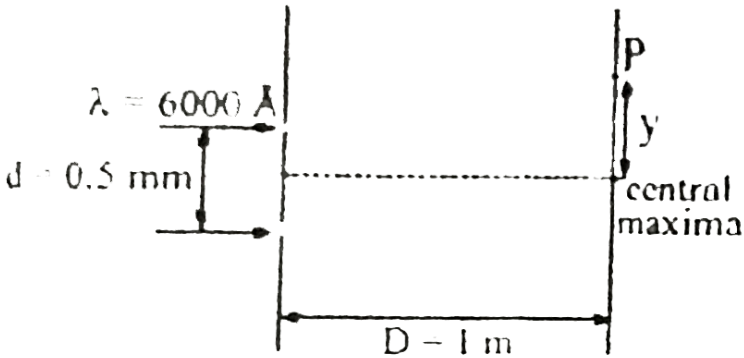
42. In a standard Yound's Double Slit Experiment light of wavelength $\lambda = 6000A$ is used screen distance (D)=1m and slit separation (d)=0.5 mm intensity of light on screen emerging from slits are individually I_(0) and 4I_(0) Column I indicates distance of certain point P on screen from central maxima Match the columns



	Column-I	Column-II
(A)	y=2 mm	(P)Intensity $= 7I_0$at P
(B)	y=2.2 mm	(Q)Intensity $=3I_0$at P
(C)	y=2.6 mm	(R)P lies between2^{nd}minima and3^{rd}maxima
(C)	y=2.6 mm	(S)P lies between3^{rd}minima and2^{nd}maxima

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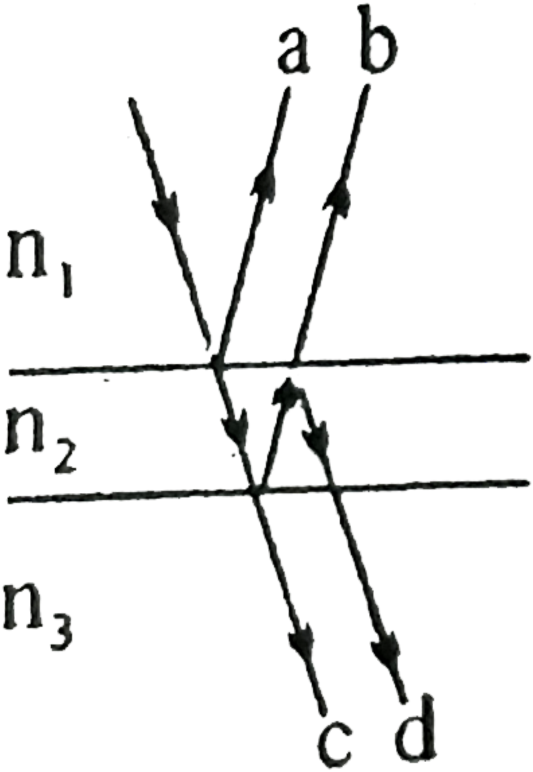
43. A ray of light is incident on a thin film Two of the reflected rays are shown, and two of the transmitted rays are shown in figure. Consider phase difference by comparing them with the phase of incident ray on the film. Match statements about phase difference in column-I with the correct order of refractive indices in column -II



	Column-I	Colu
(A)	Rays a and b have an extra phase difference over and above that due to extra optical path caused by reflection at various interfaces	$(P) n$
(B)	Rays a and c have an extra phase difference over and above that due to extra optical path caused by reflection at various interfaces	$(Q) n$
(C)	Rays a and d have an extra phase difference over and above that due to extra optical path caused by reflection at various interfaces	$(R) n$
(D)	Rays b and c have an extra phase difference over and above that due to extra optical path caused by reflection at various interfaces	$(S) n$
		(T) th

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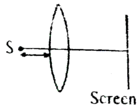
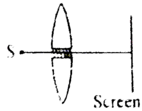
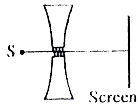
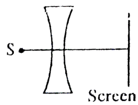
44. Light from sources $S(|u| < |f|)$ falls on lens and screen is placed on the other side the lens is formed by cutting it alond principal axis into two equal parts and are joined as indicated in column II

	Column I		Column II
(A)	Plane of image moves towards screen if $|f|$ is increased	(P)	 Small portion of each part near pole is removed. The remaining parts are joined
(B)	Images formed will be virtual	(Q)	 The two parts are separated slightly. The gap is filled by opaque material
		(R)	 The two parts are separated slightly. The gap is filled by opaque material.
(C)	Interference pattern can be obtained if screen is suitably positioned.	(S)	 Small portion of each part near pole is removed. The remaining parts are joined.

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45. Three physical quantities are listed in column I and their values are listed in column II in random order Match the oppropriate quantities.

	Column-I	Column-II
(a)	binding energy of heavy nuclei per nucleon	(1) 10 keV
(b)	X-ray photon energy	(2) 7 MeV
(c)	Photon energy of visible light	(3) 2 eV

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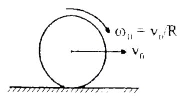
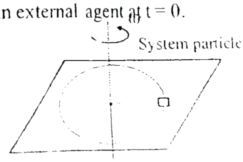
46. Then choose the correct option in which matching is correct

	Column-I		Column-II
(A)	Angular momentum of system is conserved about centre of circular path.	(P)	**System : An electron** revolving around nucleus in hydrogen atom in ground state. **Event :** A photon corresponding to first line of lyman series is incident on it just before $t = 0$ and is absorbed.
(B)	Mechanical energy of system can increase for $t > 0$.	(Q)	**System : A ball.** **Event :** It is projected on a rough surface with some angular velocity at $t = 0$ as shown 
(C)	Kinetic energy of system reamins, constant.	(R)	**System : A small ball.** It is attached to a cord passing through a hole on a frictionless horizontal surface and rotating as shown. **Event :** The cord is slowly pulled inside by an external agent at $t = 0$. 

(D) Speed of system's centre of mass can increase for $t > 0$.

(S) **System :** An electric dipole free in space. **Event :** At $t = 0$ a charge is brought near it. (Consider the centre of dipole as the centre of the circular path.)

(T) **System :** A charged ball is revolving in a circular path made on a smooth horizontal table. **Event :** A uniform magnetic field is switched on in vertically upward direction at $t = 0$ which gradually increases in magnitude.

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47.

	Column-I	Column-II
(A)	beta-rays	(P) Continous energy distributi
(B)	y-rays	(Q) Continuous energy distribu
(C)	absorption spectrum of Hydrogen	(R) Continuous energy distribu
(D)	X-rays	(S) Discrete energy distributior

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48. Q is energy released in the decay m_(x) is atomic mass of parent nucleus m_(y) is atomic mass of daughter nucleus and m_(e) is mass of elctron then match the following:

	Column-I	Column-II
(A)	k capture	$(P) Q=\left(m_x-m_y\right) c^2$
(B)	β^{-} *decay*	$(Q) Q=\left(m_x-m_y-m_c\right) c^2$
(C)	β^{+} *decay*	$(R) Q=\left(m_x-m_y-2 m_e\right) c^2$
		$(S) Q=\left(m_x-m_y+2 m_e\right) c^2$

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