MODEL PAPER "PHYSICS"

Intermediate Part-I Examination

OBJECTIVE

Time: 20 Minutes **Marks: 17**

Q.No.1. Note: Write answers to the questions on the objective answer sheet provided. You have four choices for each objective type question as A, B, C, and D. The choice which you think is correct; fill the circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling to or more circles will result in zero mark in that question. Attempt as many question as given in objective-type question paper and leave others blank.

(i) The dimensions of Moment of inertia are
(a) ML^{-2} (b) ML^2 (c) M^2L (d) ML

(ii) The resultant of two forces 10 N and 8 N cannot be:
(a) 2N (b) 18N (c) 12N (d) 20N

(iii) i .(j x k)
(a) i (b) j (c) k (d) 1

(iv) The velocity – time graph is parallel to Time – axis, the acceleration of the moving body is
(a) Positive (b) Negative (c) Zero (d) Maximum

(v) A body of weight 5 N falls though a height of 10m. Its energy 5m above the ground is:
(a) 25J (b) 50J (c) Both 'a' and 'b' (d)75J

(vi) The weight of man in a elevator moving down with an acceleration 9.8 ms^{-2} will become:
(a) Half (b) Double (c) Unchanged (d) Zero

(vii) The moment of linear momentum is called:
(a) Impulse (b) Torque (c) Angular Momentum (d) Couple

(viii) High concentration of red blood cells increases the viscosity of blood from
(a) 2 –3 times that of water (b) 3 – 4 times that of water (c) 3 – 5 times that of water (d) 4 – 5 times that of water

(ix) The product of time-period and frequency is equal to:
(a) 3 (b) 2 (c) 1 (d) 0

(x) The velocity of sound in Hydrogen as compared to Oxygen under similar condition is:
(a) ¼ the velocity of O2 (b) Four times the velocity in O2 (c) ½ the velocity in O2 (d) Two times the velocity in O2

(xi) When two notes of frequencies f_1 and f_2 are formed. If $f_1 > f_2$, then frequency of beats is:
(a) $f_1 + f_2$ (b) $f_1 - f_2$ (c) $\frac{1}{2}(f_1 + f_2)$ (d) $\frac{1}{2}(f_1 - f_2)$

(xii) Light from sun reaches the earth in the form of:
(a) Cylindrical wave front (b) Spherical wave front (c) Plane wave fronts (d) All the above

(xiii) The central part of Newton's Rings when observed with reflected light is dark due to the reason that;
(a) The part of ray reflected from upper surface of convex lens undergoes a phase shift of 180^0 (b) The reflection from upper surface of air film undergoes a phase shift of 180^0 (c) The reflection from lower surface of air film undergoes a phase shift of 180^0 (d) All of above

(xiv) A double convex lens acts as a diverging lens when the object is:
(a) Inside the focus (b) Away from 2f (c) Between f and 2f
(d) On 2f

(xv) Least distance of distinct vision:
(a) Increase with increase of age (b) Remain same with increase of age
(c) decrease with increase of age (d) All of these

(xvi) Pressure of an ideal gas in terms and conditions of its density can be written as:
(a) $P= \rho v^2$ (b) $P= 1/3\ \rho v^2$ (c) $P= 2/3\ \rho v^2$ (d) $P= \frac{1}{2}\ \rho v^2$

(xvii) Which of the following forces is irreversible:

(a) Slow compression of an elastic spring
(b) Slow evaporation of a substance on an insolated vessel
(c) Slow compression of a gas
(d) A chemical explosion

MODEL PAPER "PHYSICS"

Intermediate Part-I Examination

SUBJECTIVE

SECTION – I

Time: 2:40 Hours Marks: 68

Note: Out of Questions Nos.2,3, and 4 write any 22 (Twenty two) short answers. While writing answer write question No. carefully.

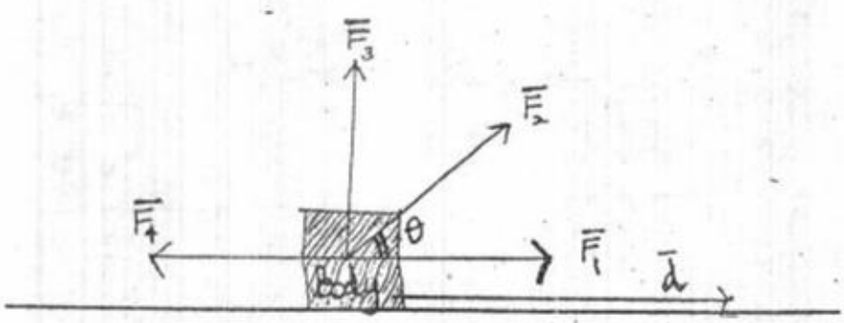
Q.No.2. Write short answers.

i) Name two physical quantities which have the same dimensional formula. Write the dimensions also with each

ii) Find the dimensions of 'η' in the relation $F = 6\pi\eta rv$ where r = radius and v = velocity

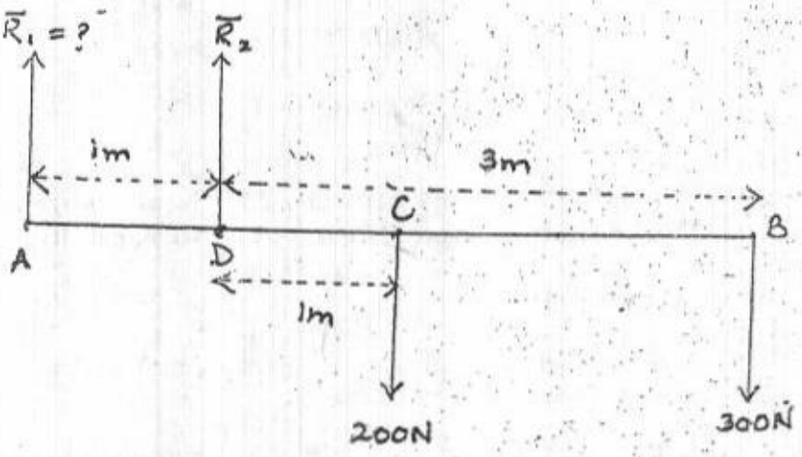
iii) Write the names of two supplementary units and define them

iv) Forces $\overline{F}_1$, $\overline{F}_2$, $\overline{F}_3$ and $\overline{F}_4$ are equal in magnitude but have different directions as shown in the given figure. Which force will give maximum work and why?

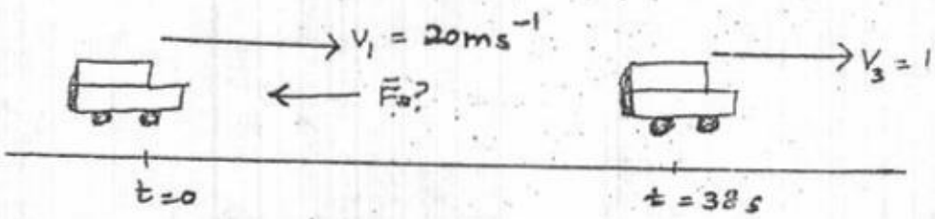


v) Given that $\overline{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\overline{B} = 3\hat{i} - 4\hat{k}$, find the length of the projection of $\overline{A}$ on $\overline{B}$

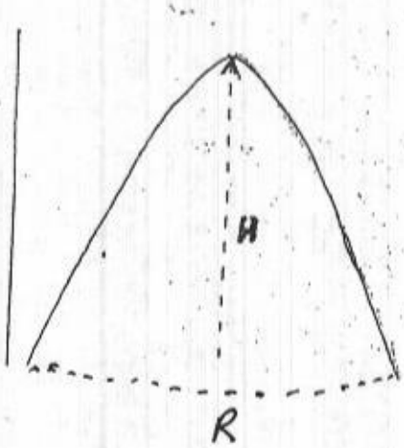
vi) Find the value of unknown forces $\overline{R}_1$ in the figure (Rod AB with pivotal point D) using 2nd condition of equilibrium.



vii) In the figure the velocity of the car is reduced due to the retarding force $\overline{F}$. Find the magnitude of the force.

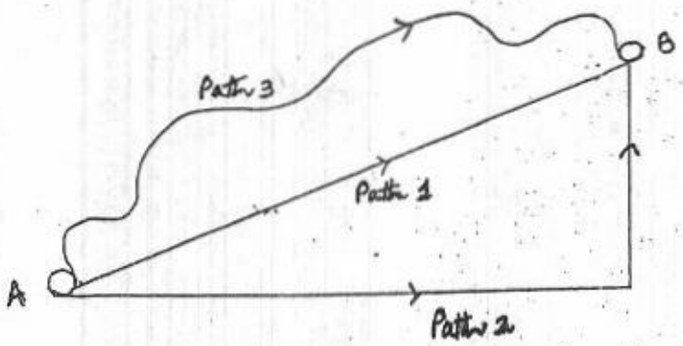


(viii) In the figure, maximum height and horizontal range are equal, find the angle of projection of the projectile.

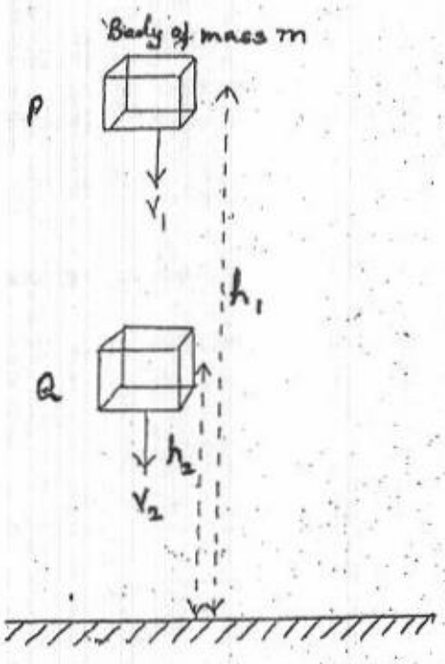


(ix) Prove that power is a scalar product of force and velocity.

(x) In figure there are three paths between points **A** and **B**. On which path the work done in moving a body from **A** to **B** will be maximum or will it remain the same.

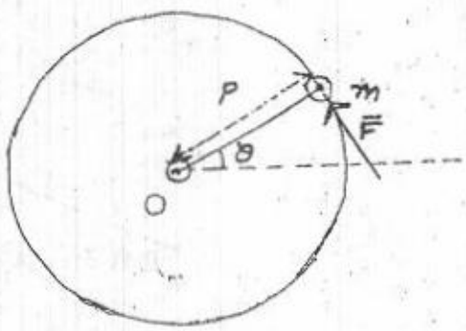


(xi) A body of mass m is falling down with velocity v_1 and at height h_1 from point P. If there is no frictional force, write the work-energy equation for the body at point Q.



Q.No.3. Write short answers.

i) Figure shows a mass m attached to a mass-less rod at 0 (pivot point). A force is applied on it as shown. Find the value of TORQUE in terms of moment of inertia I and angular acceleration 'α'.



ii) A 1000 kg car is traveling with a speed of 144 kmh-1 round a curve of 100 m. Find the necessary centripetal force.

iii) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.

iv) State the Torricellis' Theorem with diagram

v) Explain the difference between laminar flow and turbulent flow.

vi) Two row boats moving parallel in the same direction are pulled towards each other. Explain.

vii) Define Resonance with one example

viii) A mass '**m**' is attached with a spring and pulled slowly through $\mathbf{x_o}$ against the elastic restoring force **F**, using Hooke's Law, calculate the work done in displacing the mass and hence calculate elastic PE of the spring.

ix) Explain S.H. Motion for a body of mass '**m**' attached with a spring of spring constant **k**.

x) Explain the terms crest, trough, node and antinodes.

xi) Name the three important cases of superposition of two waves when they act simultaneously upon the particles of medium.

Q.No.4. Write short answers.

i) What is Huygen's Principle?

ii) What is Total Internal Reflection?

iii) Draw the diagram of Michelson's Interferometer and write the equation by which we can find the displacement L of the mirror.

iv) Define Grating Element.

v) How is the distance between interference fringes affected by the separation between the slits of Young's Experiment?

vi) Draw the Ray-diagram of a compound Microscope

vii) How does the magnification of a) Simple microscope and b) Astronomical Telescope changes by decreasing the focal length of an eyepiece. Explain.

viii) Name the three types of optical fibres.

ix) State First Law of Thermodynamics with sign conversion

x) Why $C_p > C_v$?

xi) Explain the principle of Heat engine with diagram

SECTION - II

Note: - Attempt any THREE questions. **(8 x 3) = 24**

Q.No5. (a) Define Vector Product of Two Vectors with examples. State right hand rule. Show that $\overline{A} \times \overline{B} = -\overline{B} \times \overline{A}$. 4

(b) Find the angle between vectors, $\overline{A} = 5\hat{i} + \hat{j}$ and $\overline{B} = 2\hat{i} + 4\hat{j}$ 4

Q.No6.(a) Derive an expression for Centripetal Force. 4

b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the height point.

Q.No7. (a) State and prove Bernoulli's Theoram. 4

(b) How large must a heating duct be if air moving 3.0 ms^{-1} along it can replenish the air in a room of 300 m^3 volume every 15 min.

Q.No8. (a) Give drawback of Newton's formula for velocity of sound. How was this was corrected by Laplace. 4

(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C. 4