



**ST. JOSEPH'S COLLEGE, PRAYAGRAJ**  
**HALF YEARLY EXAMINATION 2024**

**PHYSICS**  
**CLASS - IX**

TIME: 2 Hours

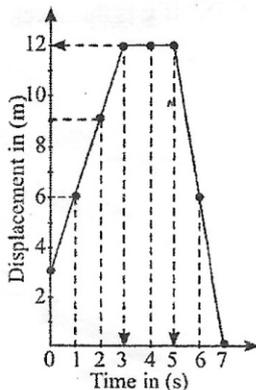
MM: 80

**SECTION A - 40 Marks**

- Q 1) Choose the correct answer to the questions from the given options: [15]**
- If the value of acceleration due to gravity on earth is  $g$ , then corresponding value on the moon is  
(a)  $g$  (b)  $g/6$  (c)  $6g$  (d)  $g/4$
  - An apple falls from a tree because of gravitational attraction between earth and the apple. If  $F_1$  is the force exerted by earth on the apple and  $F_2$  is the magnitude of force exerted by apple on the earth, then  
(a)  $F_1$  is very much greater than  $F_2$  (b)  $F_2$  is very much greater than  $F_1$   
(c)  $F_1$  and  $F_2$  are equal (d)  $F_1$  is only little greater than  $F_2$
  - A girl stands on a box having 60 cm length, 40 cm breadth and 20 cm height in three ways. Pressure exerted by the box will be  
(a) maximum when length and breadth form the base  
(b) maximum when breadth and height form the base  
(c) maximum when height and length form the base  
(d) same in all the three cases
  - If relative density of a metal alloy is 5.6, then its density in SI units will be  
(a)  $5.6 \text{ kg m}^{-3}$  (b)  $5.6 \times 1000 \text{ kg m}^{-3}$  (c)  $1005.6 \text{ kg m}^{-3}$  (d)  $5600 \text{ kg m}^{-3}$
  - Submarines are designed on the basis of  
(a) Newton's law of gravitation (b) Newton's third law  
(c) Pascal's law (d) Archimedes' principle
  - Inertia of an object depends on its  
(a) mass (b) velocity (c) mass and velocity (d) mass and acceleration
  - The inertia of an object tends to cause the object  
(a) to increase its speed (b) to retard due to friction  
(c) to accelerate (d) to resist any change in motion
  - A body of weight  $W$  is floating in a liquid. Its apparent weight will be:  
(a) equal to  $W$  (b) less than  $W$  (c) greater than  $W$  (d) zero
  - The normal atmospheric pressure is:  
(a) 76 m of Hg (b) 76 cm of Hg (c) 76 Pa (d)  $76 \text{ Nm}^{-2}$
  - The pressure on a surface is reduced by  
(a) using high thrust (b) increasing the area of surface  
(c) decreasing the area of surface (d) none of these
  - Which of the following is the smallest unit?  
(a) Millimetre (b) Angstrom (c) Fermi (d) Metre
  - The time period of two pendulums of length 4 m and 9m are in the ratio:  
(a) 4 : 9 (b) 9 : 4 (c) 2 : 3 (d) 3 : 2
  - The slope of the velocity - time graph gives:  
(a) Displacement (b) Speed (c) Distance (d) Acceleration
  - A car acquires a velocity of  $54 \text{ ms}^{-1}$  in 20 s starting from rest, then its acceleration is:  
(a)  $5.4 \text{ ms}^{-2}$  (b)  $2.7 \text{ ms}^{-2}$  (c)  $7.2 \text{ ms}^{-2}$  (d)  $2.0 \text{ ms}^{-2}$
  - 1 Newton is equal to:  
(a)  $10^3 \text{ dyne}$  (b)  $10^8 \text{ dyne}$  (c)  $10^{10} \text{ dyne}$  (d)  $10^5 \text{ dyne}$

**Q 2)**

1. The figure below shows the displacement-time graph of a body.





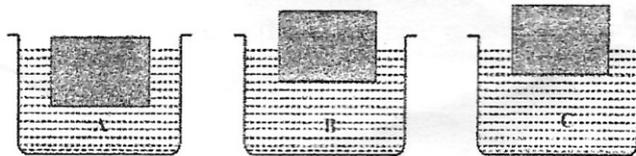
From the graph calculate the following:

[3]

- average velocity between 0 s - 3 s.
  - average velocity between 3 s - 5 s.
  - average velocity between 5 s - 7 s.
- A toy car initially moving with a uniform velocity of 18 km/hr comes to stop in 2 sec. Find the retardation of the car in S.I. units. [2]
  - A dam has broader walls at the bottom than at the top, why? [2]
  - State Pascal's law of transmission of pressure. [2]
  - List out the factors affecting upthrust. [2]
  - Two simple pendulums X and Y have equal lengths but their bobs weigh 50gf and 100gf respectively. What would be the ratio of their time periods? What is the reason for your answer? [2]
  - Name the SI and cgs units of force. How are they related? [2]
  - State the laws of liquid pressure. [2]
  - Define linear momentum and state its SI unit. [2]

Q 3)

- A car travels with a uniform velocity of  $20 \text{ ms}^{-1}$  for 5 s. The brakes are then applied and the car is uniformly retarded. It comes to rest in further 8 s. [2]
  - Draw a graph of velocity against time.
  - Use this graph to find the total distance travelled.
- a) State Archimedes' principle. [2]  
b) What can you say about the average density of a ship floating on water in relation to the density of water?
- The following figure shows the same block of wood floating in three different liquids A, B and C of densities  $d_1$ ,  $d_2$  and  $d_3$  respectively. Which liquid has highest density? Give reason for your answer. [2]



## SECTION B – 40 Marks

Q 4)

- Define each of the following: [3]
  - Vector quantities
  - Variable velocity
  - Linear momentum
- A body with an initial velocity of  $18 \text{ km h}^{-1}$  accelerates uniformly at the rate of  $9 \text{ cm s}^{-2}$  over a distance of 200m. Calculate: [3]
  - the acceleration in  $\text{m s}^{-2}$ .
  - its initial velocity in  $\text{m s}^{-1}$
  - its final velocity in  $\text{m s}^{-1}$
- Explain the least count of a Vernier callipers. Also name its part which is used to measure the following: [4]
  - internal diameter of a mug
  - thickness of a pencil

Q 5)

- A body of volume  $V$  and density  $D_b$  is kept completely immersed in liquid of density  $D_L$ . If  $g$  is the acceleration due to gravity, write expressions for the following: [3]
  - the weight of body.
  - the upthrust on body.
  - the apparent weight of body in liquid.
- State three characteristics of upthrust [3]
- State the reason for the following: [4]
  - nose starts bleeding at higher altitudes.
  - deep sea divers need special protective suits.



Q 6)

1. a) Explain why a gas bubble released at the bottom of a lake grows in size as it rises to the surface of lake. [3]  
b) State Pascal's law of transmission of pressure.
2. Complete the following sentences: [3]
  - a) Pressure is \_\_\_\_\_ in all directions about a point in a liquid.
  - b) Pressure at a point inside a liquid is \_\_\_\_\_ to its depth.
  - c) Pressure of a liquid at a given depth is \_\_\_\_\_ to the density of liquid.
3. A boy weighing 60 kgf is wearing shoes with heel of area of cross section  $20 \text{ cm}^2$ , while a girl weighing 45 kgf is wearing sandals with heel of area of cross section  $1.5 \text{ cm}^2$ . Compare the pressure exerted on ground by their heels when they stand on the heel of one foot. [4]

Q 7)

1. An auto driver moving with a speed of 36 km/hr saw a child standing in the middle of the road and applied brakes to bring the vehicle to rest in 5 seconds. If the total mass of auto and driver is 450 kg, then calculate the average force exerted by the brakes. [3]
2. A metallic ball is hanging from a rigid support. Draw a neat labelled diagram showing the forces acting on the ball and the string. Also state any two differences between mass and weight of a body. [3]
3. Two bodies P and Q are of same mass, but moving with velocities  $v$  and  $5v$  respectively. Compare their  
i) inertia and (ii) momentum. [4]