

PHYSICS

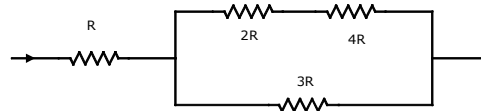
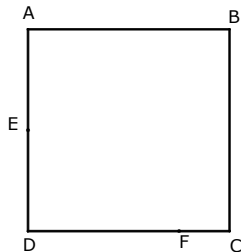
Time: ONE Hour

Max. Marks: 50

- Answers must be written either in English or the medium of instruction of the candidate in high school.
- Answer all the questions in the booklets provided for the purpose.
- There will be no negative marking.
- The relevant working or the argument in arriving at an answer has to be included in your answer.
- Use of calculators is not permitted.
- Questions in Part A carry 5 marks each , questions in part B carry 2 marks each.

Part A

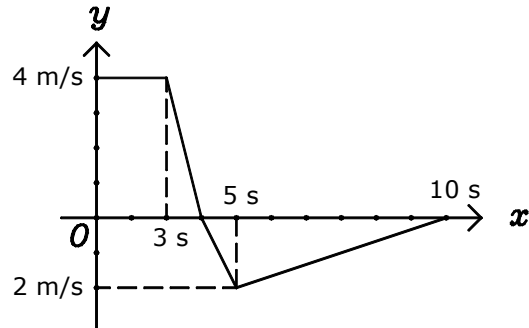
- 1 A body dropped from a very large height , experiences resistance to its motion due to air and has a varying acceleration which decreases to zero in time t . Assume the displacement in this time and the velocity acquired at the end of this time are same as that due uniform acceleration of cg (c is a constant less than 1). The body then travels with a uniform speed acquired at the end of time t . Find the displacement of the body in time $2t$.
- 2 A bright point object is kept at some distance from a lens of focal length 20 cm. If the object distance is changed $5/6$ times, the distance of the screen from the lens has to be changed by $5/3$ times to obtain a clear image on the screen. Find the distance through which the screen has been moved.
- 3 ABCD is a square of side 400 m. E and F are points 200 and 300 m away from corner D. Two persons starting from E and F and moving away from D, meet at B. Where would they meet if they were to travel towards D.



- 4 In the circuit shown PD across R is V . Find the PD across the resistance $2R$
- 5 Two liquids of densities 2 gcm^{-3} and 4 gcm^{-3} of equal volumes form a homogenous mixture. A solid object made of materials of density 1 gcm^{-3} and 5 gcm^{-3} mixed homogenously is just found to just float in this mixture. What is ratio by volumes/masses of the materials of the solid object?
- 6 A man is standing to the south of a vertical conductor carrying current facing the conductor. Direction of the magnetic field at a position in between him and the wire is from his left to right. What would be magnetic field direction behind him if he moved to a position (i) east of the conductor (ii) to the north of the conductor. Assume he always faces the conductor and current direction in the wire remains constant. (Express these directions as east or west etc..)
- 7 Average energy required by an adult to sustain himself is 1500 kilocalories per day . A medium sized banana is about 100 g and provides about 100 kilocalories. How many kg of bananas are required per day to sustain a population of 1000 million? If some how the biological processes were to be sustained by nuclear reactions, how many kg of mass must disappear to provide this energy?
- 8 A ray of light is incident at 45° on to a transparent slab of thickness 10 cm made of a material of refractive index $\sqrt{2}$. Find the lateral displacement of the ray as it emerges from the slab.

Part B

- 9 Length of a wire of resistance R and resistivity ρ is doubled by stretching it. What will be its new resistance and resistivity?
- 10 A solid object made of material of density 0.79 gcm^{-3} of negligible coefficient of cubical expansion is floating in a liquid of density 0.8 gcm^{-3} at 20°C . When the temperature is raised to 220°C , the solid object starts sinking in the liquid. Find the coefficient of cubical expansion of the liquid.
- 11 Velocity time graph of a body is as shown. Find its displacement in 10 s.



- 12 Sound wave of wavelength 0.5 m in air passes in to water. What is its wavelength in water? Also find the frequencies of the wave in air and water (Velocity of sound in air and water are 350 m/s and 1400 m/s respectively)
- 13 A 1000 MW thermal power plant burns 10^6 kg of coal in one hour. How many kg of coal is burnt to produce the power required to light up a 100 W lamp for 8 hours.