



# GEMS SCHOOL

Dhapakhel, Lalitpur

## Model Question SET –1

### PHYSICS

Class: XI  
Time: 3:00 hours

Full Marks: 75  
Pass Marks: 27

*Candidates are required to give their answer in their own words as far as practicable. The figures in the margin indicate full marks.*

#### Group 'A'

1. Answer, in brief, any **SIX** questions. [6×2=12]

- If  $y = a+bt+ct^2$ , where  $y$  is the distance and  $t$  is the time. What is the dimension and unit of  $C$ ?
- A projectile fired at an angle of  $18^\circ$  has certain horizontal range. State another angle of projection for the same range.
- What will happen to the value of 'g' if the earth stops rotating?
- Can a body be in equilibrium if it is in motion? Explain.
- Can you distinguish a raw egg and a hardboiled egg by spinning each one on the table? Explain.
- What will happen to the level of water in a container when a submerged piece of ice melts completely?
- Machine parts are jammed in cold day. Why?

2. Answer, in brief, any **TWO** questions. [2×2=4]

- Does the coefficient of linear expansion depend on length? Explain.
- Why are dews formed in the early morning hours?
- Is it possible to construct a heat engine that creates no thermal pollution?

3. Answer in brief, any **ONE** question. [1×2=2]

- Why a mirror cannot give rise to chromatic aberration? Explain.
- The sun is less bright in the morning and evening as compared to at noon, although its distance from the observer is almost the same. Why?

4. Answer in brief any **ONE** question. [1×2=2]

- No two lines of force in an electric field ever intersect each other. Why?
- Distinguish between dielectric constant and dielectric strength.

#### Group 'B'

5. Answer any **THREE** questions. [3×4=12]

- What is conical pendulum? Show that the period of oscillation of the pendulum is given by:  $T = 2\pi \sqrt{\frac{l \cos \theta}{g}}$ .
- What is the physical difference between elastic and inelastic collisions? Prove that the colliding objects having same masses exchange their velocities in one dimensional elastic collision.
- What is Poisson's ratio? Derive an expression for the energy stored in a stretched wire?
- Define surface tension and angle of contact. Deduce an expression for rise of liquid in a capillary tube.

6. Answer any **TWO** questions. [2×4=8]

- On the basis of kinetic theory of gases, deduce the relation  $P = \frac{1}{3} \rho \overline{c^2}$ ; where the symbols have their usual meanings.
- Define latent heat of fusion of ice. Explain the method of determining the latent of heat fusion of ice by the method of mixture.
- Derive the relation  $C_p - C_v = R$ , where the symbol's have their usual meanings.

7. Answer any **ONE** question. [1×4=4]

- a) Show that  $\mu = \frac{\sin\left(\frac{A+\delta_{min}}{2}\right)}{\sin(A/2)}$ , for a prism where the notations carry usual meanings.
- b) Draw an outline diagram of compound microscope and derive expression for the magnification.

8. Answer any **ONE** question. [1×4=4]

- a) State and explain Gauss's law in electrostatics. Use it to find the electric field intensity due to a linear charge distribution.
- b) Derive an expression for the energy stored in a capacitor of capacitance "C" when there is potential difference of 'V' between the plates.

#### Group 'C'

9. Answer any **THREE** numerical questions: [3×4=12]

- a) A man wishes to swim across a river 600m wide. If he can swim at the rate of 4km/h in still water and the river flows at 2kmh<sup>-1</sup>. Then in what direction must he swim to reach a point exactly opposite to the starting point and when will he reach it?
- b) Assuming the earth to be uniform sphere of radius 6400 Km, calculate the total energy needed to rise a satellite of mass 2000kg to a height of 8000 km above the surface of the earth and to set it into circular orbit at that altitude.
- c) A simple pendulum has a period of 2 seconds. When the pendulum is shortened by 1m, the period is 1.8 sec. From these measurements, calculate the acceleration due to gravity and the original length of pendulum.
- d) Water enters a house through a pipe with an inside diameter of 2.0 cm at an absolute pressure of 4.0 x10<sup>5</sup> Pa. A 1.0 cm diameter pipe leads to the second floor bath room 5.0 m above. If the flow speed at the inlet pipe is 1.5 m/s, find flow speed, pressure and volume flow rate in the bath- room.

10. Answer any **TWO** numerical questions: [2×4=8]

- a) A ball of copper weighing 400gm is transferred from a furnace to copper calorimeter of mass 300gm and containing 1Kg of water at 20°C. The temperature of water rises to 50°C. What is the original temperature of the ball? (Given specific heat capacity of copper = 0.094Cal/gm/°C)
- b) Estimate the rate of heat loss through a glass window of area 2m<sup>2</sup> and thickness 4mm, when the temperature of the room is 300K and temperature outside is 5°C. [Given K = 0.72 Wm<sup>-1</sup> K<sup>-1</sup>]
- c) The efficiency of a carnot cycle is 15 %.If on reducing the temperature of the sink by 65 °C,the efficiency becomes 30 %.Find the initial and final temperature between which the cycle is working.

11. What is the apparent position of an object below a rectangular block of glass 6cm thick if a layer of water 4cm thick is on the top of glass?  
[Give  $\mu_g = \frac{3}{2}$  and  $\mu_w = \frac{4}{3}$ ] [4]

12. Three equal charges 1.8x10<sup>-6</sup> C each are located at the corners of an equilateral triangle ABC, whose sides are 6 cm. Calculate the electric potential at a point mid – way between the corners A and B. [3]

###