



GEMS SCHOOL

Dhapakhel, Lalitpur

Model Question

SET –3

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.

[6x2=12]

- Can a body have zero velocity but non zero acceleration?
- Mountain roads are curved and not straight up the slope, why?
- Distinguish between precise and accurate measurements.
- A person standing on single foot can easily be knocked down than a person standing on both feet, why?
- Two vectors have equal magnitudes and their resultant also has the same magnitude. What is the angle between the two vectors?
- Does the centre of gravity of a solid body always lie within the material of the body? Explain why?
- What will happen if a capillary tube of insufficient height is dipped in water?

2. Answer, in brief, any TWO questions.

[2x2=4]

- What will happen the internal energy of ice when ice melts?
- Why do birds puff up their feathers on a cold day?
- Two identical spheres, one of them solid and another hollow are heated to the same temperature and allowed to cool, which one will cool faster?

3. Answer, in brief, any ONE question.

[1x2 = 2]

- What is luminance? Name the factors upon which it depends.
- Sun glasses have curved surfaces but their power is zero, why?

4. Answer, in brief, any ONE question.

[1x2 = 2]

- A man inside an insulated hollow metal cage does not receive a shock although it is connected to a high voltage supply. Explain, why?
- Two conducting spheres of the same metal have the same radii. If one is hollow and the other is solid, which one will have more amount of charge if each is charged through the same potential?

'Group B'

5. Answer any THREE questions.

[3x4=12]

- Show that when a body just begins to slide down on an inclined plane, the coefficient of friction is equal to the tangent of inclination of the plane. Obtain expression for the relation between angle of friction and angle of repose.
- What is principle of conservation of energy? Show that total mechanical energy of a body is conserved when it moves under the action of gravitational field.
- What do you mean by satellite? Derive an expression for the total energy of a satellite orbiting round the earth.
- Derive an expression for the terminal velocity of a small spherical ball of radius r dropped gently in a viscous liquid of density ρ and coefficient of viscosity η .

6. Answer any TWO questions.

[2x4 = 8]

- How can you determine the specific heat capacity of a liquid by the method of cooling? What is the principle used in this method?
- Describe Dulong and Petit method of determining the absolute expansivity of a liquid.
- Draw the P-V diagram for petrol engine and explain its working on the basis of the diagram.

7. Answer any **ONE** question. [1x4 = 4]

- Describe the construction and working of a refraction type astronomical telescope. Obtain its angular magnification when the final image is formed at infinity.
- Derive lens maker's formula $\frac{1}{f} = (\mu-1) \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$ where the symbols have their usual meaning.

8. Answer any **ONE** question. [1x4 = 4]

- Define the term potential difference between any two points in an electrostatic field and hence derive an expression for it.
- How can a number of capacitance be connected to increase and decrease the effective capacitance? Find the respective expression for the effective capacitance in each case.

Group C

9. Answer any **THREE** numerical questions. [3x4 = 12]

- A train of mass 2×10^5 kg moves at a constant speed of 72 km/hr up a straight incline against a frictional force of 1.28×10^4 N. The inclination is such that the train rises vertically 1 meter for every 100 m travelled along the incline. Calculate the necessary power developed by the engine of the train.
- An object of mass 10 kg is whirled round a horizontal circle of radius 4m by a revolving string inclined to the vertical. If the uniform speed of the object is 5m/s. Calculate (i) the tension in the string (ii) the angle of inclination of the string to the vertical.
- A body of mass 0.2 kg is executing simple harmonic motion with amplitude of 20mm. The maximum force which acts upon it is 0.64 N. Calculate (i) its maximum velocity and (ii) its period of oscillation.
- A recording disc rotates steadily at 45 rev/min on a table. When a small mass of 0.02 kg is dropped gently on the disc at a distance of 0.04 m from its axis and sticks to the disc, the rate of revolution falls to 36 rev/min, calculate the Moment of inertial of the disc about its centre.

10. Answer any **TWO** numerical questions. [2x4 = 8]

- Find the result of mixing 10g of ice at -8°C with 10g of water at 12°C . Sp. heat of ice is 0.5 and latent heat of ice is 80cal/gram.
- Air at 273 K and 1.01×10^5 N/m² pressure contains 2.7×10^{25} molecules per cubic meter. How many molecules per m³ will be there at a place where the temperature is 223 K and pressure is 1.33×10^{-4} N m⁻²?
- Gas in a cylinder, initially at a temperature of 10°C and pressure of 1.01×10^5 N m⁻² is to be compressed adiabatically to one eighth of its volume. Find final pressure and temperature. (Ratio of molar heat capacities = 1.40)

11. A glass prism of angle 72° and index of refraction 1.66 is immersed in a liquid of refractive index 1.33. What is the angle of minimum deviation for a parallel beam of light passing through the prism. [4]

12. Two capacitors of capacitances $4\mu\text{F}$ and $6\mu\text{F}$ respectively are joined in series with a battery of emf 60 volts. The connections are broken and the like terminals of the capacitors are then joined. Find the final charge on each capacitor. [3]