GEMS SCHOOL

Dhapakhel, Lalitpur

Model Question
SET –2

PHYSICS

Class: XI   Full Marks: 75
Time: 3:00 hours   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]

   a) Taking force, length and time as fundamental quantities, find the dimension of density.
   b) Find the angle of projection at which the horizontal range and maximum height of a projectile are equal.
   c) When a horse pulls a cart, the cart also pulls the horse backwards. Explain how the motion takes place.
   d) Why are roads banked on curved path?
   e) If meteorites strike the earth, the earth will slow down slightly. Why?
   f) Why is the bottom of a ship made heavy?
   g) What will happen if a glass capillary tube of insufficient length is dipped in water?

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

   a) As we go higher in the earth's atmosphere, the ratio of N_2 to CO_2 molecules increases. Why?
   b) What is triple point? Show that there exist a single value of triple point.
   c) Show that adiabatic curve is steeper than isothermal curve.

3. **Answer, in brief, any *ONE* question.**   [1x2 = 2]

   a) A lens made of glass is immersed in water. Will its power decrease or increase?
   b) If a plane glass slab is placed on the letters of different colors, then violet colored letters appears more and more raised up, why?

4. **Answer, in brief, any *ONE* question.**   [1x2 = 2]

   a) A charged conical conductor loses its charge earlier than a similarly charged sphere. Why?
   b) Distinguish between dielectric constant and dielectric strength.

Group B

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

   a) State the principle of conservation of linear momentum and show that it follows from Newton's second and third law of motion.
   b) Define simple harmonic motion. Prove that the motion of a simple pendulum is simple harmonic and hence derive the expression for its time period.
   c) What do you mean by escape velocity? Show that the escape velocity is independent of the mass of the escaping body.
   d) State and prove Bernoulli's theorem. How is the theorem valid for non-viscous and incompressible liquid?

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

   a) Define specific heat capacity of solid? Describe the method of mixture to measure the specific heat capacity of a solid.
   b) Define the coefficient of real and apparent expansions of a liquid and derive a relation between them.
   c) Explain the working of diesel engine with the help of PV diagram.

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

   a) What is achromatism? Deduce the condition for achromatic lenses

   b) Describe the construction and working of a astronomical telescope and hence derive an expression for its magnifying power

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

   a) State and explain Gauss's theorem in electrostatics. Use it to obtain an expression for electric field intensity due to infinite plane sheet of charge.

   b) What do you mean by capacitance of a capacitor? Deduce an expression for the capacitance of a parallel plate capacitor.

Group C

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

   a) An iron block of mass 10 kg rests on a wooden plane inclined at $30°$ to the horizontal. It is found that the least force parallel to the plane which causes the block to slide up the plane is 100 N. Calculate the coefficient of sliding friction between wood and iron.

   b) A flywheel has moment of inertia of 4 kgm^2 about an axis passing through its Centre and is rotating at 120 revolutions per minute. What constant opposing torque is required to bring it to rest in 5 seconds?

   c) A string supports a solid iron object of mass 200 gm totally immersed in a liquid of density 800 kgm^{-3}. The density of iron is 8000 kgm^{-3} . Calculate the tension in the string.

   d) A vertical brass rod of circular section is loaded by placing a 5 Kg weight on top of it. If its length is 50 cm, its radius of cross- section 1 cm, and the young modulus of the material $3.5x10^5$ Nm^{-2}, find a) the contraction of the rod b) the energy stored in it.

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

   a) Calculate how much steam from water boiling at $100°c$ will just melt 50 g of wax at $20°c$.
       (melting point of wax=$55°c$,specific heat of wax=0.7cal $g^{-1}°c^{-1}$,specific latent heat of fusion of wax=35 cal g^{-1})

   b) Assuming the density of Nitrogen at STP to be 1.251 kg/m^3, find the root mean square velocity of Nitrogen molecules at $127°C$. Atmospheric pressure = $1.01 ×10^5$ N/m^2.

   c) The density of an ideal gas is 1.6kg/m^3 at $27°c$ about 10^5 N m^{-2} pressure .Its specific heat at constant volume is 312 $Jkg^{-1}K^{-1}$. Find the ratio of specific heat at constant pressure to that at constant volume.

11. A converging meniscus of glass (μ_g=1.5) having radius of curvature 4cm and 8 cm is put on a horizontal surface facing upward. If it is filled with water ($\mu_w = \frac{4}{3}$), what will be the focal length of the combination?   [4]

12. What distance must an electron move in a uniform potential gradient 200 Vcm^{-1} in order to gain kinetic energy $3.2x10^{-18}$ J?   [3]

Good Luck