IMMACULATE HEART GIRLS' SCHOOL – NYAKIBALE
S.4 PHYSICS – GUIDING QUESTIONS

1. (a) Define the terms
    (i)   Heat
    (ii)   Temperature
    (iii)   Thermometer
    (b) (i) State three effects of heart on a body.
    (ii) Define the terms **Lower** and **Upper** fixed points.
    (iii)Describe briefly how the lower and upper fixed points can be determined
            in separate experiments.
    (c) On a gas thermometer, the temperature was shown as 600mm at ice point and
            820mm at steam point. If 655mm of mercury corresponds to temperature Q,
            calculate the value of Q.

2. (a) Define thermometric property.
    (b) State four qualities of a good thermometric liquid.
    (c) State advantages of mercury over alcohol as a thermometric liquid.
    (d) State advantages of alcohol over mercury as a thermometric liquid.
    (e) State reasons why water cannot be used as thermometric liquid.
    (f) Draw and label
        (i) simple liquid-in-glass thermometer
        (ii) clinical thermometer.
    (g) Describe the features of a liquid-in-glass thermometer and explain how its
        sensitivity can be increased.

3. (a) Define the following terms as applied to heat transfer:

(i)   Conduction
(ii) Convection
(iii) Radiation

(b) Distinguish between bad and good conductors of heat and give examples of
    each.
(c) Describe a simple experiment to compare thermo-conductivity of various
    materials.
(d) Describe an experiment to show that convection takes place in liquids.
(e) Describe with the aid of a diagram an experiment to show that water is a bad
    conductor of heat.
(f) State and explain the effects and applications of convection in fluids.
(g) Describe the structure and mode of action of a vacuum flask.

4. (a) State gas laws.
   (b) Describe how Charles' law can be verified.
   (c) What is meant by absolute zero?
   (d) The volume of a fixed mass of a gas at constant pressure is tripled as its
       temperature increases from 0° C. Determine the final temperature of the gas.
   (e) Distinguish between saturated and unsaturated vapour.
   (f) Distinguish between saturated vapour pressure and unsaturated vapour
       pressure.
   (g) State the factors that affect boiling point of a given liquid.

5. (a) State the laws of refraction of light.
   (b) Describe how the refractive index of glass in form of a glass block can be
       determined.
   (c) A ray of light travelling from air to glass is refraction at an angle of 35°. If the
       refractive index of glass is 1.52, calculate the angle of incidence.
   (d) Define the terms **focal point** and **focal length** as applied to lenses.
   (e) Describe briefly how a lens camera works.

(f) State the differences and similarities between a lens camera and an eye.

(g) (i) Define power of a lens.

   (ii) A diverging lens has a focal length of 20cm. Calculate its power.

6. (a) State the Newton's laws of motion.

(b) Define the term momentum.

(c) (i) State the law of conservation of linear momentum.

   (ii) Distinguish between elastic and inelastic collisions.

   (iii)A ball of mass 5kg moving with a velocity of $10ms^{-1}$ makes a head on
        collision with another ball of mass 2kg with a velocity of $5ms^{-1}$. If the two
        bodies stick together after collision, calculate their common velocity.

(d) A bullet of mass 10g is fired from a gun at a velocity of $400ms^{-1}$. If the gun has
     a mass of 5kg, find the recoil velocity of the gun.

(e) A girl of mass 60kg stands on a weighing scale in a lift. What is the reading in
     newtons when the lift moves

(i)   upwards with an acceleration of $2ms^{-2}$.

(ii)   downwards with an acceleration of $2ms^{-2}$

(iii)   downwards with a constant velocity of $3ms^{-1}$

(iv)   falls freely when the cable breaks.

7. (a) Define the term moment of a force.

(b) State the principle of moments.

(c) Describe briefly how the mass of a metre rule can be determined.

(d) A metre rule of mass 100g had a load of mass 200g suspend from its
    one end.
    If the metre rule balances horizontally on a knife edge, determine the position
    of the knife edge.

(e) (i) Define the term **centre of gravity**.

   (ii) How would you determine, by experiment, the centre of gravity of an
        irregular lamina?

   (iii) Explain what is meant by stable, unstable and neutral equilibrium. Give one
        example of each.

8. (a) What are cathode rays?
   (b) How can cathode rays be produced?
   (c) State four properties of cathode rays.
   (e) (i) What is meant by the term radioactivity?
       (ii)The half-life of a radioactive element X is 24 days, calculate the mass
           remaining unchanged of 0.64g of X after 120 days.
   (f) State the effect of magnetic field on
       (i) gamma rays
       (ii) beta particles
       (iii)alpha particles

9. (a) (i) Define the term **electromotive force** and **internal resistance** of a cell.
       (ii) A cell is joined in series with a resistance of 2Ω and a current of
   0.25A
           flows through it. When a second resistance of 2Ω is connected in
   parallel
           with the first the current through the cell increases to 0.3A. What is the
           e.m.f and internal resistance of the cell?
   (b) Describe how a gold leaf electroscope can be charged positively by
   induction.
   (c) Explain the working of a lightning conductor.
   (d) (i) What is meant by electric field?
       (ii) Define neutral point as applied to electrostatics.
      (iii)Draw electric field pattern between a negatively charged point and a
   neutral
           metal plate.

10.(a)Define the terms below as applied to waves
       (i)   amplitude
       (ii)   frequency
       (iii)   wavelength
       (iv)   wave front
   (b) Describe briefly how the velocity of sound in air can be determined.
   (c) A student standing between two vertical cliffs and 480m from the
   nearest cliff,
       shouted. She heard the first echo after 3 seconds and the second echo
   after 2
       seconds later. Use this information to calculate

      (i)   the velocity of sound in air

      (ii)   the distance between the cliffs.

(d) (i) Distinguish between refraction and diffraction of waves.

    (ii) Draw a diagram to show how plane waves are diffracted through a narrow

       gap/slit.

    (iii)With the aid of a diagram show how circular waves are reflected by a

       straight barrier.

11.(a) What is meant by the term magnetisation?

    (b) State the types of magnetisation.

    (c) How can a magnet lose its magnetism?

    (d) (i) What is meant by magnetic field and a neutral point as applied to

        magnetism?

      (ii)Draw magnetic fields due to a bar magnet placed with its north pole facing

       the geographic south of the earth.

    (e) State any important differences between soft iron and steel and indicate which

     you would select for use as

     (i) a magnetic keeper

     (ii) the core of an electromagnet.

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