Physics – Mock Test Paper

[Time: $1\frac{1}{2}$ hrs] **[M. Marks : 80]**

Answers to this paper must be written on the paper provided separately.

You will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the Question Paper.

The time given at the head of this paper is the time allowed doe writing the answers.

Section I is compulsory. Attempt any **four** questions from **Section II**.

Section I (40 Marks)

Attempt all questions from this section

Question 1.

(a) A body weighing 350 Newton, runs up a flight of 30 steps, each 20 cm. high in 5 seconds. Calculate the power spend.

(b) Which physical quantities do the following unit represent ?

(i) Dioptre; (ii) Kelvin.

(c) State one factor on which the magnitude of a non-contact force depends.

(d) Where is the centre of gravity of :

(i) a uniform ring,

(ii) a rectangular lamina situated ?

Question 2.

(a) Which material is used for making wire of standard resistance ? Give reason.

(b) Does land cool at a slower or faster rate than water ? Give one reason for your answer.

(c) Explain, why steam pipes warm a building more effectively than hot water pipes in cold countries ?

(d) A ray of light, after refraction through a concave lens, emerges parallel to the principal axis. Draw a ray diagram to show the incident ray and its corresponding emergent ray.

(e) Does total internal reflection occurs when light passes from a rarer medium to a denser medium ?

Question 3.

(a) Which material is used for making wire of standard resistance ? Give reason.

(b) Why the poles of permanent magnet are "concave cylindrical". In case of galvanometer ? Explain.

(c) The ratio of the amplitudes of two waves is 4 : 9. What is the ratio of their intensities ?

(d) A bat emits an ultrasonic sound of frequency 0.25 MHz. Calculate the time in which one vibration is completed.

(e) Which of the two wires of similar dimensions, copper or nichrome, would you use for the electric heater element ? Give reasons to justify your answer.

Question 4.

(a) Why should the internal resistance of a cell be low ?

(b) A flag is made up of three strips of cloth of yellow, white and cyan colours. Name the colour of a particular light in which this flag will appear to be of a single colour.

(c) The wave length of red colour is 7×10^{-7} m and that of blue colour is 4×10^{-7} m. Will the speed of both the colours be the same in (i) vacuum, and (ii) glass ?

(d) An electric kettle is rated 2.5 KW, 250V. Find the cost of running the kettle for two hours at 60 paise per unit.

(e) A mass of lead is embedded in a block of aluminium (2 mm thick). Radiations from a radioactive source incident on the side of the block produce a shadow on a fluorescent screen placed beyond the block. The shadow of the block of aluminium is fainter than the shadow of lead. Give the reason for this difference.

SECTION—II (40 Marks)

*(Attempt any **four** questions from this Section)*

Question 5.

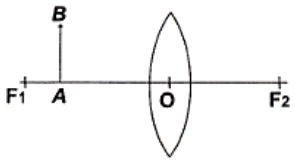
(a) A body of mass m initially moving with a velocity 'u' picks up velocity 'v' in 't' second when a force 'F' acts on it, such that acceleration is 'a'. Derive a relation between force, mass and acceleration.

(b) Write two advantages of the ring main system of power distribution.

(c) A person continues to push a rock for sometime but fails to move it. What is the work done by it ?

Question 6.

(a) Given diagram shows an object AB placed on the principal axis of a convex lens placed in air. F_1 and F_2 are the two foci of the lens. Copy the diagram :



(i) Draw a ray of light starting from B and passing through ? Show the same ray after refraction by the lens.

(ii) Draw another ray from B which passes through F_2 after refraction by the lens.

(iii) Locate the final image formed.

(iv) Is the image real or virtual.

(b) A postage stamp appears raised by 7.0 mm when placed under a rectangular glass block of refractive index 1.5. Find the thickness of the glass block.

Question 7.

(a) What type of waves are produced when a bell rings in air ?
A string vibrates with a frequency of 500 Hz. If the distance between two consecutive troughs of a transverse wave produced in the string is 20 cm, find the velocity and the period of the wave.

(b) (i) If a monochromatic beam of light, undergoes minimum deviation through an equiangular prism, how does the beam pass through the prism, with respect to its base ?
(ii) If white light is used in the same way as in (i) above, what change is expected in the emergent beam ?

(c) (i) What do you mean by percussion instruments ? Give few examples.
(ii) State the energy changes taking place in following cases :
(a) Electric cell in a circuit
(b) Burning of wood and
(c) Petrol engine of a running car.

Question 8.

(a) 0·5 kg of ice at 0°C is heated uniformly by an electric heater of power 2 KW. If all heat is absorbed by ice, calculate the time intervals in seconds for :
(i) Ice to completely melt to form water at 10°C,
(ii) Water to attain a temperature of 100°C,
(iii) Water to change to steam at 100°C.

Given : Sp. latent heat of ice = 336,000 Jkg^{-1} .
Sp. latent heat of steam = 2260,000 Jkg^{-1}.
Sp. heat capacity of water = 4200 $Jkg^{-1}\ K^{-1}$

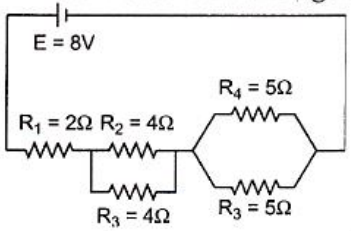
(b) Electrical power P is given by the expression :

$$P = (Q \times V)/\text{time}$$

(i) What do the symbols Q and V represent ?
(ii) Express 'Power' in terms of current and resistance explaining the symbols used therein.

Question 9.

(a) Find the current flowing in the circuit shown in the figure.



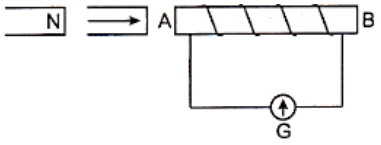
(b) The diagram shows a coil connected to a centre zero galvanometer G. The galvanometer shows, a deflection to the right when the N—pole of a powerful magnet is moved to the right as shown :

(i) Explain, why the deflection occurs in the galvanometer ?

(ii) Does the direction of the current in the coil appear clockwise or anti-clockwise when viewed from the end A ?

(iii) State the observation in G when the coil is moved away from N.

(iv) State the observation in G when, both the coil and the magnet, are moved to the right at the same speed.



Question 10.

(a) In the nuclear reaction given below, a nucleus X changes to another nucleus Y.

$$_{88}X^{226} \longrightarrow Y + \alpha + \text{Energy}$$

(i) What are the atomic and mass numbers of Y ?

(ii) Name the gas formed when the α-particles acquires two electrons.

(iii) What is the effect on the motion of the α-particle when it passes through a region containing a magnetic field ?

(b) Define uniform circular motion.

(c) Draw a cathode ray tube consisting of a heater, a cathode, cylindrical anode and a deflecting system. Show how you will connect a low tension battery of 6V and a high tension one of 1000V to the electrodes of the tube.