V I B G Y O R H I G H

First Preliminary Examination

2020-2021

PHYSICS

SCIENCE Paper - 1

Grade: X **Max. Marks : 80**

Date : 24/11/2020 **Time Allowed: 2 hour**

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 for writing the answers.

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

The intended marks for the questions or parts of questions are given in brackets [ ].

SECTION – I (40 Marks)

*Attempt **all** questions from this Section.*

Question 1 **[10]**

a) Define the term power. State its S.I. unit. [2]

b) State two conditions for a body, acted upon by several forces to be in equilibrium. [2]

c) Can a machine act as a force multiplier and speed multiplier simultaneously? Justify your answer. [2]

d) Calculate the frequency of red light of wavelength 800 nm. The speed of light is 3×10^8 ms^{-1}. [2]

e) Which characteristic of sound will change if there is a change in (i) its amplitude (ii) its waveform. [2]

Question 2 **[10]**

a) Is it possible to have an accelerated motion with a constant speed? Name such type of motion. [2]

b) A body of mass 5 kg is taken from a height 5 m to 10 m. Find the increase in potential energy ($g = 10\ ms^{-2}$). [2]

c) Define the term efficiency of a machine. Give one reason for a machine not to be 100% efficient. [2]

d) Draw a graph between displacement and the time of a body executing damped vibrations. [2]

e) What is 'SONAR'? State the principle on which it is based. [2]

Question 3 **[10]**

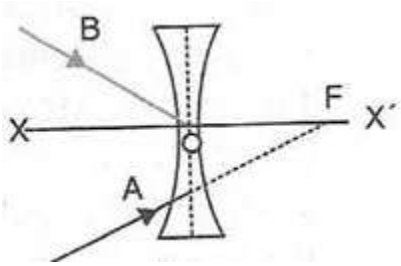
a) A girl weighing 30 kgf climbs up 30 steps, each 20 cm high in 4 minutes. Calculate the work done by her against gravity. [2]

b) (i) State the relation between the critical angle and absolute refractive index of a medium. [2]

(ii) (ii) Which colour of light has a higher critical angle? Red light or green light.

c) How will you differentiate between a convex and a concave lens by looking at the 'printed page'? [2]

d) In the diagram below, XX' represents the principal axis, O the optical centre and F the focus of the lens. Complete the path of rays A and B as they emerge out of the lens. [2]



e) (i) A ray of light passes from medium 1 to medium 2. Which of the following quantities of the refracted ray will not differ from that of incident ray: speed, intensity, frequency and wavelength? [2]

(ii) What name is given to the elements with same mass number and different atomic number?

Question 4 **[10]**

a) State one safety precaution for each of the following: [2]

(i) In establishment of nuclear power plant.

(ii) In handling a radioactive source.

b) Rishi is surprised when he sees water boiling at 115^{o}C in a container. Give reason as to why water can boil at the above temperature. [2]

c) The magnification produced by a lens is – 0.7 [2]

(i) Name the lens used.

(ii) What is the nature of image formed?

d) Define the following: [2]

(i) Principal focus of a concave lens.

(ii) Optical centre.

e) Give two characteristics of high tension wires. [2]

SECTION II (40 Marks)

*Attempt any **four** questions from this Section.*

Question 5 **[10]**

a) A uniform metre rule of weight 10 gf is pivoted at its 0 mark. [3]

(i) What moment of force depresses the rule?

(ii) How can it be made horizontal by applying a least force?

b) Show how the energy of a freely falling object remains conserved. [3]

c) An electric heater of power 600 W raises the temperature of 4.0 kg of a liquid from 10^oC to 15^oC in 100 s. calculate: [4]

(i) The heat capacity of the liquid.

(ii) The specific heat capacity of 4.0 kg of liquid.

Question 6 **[10]**

a) A pulley system has velocity ratio of 4 and an efficiency of 90%. Calculate: [3]

(i) The mechanical advantage of the system.

(ii) The effort required to raise a load of 300 N by the system.

b) (i) What do you understand by the term latent heat? [3]

(ii) Which cools faster, land or water? Give a reason for your answer.

c) A lens is used to obtain an image of an object placed in front of it. The inverted image is formed between F_2 and $2F_2$ of the lens. [4]

(i) Name the lens used.

(ii) Where is the object placed in the above case?

(iii) Draw a ray diagram to illustrate the formation of the image obtained.

Question 7 **[10]**

a) (i) Define absolute refractive index of a medium. [3]

(ii) A coin is placed at the bottom of a glass trough containing water (refractive index = 4/3) upto a height 20 cm. At what depth it will appear when it is viewed from air, vertically above the coin?

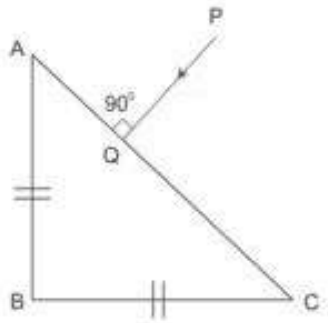
b) A boy standing in front of a wall at 80 m produces 2 claps per second. He notices that the sound of his clapping coincides with echo. The echo is heard only once when clapping is stopped. Calculate the speed of sound. [3]

c) (i) Name the electromagnetic spectrum which can be obtained from its source using quartz prism. [4]

(ii) Give its two uses and one harmful effect.

Question 8 **[10]**

a) In the following figure a ray of light PQ is incident normally on the hypotenuse of an isosceles right angled prism ABC. [3]



(i) Complete the path of the ray PQ until it emerges from the prism. Mark in the diagram the angle wherever necessary.

(ii) Name a device in which this action is used.

b) A geyser is rated '1500W, 250V'. This geyser is connected to 250V mains. Calculate: [3]

(i) The current drawn.

(ii) The energy consumed in 50 hours, and

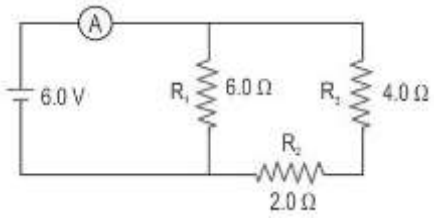
(iii) The cost of energy consumed at Rs. 4.20 per kWh.

c) (i) Define one ohm of resistance. [4]

(ii) A metal wire is doubled on itself. How does its resistance and specific resistance change?

Question 9 **[10]**

a) Three resistors of 6.0 ohm, 2.0 ohm and 4.0 ohm are joined to ammeter A and a cell of e.m.f 6.0 V as shown in figure. [3]



Calculate :

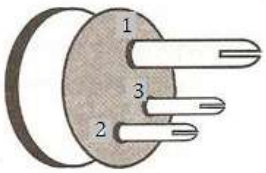
(i) The effective resistance of the circuit.

(ii) The reading of ammeter.

b) (i) 'A fuse is rated 8 A'. Can it be used with an electrical appliance of rating 5 kW, 200 V? [3]

(ii) How does the thickness and length of a fuse wire depend on its current rating?

c) The diagram in figure shows a three-pin plug. [4]



(i) Label the three pins.

(ii) Why is the earth pin of three-pin plug made longer and thicker?

(iii) Why are the pins splitted at the ends?

Question10 **[10]**

a) A piece of stone tied at the end of a thread is whirled in a horizontal circle with uniform speed with the help of hand. Answer the following questions. [3]

(i) Is the velocity of stone uniform or variable?

(ii) Is the acceleration of stone uniform or variable?

(iii) What force does provide the centripetal force required for circular motion?

b) A block and tackle system has two pulleys in each block, with the tackle tied to the hook of the lower block and the effort being applied upwards. Draw a neat diagram to show an arrangement. [3]

c) A radioactive source emits three types of radiations. [4]

(i) Which radiation has zero mass?

(ii) Name the radiation, which has the lowest ionizing power.

(iii) Name the radiation, which has the lowest penetrating power.

(iv) From which part of the atom do these radiations come?

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