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Physics
SCIENCE Paper-I
(Two Hours)

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.

Attempt **all** questions from **Section I** and attempt **any four** from **Section II**.
The intended marks for questions or parts of questions are given in brackets [].

SECTION I [Marks 40]

Attempt all questions from this Section.

Question 1

(a) i) State the unit of moment of force.
ii) Is clock wise moment of force positive or negative? [2]

(b) Name the chief energy transformations that occur in the following:
i) a toaster ii) charging of a cell phone. [2]

(c) An electron revolves around the nucleus in a circular path:-
i) Which force acts on the electron to maintain its circular motion?
ii) Define the force stated by you in the above question. [2]

(d) i) Name the type of waves used for sound ranging.
ii) Why are these sound waves mentioned in (i) above not audible to us? [2]

(e) A refrigerator is marked 80 W and 220 V. How much energy does it consume in one day? [2]

Question 2

(a) i) Which lens, thick or thin has greater focal length?
ii) Name the lens that always forms a virtual and erect image. [2]

(b) Give two reasons why the efficiency of a single movable pulley system is not 100%. [2]

(c) You are provided with a printed piece of paper. Using this paper, how will you differentiate between a convex lens and a concave lens? [2]

(d) In a music concert, the singer is accompanied by a guitarist and a drummer
i) How does the tension in the strings of guitar affect the pitch of the musical notes played?
ii) What happens to the sound when the drummer increases the force with which he strikes the drum? [2]

(e) State two advantages of using a right angled prism as a reflector rather than a plane mirror? [2]

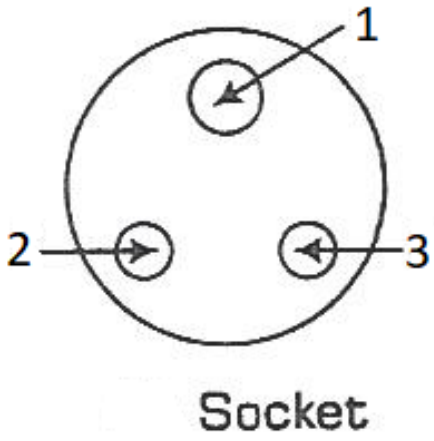
Question 3

(a) Name any two electromagnetic waves which have wavelengths higher than that of red light. State one use of each. [2]

(b) State one way by which each of the following radiations can be detected:-
i) U.V. radiations ii) Infrared radiations. [2]

(c) What is the relationship of the size of the body with its :
(i) Specific heat capacity (ii) heat capacity [2]

(d) The following diagram shows a three pin socket marked as 1,2 and 3. Identify and write live (L), Neutral (N) and earth (E) against the correct number. [2]



(e) Draw a labelled ray diagram to illustrate 1) critical angle and 2) total internal reflection, for a ray of light moving from one medium to another? [2]

Question 4

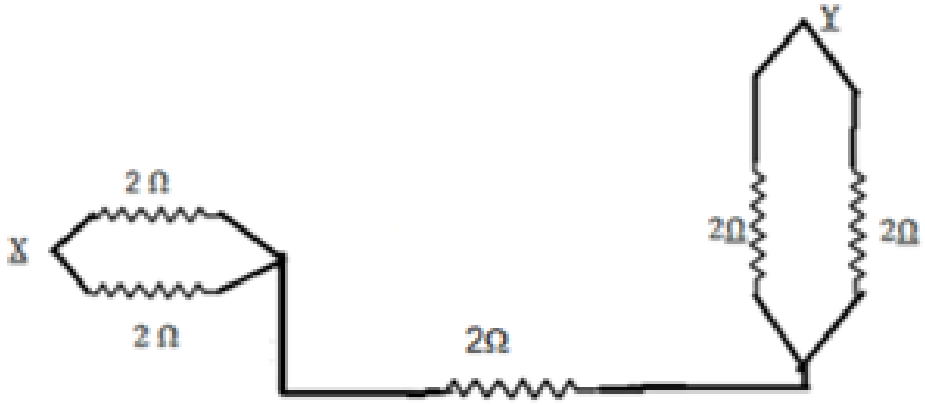
(a) What is responsible for the flow of current:
i) Inside the cell through its electrolyte
ii) Outside the cell through the external circuit. [2]

(b) Mention two properties on which the internal resistance of the cell depends. [2]

(c) What are background radiations? Give one example. [2]

(d) How is it possible for a radioactive element to decay into another element of higher atomic number? Give an example. [2]

(e) Calculate the resistance between points X and Y in the diagram given below: [2]



SECTION – II [Marks 40]

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

Question 5

(a) Define centre of gravity of a body. Where is the center of gravity located in a solid cone? Will it remain at the same place if the body is deformed? [3]

(b) i) How are the S.I. and C.G.S. units of work related?

ii) What is the work done when a body moves in circular path? Explain giving suitable reason.[3]

(c) A block and tackle pulley system has a velocity ratio 3 and efficiency of 90%. Draw a labelled diagram to show this arrangement. Calculate:

i) The effort required to raise a load of 540 N by the system

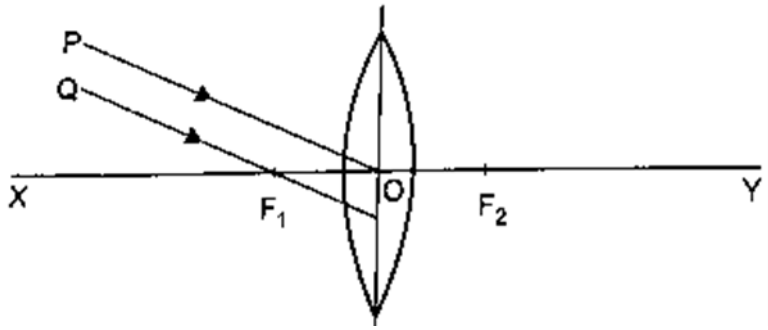
ii) What change can be made in the movable pulley of this system to increase the mechanical advantage of the system? [4]

Question 6

(a) What do you understand by the term couple? Give one example of couple action in our daily life. How can you increase the couple formed on a body? [3]

(b) A man weighing 25 kgf climbs up from the first floor at height 3m above the ground to the third floor at height 9m above the ground. Which kind of energy will increase? Calculate the increase in his energy? (g= 10 m/s^2) [3]

(c) XY represents the principal axis in the given figure. "O" is the optical centre and F_1 and F_2 are the foci of the lens. Copy and complete the path of P and Q as they emerge out of the lens. Where is the image formed? Write the characteristics of the image. [4]



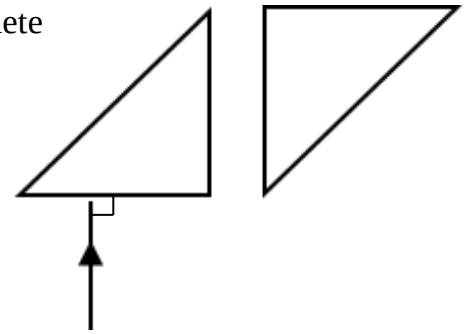
Question 7

(a) i) State the colour code as per the new convention for the insulation on the
1.Live 2.Neutral and 3.earth wire [3]

(b) i) What is meant by an echo? State one important condition that is necessary for an echo.

ii) Mention one important use of echo. [3]

(c) Two isosceles right angled prisms are arranged as shown in the diagram. Copy the diagram and complete the path of light and mark all angles. [4]



Question 8

(a) i) Why is earthing absolutely necessary in a power circuit?
ii) Why is the earth pin of the socket made thicker? [3]

(b) A person stands between two parallel cliffs, which are 99m apart. He fires a gun and hears two successive echoes after 0.2s and 0.4s; calculate:-
i) Distance of the nearest cliff from the person
ii) Speed of sound. [3]

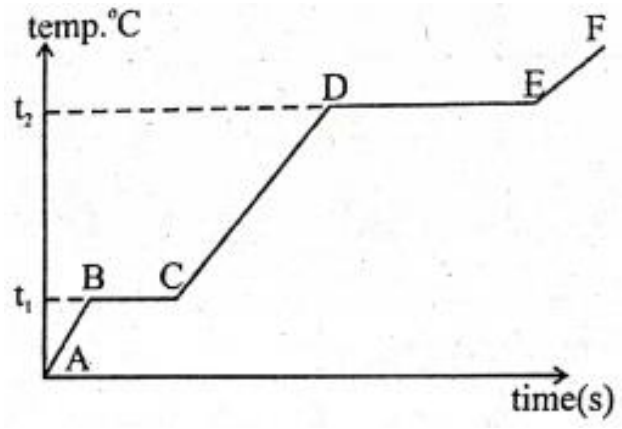
(c) i) What material is the Calorimeter made up of? Why?
ii) 880J of heat is given to 200g of copper at 20° C. What is the final temperature if specific heat capacity of copper is 0.4 J/g°C ? [4]

Question 9

(a) A geyser is rated 1500W, 250V. This geyser is connected to 250 V mains. Calculate:
i) the current drawn
ii) the energy consumed in 50 hours
iii) the cost of energy consumed at `5.00 per kWh. [3]

(b) An atomic nucleus A is composed of 84 protons and 128 neutrons. The nucleus A emits alpha particle and is transformed into a nucleus B.
i) What is the composition of B?
ii) The nucleus B emits a beta particle and is transformed into a nucleus C. What is the composition of C?
iii) Does the composition of C change if it emits gamma radiations? [3]

(c) The diagram below shows the change of phase of a substance on a Temperature vs Time graph on heating the substance at a constant rate .



i) Why is the slope of CD less than slope of AB?
ii) Why does it take longer from D to E than B to C?
iii) Which part of the graph represents boiling of the liquid?
iv) What is the Melting point ? [4]

Question 10

(a) i) What are superconductors? Give an example.

ii) Name a substance whose specific resistance practically remains constant with the change in temperature.

[3]

(b) When can we say that a conductor obeys Ohm's law? Draw a current voltage graph for such a conductor.

[3]

(c) i) A radioactive source emits three types of radiations. Name the radiation which has

1. lowest penetrating power
2. highest ionizing power.

ii) State two safety precautions that you would take while handling the radioactive substances.

[4]