JANKIDEVI
PUBLIC SCHOOL

PRELIMINARY EXAMINATION 2018-2019
PHYSICS

STD : X | SCIENCE Paper – 1 | DATE: 04.01.2019
TIME: 2 hrs | MARKS : 80

Answers to this paper must be written on the paper provided separately.
You will not be allowed to write during the first 15minutes.
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 any four from Section II.
The intended marks for questions or parts of questions are given in brackets [].
This question paper consists of four printed pages.
Nothing should be written on the question paper.

SECTION I (40 Marks)
Attempt all questions from this section.

Question 1

(a) Define the moment of a couple. State its S.I. unit. [2]

(b) A sound wave has a frequency of 256Hz and a wavelength of 1.3m. Calculate the speed of the sound wave. [2]

(c) Why is there an increase in the mechanical advantage of a block and tackle system arrangement with the increase in the number of pulleys? [2]

(d) The critical angle for glass-air surface is 45^0 for yellow colour light. State whether it will be less than, equal to or more than 45^0 for red colour light. Justify your answer. [2]

(e) Write the nuclear equations for the α decay of ${}^{226}_{88}X$ to form an isotope Y followed by β decay to form an isotope Z. [2]

Question 2

(a) State the principle of levers. How can the mechanical advantage of a lever be increased by keeping the position of load fixed? [2]

(b) A 10 ohm resistor and two 5ohm resistors are connected together so that the total effective resistance is 12.5ohm. Draw a diagram to show the arrangement of the resistors. [2]

(c) A certain amount of heat Q will warm 1g of material X by 3^0C and 1g of material Y by 4^0C. Which material has higher specific heat capacity? Justify your answer. [2]

(d) Name the device used to protect the electric circuits from over loading and short circuits. On what effect of electricity does this device work? [2]

(e) If the power of a motor is 40kW, at what speed can it raise a load of 20,000N? [2]

Question 3

(a) If a ray of light bends towards the normal while passing from medium b to a and ${}_a\mu_b = \frac{\sin x}{\sin y}$ then state whether (i) $x < y$ (ii) $x > y$. [2]

(b) (i) Name the radiation which produces maximum biological damage. [2]
(ii) What happens to the atomic number of an element when the radiations named in (i) are emitted?

(c) A handle of a nut cracker is 18cm long. A nut of weight 36kgf is placed 2cm from the hinge. Calculate the force applied at the end of the handle to crack the nut. [2]

(d) A blub marked 12V-24W operates on a 12V battery for 20mins. Calculate the current flowing through it and the energy consumed. [2]

(e) State two points of difference between class II lever and class III lever. [2]

Question 4

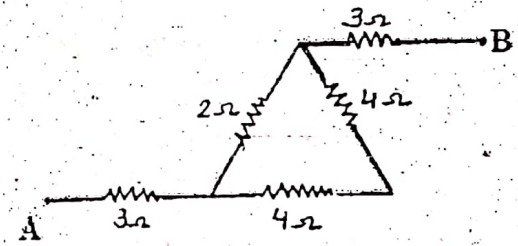
(a) State the energy change that takes place in a D.C motor. Suggest one method to increase its speed. [2]

(b) Calculate the heat energy required to heat 1kg of water from 20^0C to 100^0C. Specific heat capacity of water = 4200 J kg^{-1} K^{-1}. [2]

(c) State the application of a convex lens when an object is placed (i) at $2F_1$ and (ii) between F_1 and $2F_1$ of the lens. [2]

(d) The electrical gadgets fans, geyser, heater etc used in homes are always connected in parallel and not in series. [2]
Give two reasons for connecting them in parallel.

(e) Calculate the effective resistance across the points A and B in the following figure. [2]



SECTION II (40 Marks)

Attempt any four questions from this section.

Question 5

(a) (i) Draw a diagram to show the energy changes in an oscillating simple pendulum. Indicate in the diagram how the total mechanical energy in it remains constant during the oscillation. (ii) What is dissipation of energy? [3]

(b) A uniform meter rule can be balanced at the 75cm mark when a mass of 0.05kg is hung from the 95cm mark. Draw a diagram of this arrangement and calculate the mass of the meter rule. [3]

(c) (i) Draw a labeled diagram of a block and tackle system of pulleys with two pulleys in each block indicating the directions of the load, effort and tension in the strings. (ii) In this block and tackle system of pulleys a load of 150kgf is raised using an effort of 50kgf. Find the mechanical advantage and the efficiency of this pulley system. [4]

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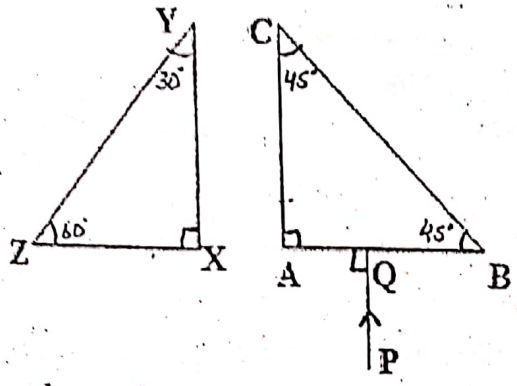
Question 6

(a) A lens forms the image of an object placed at a distance of 15cm from it, at a distance of 60cm in front of it. Find (i) focal length of the lens. (ii) the magnification. (iii) nature of the image. [3]

(b) In the figure, a ray of light PQ is incident normally on the face AB of a prism. Copy the diagram and complete the path of ray of light as it emerges out of the second prism. Critical angle for glass is 42^0. [3]



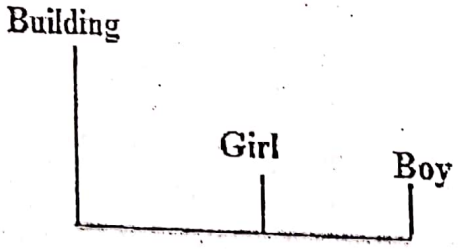
(c) A ray of monochromatic light undergoes minimum deviation through an equiangular prism. (i) How does the ray pass through the prism with respect to its base? (ii) How is the angle of incidence related to the angle of emergence. (iii) If white light is used instead of monochromatic light what change do you expect in the emergent beam. (iv) What conclusion do you draw about the nature of white light? [4]

Question 7

(a) (i) Two waves of the same pitch have amplitudes in the ratio of 1:3. What will be the ratios of their intensities? (ii) How can a low pitch sound be produced in musical instruments like i) guitar ii) flute? [3]

(b) What is meant by Resonance? State two ways in which Resonant vibrations differ from Forced vibrations. [3]

(c) A girl standing 150m in front of a tall building fires a gun. A boy standing 350m from the girl hears two bangs one second apart. Find the speed of sound in air. [4]



Question 8

(a) Explain why water is used in hot water bottles for fomentation and also as a universal coolant. [3]

(b) Why is it difficult to cook vegetables and pulses on hills and mountains? Suggest two ways to make cooking easier and fuel efficient. [3]

(c) Calculate the amount of ice required to cool 150g of water contained in a vessel of mass 100g at 30^0C such that the final temperature of the mixture is 5^0C. The specific heat capacity of material of vessel = $0.4Jg^{-1}K^{-1}$, specific latent heat of fusion of ice = $336Jg^{-1}$, specific heat capacity of water = $4.2Jg^{-1}K^{-1}$ [4]

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Question 9

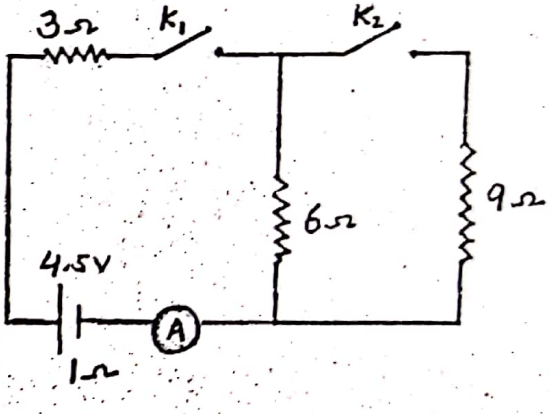
(a) (i) At what voltage and frequency is the electric power generated at the power generating station? (ii) What quantity of heat will be produced in a coil of resistance 80Ω if a current of 3A is passed through it for 4seconds? [3]

(b) State Ohms law and also draw a graph for ohmic conductors. [3]

(c) A cell of e.m.f 4.5 volts and internal resistance 1Ω is connected to resistors as shown in the figure. Calculate the reading of the ammeter of negligible resistance when: [4]

(i) Key K_1 is closed and K_2 is open.

(ii) Keys K_1 and K_2 both are closed.



Question 10

(a) (i) Why does a magnetic needle show a deflection when brought close to a current carrying conductor? (ii) A wire bent into a circle carries current in the anticlockwise direction. What polarity does this face of the coil exhibit? [3]

(b) (i) Draw a labeled diagram of a simple A.C generator (ii) Name the principle on which it works. (iii)What determines the frequency of the A.C. generator? [3]

(c) (i) State two points of difference between nuclear fission and nuclear fusion. [4]
(ii) If in the nuclear fission of a piece of uranium, 0.8g mass is lost, how much energy in kWh is obtained.

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