PRE BOARD EXAMINATION
2019-20
PHYSICS
Class- X

Answer 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 to Questions Paper.
The time given at the head of this paper is the time allowed for writing the answers.

Section I is compulsory. Attempt any for questions from Section II
The intended marks for question of the parts of questions given in brackets [ ]

SECTION – I (40 Marks)

Questions -1

(a) Two bodies A and B have masses in the ratio 5:1 and their kinetic energies are In the ratio 125:9. Find the ratio of their velocities. [2]

(b) In a single fixed pulley actual mechanical advantage is less than 1 and velocity Ratio is 1 even then it is widely used. Give two reasons. [2]

(c) i) Name the physical quantity which is measured in calories. [2]
ii) How is calorie related to the S.I. unit of that quantity?

(d) State the energy changes in the following cases while in use: [2]
i) An electric iron.
ii) A ceiling fan.

(e) i) Define Critical angle. [2]
ii) state one important factor which affects the critical angle of a given medium.

Question-2

(a) Define principle of moments. [2]

(b) State the position of the object in front of a converging lens if: [2]
i) It produces a real and same size image of the object.
ii) It is used as a magnifying lens.

(c) A man playing a flute is able to produce notes of different frequencies. If he Closes the holes near his mouth, will the pitch of the produced, increase or decrease? Give a reason. [2]

(d) The power of a lens is -5D. [2]
i) Find its focal length.

ii) Name the type of lens.

(e) The specific heat capacity of a substance A is 3,800 J$k^{-1}K^{-1}$ and that of a Substance B is 400 J$k^{-1}K^{-1}$. Which of the two substances is a good conductor Of heat? Give a reason for your answer. [2]

Question -3

(a) Two waves of the same pitch have amplitudes in the Ratio 1:3. What will be the Ratio of their: [2]

i) Intensities?

ii) Frequencies?

(b) A crane pulls up a car of mass 500 kg to a vertical height of 4 meters Calculate the work done by the crane. [2]

(c) i) What do you understand by the term nuclear fusion? [2]

ii) Nuclear power plants use nuclear fission reaction to produce electricity. What is the advantage of producing electricity by fusion reaction?

(d) It is possible for a hydrogen (H_1^1) nucleus to emit an alpha particle? Give a reason for your answer. [2]

(e) i) What do you understand by free vibrations of a body? [2]

ii) Why does the amplitude of a vibrating body continuously decrease during damped vibrations?

Question-4

(a) What will be the effective resistance if resistances of 3Ω, 6Ω are connected in parallel with each other and then this combination is connected in series with the resistance of 2Ω? [2]

(b) i) How can a temperature in degree Celsius be converted into S.I. unit of temperature? [2]

ii) A liquid X has the maximum specific heat capacity and is used as a coolant in car radiators. Name the liquid X.

(c) Identify the following wires used in a household circuit: [2]

i) The wire is also called as the phase wire.

ii) The wire is connected to the top terminal of a three pin socket.

(d) i) why is a nuclear fusion reaction called a thermo nuclear reaction? [2]

ii) Give an example of alpha particle emission reaction.

(e) State any two advantages of electromagnets over permanent magnets. [2]

SECTION – II (40 Marks)

*Attempt any **four** question from this section*

Question -5

(a) i) Derive a relationship between S.I. and C.G.S. unit of work. [3]

ii) A force acts on a body and displaces it by a distance S in a direction at an angle Θ with the direction of force. What should be the value of Θ to get the maximum positive work?

(b) A coin kept inside water ($\mu = 4/3$) when viewed from air in a vertical direction, Appears to be raised by 2.0mm. Find the depth of coin in water. [3]

(c) i) Draw a diagram to show a block and tackle pulley system having a velocity Ratio of 3 marking the direction of load(L), effort(E) and tension (T). [4]

ii) The pulley system drawn lifts a load of 150 N when an effort of 60 N is applied. Find its mechanical advantage.

iii) Is the above pulley system an ideal machine or not?

Question -6

(a) How does the angle of deviation formed by a prism change with the increase in the angle of incidence? [3]

Draw a graph showing the variation in the angle of deviation with the angle of incidence at a prism surface.

(b) A virtual, diminished image is formed when an object is placed between the optical centre and the principal focus of a lens. [3]

i) Name the type of lens which forms the above image.

ii) Draw a ray diagram to show the formation of the image with the above stated characteristics.

(c) An object is placed at a distance 24 cm in front of a convex lens of focal length 8 cm. [4]

i) What is the nature of the image so formed?

ii) Calculate the distance of the image from the lens.

iii) Calculate the magnification of the image.

Question-7

(a) It is observed that during march-past we hear a base drum distinctly from a

distance compared to the side drums.

i) Name the characteristics of sound associated with the above observation.

ii) Give a reason for the above observation. [3]

(b) A man stands at a distance of 25 m from a high wall. He hears the echo produced from the high wall, by blowing a whistle. If the velocity of sound in air is 330m/s, what would be the time interval between the sound produced by the whistle and the hearing of the echo. [3]

(c) Draw a diagram of refraction of light through a prism and prove that:

$$\delta = (i_1 + i_2) - (r_1 + r_2)$$ [4]

Question -8

(a) i) Write one advantage of connecting electrical appliances in parallel Combination. [3]

ii) What characteristics should a fuse wire have?

iii) Which wire in a power circuit is connected to the metallic body of the appliance?

(b) A wire of uniform thickness with a resistance of 27 Ω is cut into three equal pieces and they are joined in parallel. Find the resistance of the parallel combination. [3]

(c) An electric iron is rated 220V, 2kW. [4]

i) If the iron is used for 2h daily find the cost of running it for one week if it costs Rs. 4.25 per kWh.

ii) Why is the fuse absolutely necessary in a power circuit?

Question- 9

(a) i) Define Calorimetry. [3]

ii) Name the material used for making a Calorimeter.

iii) Why is a Calorimeter made up of thin sheets of the above material answered in ii)?

(b) How do the juice bottles under water , remains safe against freezing in very cold countries? [3]

(c) 104 gm of water at 30°C is taken in a calorimeter made of copper of mass 42gm When a certain mass of ice at 0°C is added to it, the final steady temperature of the mixture after the ice has melted, was found to be 10°C. Find the mass of ice added. [Specific heat capacity of water = 4.2 J$g^{-1}{}^{\circ}C^{-1}$; Specific latent heat of

fusion of ice = 336 Jg^{-1}; Specific heat capacity of copper = 0.4 J$g^{-1}{}^{\circ}C^{-1}$] [4]

Question -10

(a) Draw a neat diagram of an A.C. generator. [3]

(b) A certain nucleus X has a mass number 15 and atomic number 7. Find the number of neutrons. Write down the nuclear changes that take place when X loses: [3]

i) One proton

ii) one β particle

iii) one α particle.

(c) The ore of Uranium found in nature contains U_9^2 and U_9^2 . Although both the isotopes are fissionable, it is found out experimentally that one of the two isotopes is more easily fissionable. [4]

i) Name the isotope of Uranium which is easily fissionable.

ii) Give a reason for your answer.

iii) Write a nuclear reaction when Uranium 238 emits an alpha particle to form a Thorium (Th) nucleus.