Sample Paper – 2010

Subject – PHYSICS

Class – X

Time Allowed: 1.5   Hour Maximum Marks: 80

General Instructions-

(i) This question paper is divided into two sections.

(ii) Section A is compulsory.

(iii) Attempt any four questions in section B.

(iv) The intended marks for questions or parts of questions are given in brackets [].

SECTION –A

(Attempt all questions) 40 Marks

Q.1 (a) Write down the gravitational unit of force. How is it related to Newton?   [2]

(b) A water pump raises 50 litres of water through a height of 25 m in 5 s. Calculate the power which the pump supplies. [Take g = 10 Nkg-1 and density of water = 1000kgm-1]
[2]

(c) Name the three classes of levers and distinguish between them. Give two examples of each.   [2]

(d) A man weighs 600 N on the earth. What would be his approximate weight on the moon? What is the reason for your answer?   [2]

(e) Give an example when work done by the force of gravity acting on a body is zero even though the body gets displaced from its initial position.   [2]

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

(b) 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.   [2]

(c) Draw a diagram to show how a converging lens can form a real and enlarged image of an object.   [2]

(d) Water is used in hot water bottles for fomentation. Give reason for this.   [2]

(e) How is the kinetic energy of a moving cart affected if (i) its mass is doubled, (ii) its velocity is made equal to speed of light.   [2]

Q.3 (a) What will an alpha particle change into when it absorbs:-   [2]

   1. One electron;
   2. Two electrons?

(b) Some hot water was added to three times its mass of cold water at 100C and the resulting temperature was found to be 200C. What was the temperature of the hot water?   [2]

(c) Calculate the value of the resistance which must be connected to a 15Ω resistance to provide an effective resistance of 6Ω.   [2]

(d) Why are burns caused by steam more severe than those caused by boiling water at the

same temperature?   [2]

(e) Mention two important properties of a metal that make it a good thermionic emitter. [2]

Q.4 (a) Why is the mechanical advantage of a lever of the third order is always less than l? Give one example of this class of lever.   [2]

(b) Will a body weigh more in air or in vacuum when weighed with a spring balance? Give a reason for your answer.   [2]

(c) A test tube loaded with lead-shots floats to the mark X in water. The test tube alongwith lead shots weighs 25 g. When the test tube is floated in brine, 5g of lead shots were added to make it float upto level X. Find the relative density of brine.   [2]

(d) It takes a much longer time to boil off (change to steam) a certain quantity of water, rather than to bring it to its boiling point from room temperature, say $25°C$. Explain the reason for this.   [2]

(e) A hot solid of mass 60 g at $100°C$. Is placed in 100g of water at $18°C$. The final steady temperature recorded is $20°C$. Find the specific hea t capacity of the solid.   [2]

SECTION –B

(Attempt any four questions) 40 Marks

Q.5 (a) A sound wave of wavelength 0.332 m has a time period of 10-3 s. If the time period is decreased to 10-4 s; calculate the wavelength and frequency of the new wave.   [3]

(b) The rear view mirror of a motor bike starts vibrating violently at some particular speed of the motor bike.   [4]

i. Why does this happen?

ii. What is the name of the phenomenon taking place?

iii. What could be done to stop the violent vibrations?

(c) An engine can pump 30,000 litres of water to a vertical height of 45 metres in 10 minutes (g = 9·8 m/s2). Calculate the work done by the machine and its power [density of water = 103 kg/m3, 1000 litres = 1m3].   [3]

Q.6 (a) What is the wavelength of an electromagnetic wave whose frequency is 1012Hz? Name the electromagnetic wave.   [2]

(b) What is dispersion of light? Illustrate it by a ray diagram using a glass prism. State one difference between total internal reflection from a prism and reflection from a plane mirror. [4]

(c) The sun seems to rise before it actually rises and seems to set long after it actually sets. Explain.   [2]

(d) State two uses of infra-red radiations.   [2]

Q.7 (a) A bucket containing 8 kg of water at $25°C$. 2 kg of water at $80°C$ is poured into it. Neglecting the heat energy absorbed by the bucket, calculate the final temperature of water. [4]

(b) Why is the base of a cooking pan made thick and heavy?   [3]

(c) State with reason, which of the two, boiling water or steam both at $100°C$ will produce more severe burns.   [3]

Q. 8 (a) In a laboratory experiment for finding specific latent heat of ice, l00 g of water at 30°C was taken in a calorimeter made of copper and of mass 10 g. When 10 g of ice at 0°C was added to the mixture and kept within the liquid till the ice melted completely, the final temperature of the mixture was found to be 20°C.

   1. What is the total quantity of water in the calorimeter at 200C?
   2. Specific heat capacities of water and copper being 4.2 J/gC and 0.4 J/g0C respectively, what quantity of heat would each release in cooling down to 200C from the initial stage?
   3. Write an expression for the heat gained by ice on melting.
   4. Calculate the value of the latent heat of fusion of ice from the data discussed above.
[6]

(b) Electrical power P is given by the expression: $P = (Q \times V) / time$

   1. What do the symbols Q and V represent?
   2. Express 'Power' in terms of current and resistance explaining the symbols used therein.
[4]

Q.9 (a) Calculate the mass of steam at 100°C that m ust be passed into 8.4 kg. of water at 30° C to raise the temperature of water to 80°C. [Sp. h eat capacity of water Q = 4.2 J/g°C, Sp. latent heat of vaporisation of steam = 2268 J/g.]   [4]

(b) i. Define the terms: Amplitude and frequency for sound waves.

ii. Name the subjective property of sound related to its frequency and of light related to its wavelength.   [3]

(c) i. What is radioactivity?

ii. A radioactive substance is oxidized. What change would you expect to take place in the nature of its radioactivity? Give a reason for your answer.   [3]