Physics – Mock Test Paper

[Time: $1\frac{1}{2}$ hrs] **[M. Marks : 80]**

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 doe writing the answers.

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

Section I (40 Marks)

Attempt all questions from this section

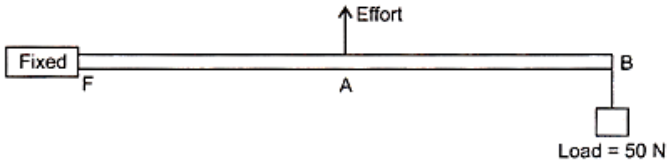
Question 1.

(a) What is the S.I. unit of work ?

(b) A body of mass 1 kg falls from a height of 5 m. How much energy does it possess at any instant, (take $g = 9{\cdot}8\ m/s^2$) ?

(c) When a body moves in a circular path how much work does it do ?

(d) The diagram shows the use of a lever.



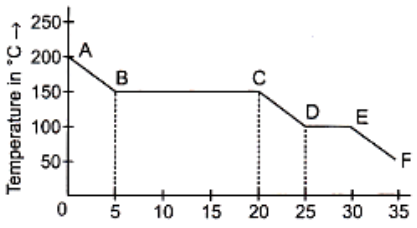
State the principle of moments as applied to the above lever. Give an example of this class of lever.

(e) If FA = 10 cm, AB = 500 cm, calculate the minimum effort required to lift the load.

Question 2.

(a) Arrange γ-rays infra-red rays, ultra-violet rays and X-rays in increasing order of their frequencies.

(b) The graph represents a cooling curve for a substance being cooled from a higher temperature to a lower temperature.



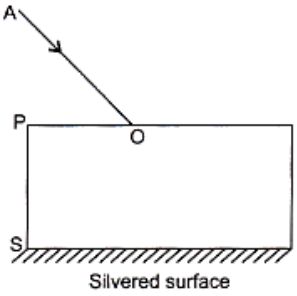
(i) What is the boiling point of the substance ?

(ii) What happens in the region DE ?

(iii) Why is the region DE shorter than the region BC ?

(c) At what approximate temperature will water boil in a pressure cooker?

(d) The adjoining diagram shows a ray of white light AO incident on a rectangular glass block, which is silvered at one surface. This ray is partly reflected and partly refracted.

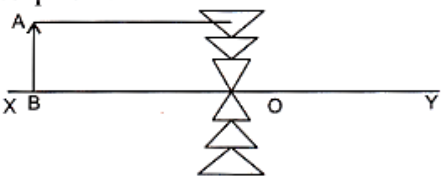


(i) Copy the diagram and trace the path of the refracted and reflected ray. Show at least two rays emerging from the surface PQ.

(ii) How many images are formed in the above case ? Which image is the brightest ?

Question 3.

(a) The diagram shows a lens as combination of glass prisms of different refractive indices. Copy the diagram and answer the following :

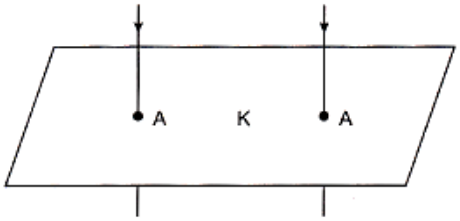


(i) Name the lens formed by the combination.

(ii) Complete the ray diagram when AB is between optical centre and 2F.

(iii) What kind of image is formed ?

(b) (i) The given diagram shows two straight wires carrying current. Copy the diagram and draw the pattern of lines of force around them and mark their directions.



(ii) What is the resultant magnetic field at K.

(c) Complete the following sentences :

(i) In a step up transformer, the number of turns in a primary are.....than the number of turns in the secondary.

(ii) The transformer is used in.....current circuits.

(d) A refrigerator is marked 80 W and 220 V.

(i) How much energy does it consume in one day if on an average it is used for 20 hrs. a day ?

(ii) What is likely to happen if the voltage drops to 50 V ?

Question 4.

(a) An α-particle absorbs an electron. What does it change to ?

(b) A fusion reaction is represented as follows :
$^{2}_{1}H + {}^{2}_{1}H \rightarrow {}^{4}_{2}He + x$. Identify x.

(c) Why does a stone lying in the sun gets heated up very much, whereas water lies in the sun for the same duration gets heated very little ?

(d) Is there any relationship between sunlight and fusion ? If so, how ?

(e) How will you demagnetize an electromagnet ?

SECTION—II (40 Marks)

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

Question 5.

(a) Explain, why bottled soft drinks are more effectively cooled by cubes of ice than by iced water ?

(b) 10 g of ice at 0°C absorbed 5460 J of heat to melt and change to water at 50°C. Calculate the specific latent heat of fusion of ice. [Specific heat capacity of water is 4200 J/kg°C.]

(c) In an experiment to determine the specific latent heat of vaporization of steam 'L', the following measurements were taken :

Mass of calorimeter + Stirrer = x kg
Mass of water = y kg
Mass of condensed steam = A kg
Initial temperature of water = t_1 °C
Final temperature of mixture = t_2 °C.

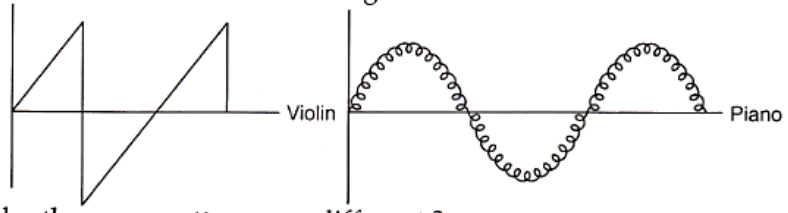
(Given Specific Heat Capacity of calorimeter and water are S_1 and S_2 respectively)
Express 'L' in terms of the above data.

Question 6.

(a) (i) Differentiate between "forced vibration" and "resonance".

(ii) How does frequency and amplitude affect a musical sound ?

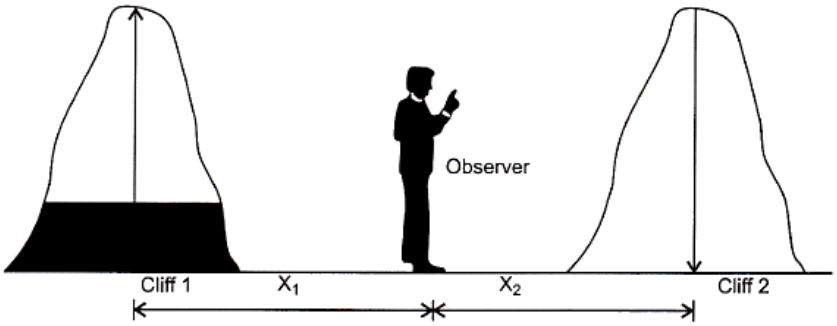
(b) Two musical notes of the same pitch and loudness are played on a violin and a piano. Their wave forms are as shown in the figures below :



Explain, why the wave patterns are different ?

(c) (i) What adjustment will you make for tuning a stringed instrument such as violin to emit a desired pitch ?

(ii) An observer, standing between two parallel cliffs, emits an intense sound note. Two successive echoes are then heard after 5 s and 7 s. Calculate the distance between the cliffs (velocity of sound = 340 ms^{-1}).



Question 7.

(a) State the S.I. unit of force. Derive a relation between S.I. and C.G.S. units of force.

(b) A force of 5N produces in a body an acceleration of 5cms^{-2}. Calculate the mass of the body.

(c) A block and tackle system of 5 pulleys is used to raise a load of 500 N steadily though a height of 20 cm. The work done against friction is 200J. Calculate :

(i) Work done by effort (ii) Efficiency of system

(iii) Displacement of the effort applied

(iv) M.A. (v) V.R.

Question 8.

(a) What is meant by

(i) Critical angle, (ii) Total internal reflection ?

(b) (i) Draw a diagram to show that white light can be split up into different colours.

(ii) Draw another diagram to show how the colours can be combined to give the effect of white light.

(iii) How would you show the presence of ultra-violet and infrared rays in the spectrum ?

(c) State three ways of obtaining an electron-beam.

Question 9.

(a) (i) State three factors which govern the speed of rotation of an electric motor.

(ii) State the law which determines the direction of magnetic field round a current carrying conductor.

(b) Why are burns caused by steam more severe than those caused by boiling water at the same temperature.

(c) (i) A thorium isotope $^{223}_{90}Th$ undergoes an α-decay and changes into radium. What is the atomic number and mass number of the radium produced ?

(ii) If the radium undergoes a further disintegration and emits two β particles, represent this reaction in the form of an equation.

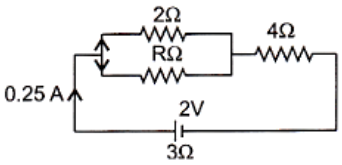
(iii) What is the source of energy released during the decay ?

Question 10.

(a) (i) State Ohm's law.

(ii) State the factors that alter the resistance of a conductor.

(b) The adjoining circuit diagram shows three resistors 2 Ω, 4 Ω and R Ω connected to a battery of emf 2 V and internal resistance 3 Ω. A main current of 0·25 ampere flows through the circuit.



(i) What is the p.d. across the 4Ω resistor ?

(ii) Calculate the p. d. across the internal resistance of the cell.

(iii) What is the p. d. across the R Ω or the 2 Ω resistors ?

(iv) Calculate the value of R.

(c) State two ways of increasing the speed of rotation of a d.c. motor.