

PRE - BOARD (2022-23)

Maximum Marks: 80

Time allowed: Two hours

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 for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

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

SECTION A (40 Marks)

(Attempt all questions from this Section)

Q1) Choose the correct answers to the questions from the given options:

[15]

(i) Sound waves are :-

- a) Electromagnetic wave b) Mechanical waves c) Transversal wave d) none of these

(ii) Which material is the calorimeter commonly made of.

- a) tin b) copper c) glass d) steel

(iii) An erect, magnified and virtual image is formed, when an object is placed between the optical centre and principal focus of lens.

- a) concave lens b) convex lens c) plano-concave d) plano-convex

(iv) Name the liquid which has the highest specific heat capacity:

- a) water b) petrol c) mercury d) oil

(v) Name the radioactive radiations which have the least penetration power.

- a) α - rays b) β - rays c) γ - rays d) X- rays

(vi) Name the radiations which has the highest ionizing power:

- a) α - particals b) β - particals c) γ - particalas d) none of these

(vii) Type of waves which are used for sound ranging.

- a) Infra-sonic b) sonic c) ultra-sonic d) electromagnetic

(viii) Write an expression for the electrical energy spend in the flow of current through an electrical appliance in terms of I, R and t.

- a) $W = I^2 R t$ b) $W = IR^2 t$ c) $W = IR t^2$ d) $W = VR t$

(ix) Two bodies of equal masses are moving with uniform velocities v and $2v$. find the ratio of their kinetic energies:

- a) 1:2 b) 2:1 c) 1:4 d) 4:1

(x) A movable pulley is used as:

- a) A force multiplier b) a speed multiplier c) a device to change the direction of effort d) an energy multiplier

(xi) A small air bubble in a glass block when seen from above appears to be raised because of:

- a) Refraction of light b) reflection of light c) refraction and reflection of light d) none of these

(xii) Express the power of concave lens of focal length 20 cm..

- (a) 5 D b) 0.5 D c) - 5 D d) - 0.5 D

(xiii) A man standing 25 m away from a wall produces a sound and received the reflected sound.
Calculate the time after which he receives the reflected sound if the speed of sound in air is 350 m s^{-1} .

- a) 0.143 sec. b) 0.22 sec. c) 27.5 sec. d) 0.37 sec.

(xiv) A fuse is connected in _____ .

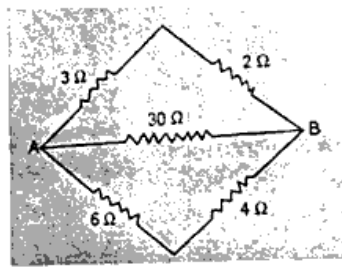
- a) Phase b) parallel c) series d) earthing

(xv) The direction of induced current is obtained by:

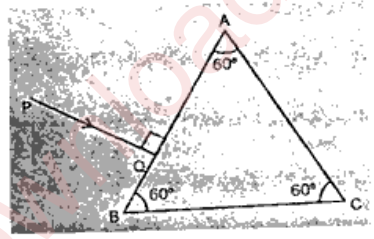
- a) Fleming's left hand rule b) Clock rule
b) Right hand thumb rule d) Fleming's right hand rule

Question 2)

- (i) (a) Define Calorimeter? [3]
 (b) What is meant by Energy degradation?
 (c) Define the term latent heat?
 (ii) (a) Is it possible to deflect γ radiations in a way similar to α and β - particles, using the electric or magnetic Field? give reason. [2]
 (b) State two factors on which the magnitude of induced e.m.f in a coil depends.
 (iii) State three factors which affect the loudness of a sound heard by a listener. [2]
 (iv) State two difference between natural and forced vibration. [2]
 (v) A lens forms the image of an object placed at a distance of 15 cm from it, at a distance of 60 cm in front of it.
 Find : (i) the focal length of lens (ii) the magnification of the lens. [2]
 (vi) Calculate the equivalent resistance between A and B from the following diagram: [2]



(vii) Copy the diagram given below and complete the path of light ray till it emerges out of the prism. The critical angle of glass is 42° . In your diagram mark the angles wherever necessary. [2]



Question3)

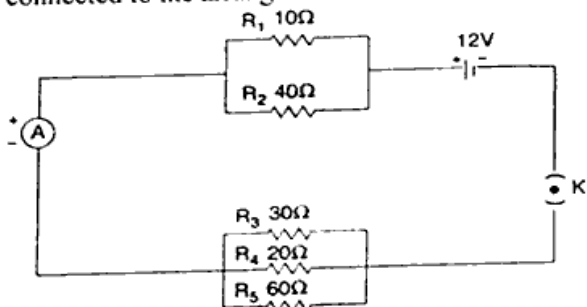
- (i) (a) What is thermionic emission? [2]
 (b) Name the unit in which the workfunction of a metal is expressed.
 (ii) (a) What is meant by 'Dispersion of light'? [2]
 (b) In the atmosphere which colour of light gets scattered the least ?
 (iii) Which character of sound will change if there is a change in [2]

- (a) its amplitude (b) its waveform.
- (iv) (a) Name one factor which affects the frequency of sound emitted due to vibration in an air column. [2]
 (b) Name the unit used for measuring the sound level.
- (v) A man can open a nut by applying a force of 150 N by using a lever handle of length 0.4 m. What should be the length of the handle if he is able to open it by applying a force of 60 N? [2]

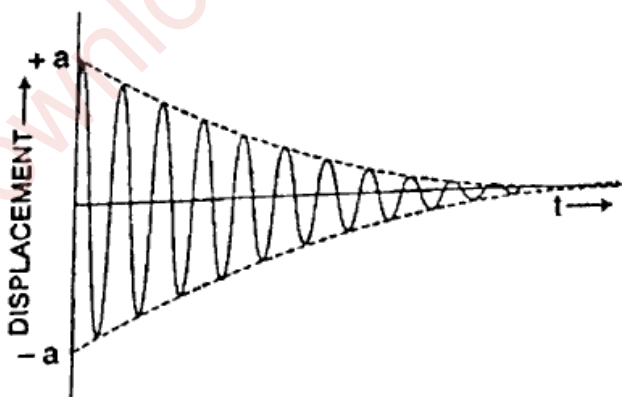
SECTION B (40 Marks)

(Attempt any four questions from this Section)

- Q1) (a) Calculate the quantity of heat that will be produced in a coil of resistance 75Ω if a current of 2A is passed through it for 2 minutes. [3]
 (b) (i) A substance has nearly zero resistance at a temperature of 1 K. What is such a substance called? [3]
 (ii) State any two factors which affect the resistance of a metallic wire. [3]
 (c) Five resistors of different resistances are connected together as shown in the figure. A 12 V battery is connected to the arrangement. Calculate : [4]



- (i) the total resistance in the circuit.
 (ii) the total current flowing in the circuit.
- Q2) (a) (i) What is meant by Resonance? [3]
 (b) (i) A man standing between two cliffs produces a sound and hears two successive echoes at intervals of 3s and 4s respectively. Calculate the distance between the two cliffs.
 The speed of sound in the air is 330 ms^{-1} .
 (ii) Why will an echo not be heard when the distance between the source of sound and the reflecting surface is 10 m? [3]
 (c) The diagram below shows the displacement-time graph for a vibrating body.



- (i) Name the type of vibrations produced by the vibrating body.
 (ii) Give one example of a body producing such vibrations.

(iii) Why is the amplitude of the wave gradually decreasing ?

(iv) What will happen to the vibrations of the body after some time ?

[4]

Q3) (a) What are infrared radiation? State two properties of it?

[3]

(b) Explain the cause of dispersion of white light through a prism.

[3]

(c) A pulley system with a velocity ratio of 4 is used to lift a load of 150 kgf through a vertical height of 20m.

The effort required is 50 kgf in downward direction. Calculate :

24

[4]

(i) The distance moved by the effort,

(ii) The work done by the effort,

(iii) The mechanical advantage,

(iv) The efficiency of the pulley system,

Q4) (a) Name the factors on which the heat produced in a wire depends when current is passed in it.

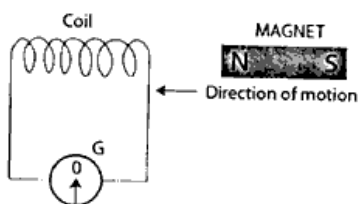
[3]

(b) Write the difference between Electromagnet and permanent magnet

[3]

(c) The diagram shows a fixed coil of several turns connected to a centre zero galvanometer G and a magnet NS which can move in the direction shown in the diagram.

[4]



(i) Describe the observation in the galvanometer if (i) the magnet is moved away rapidly, (ii) the magnet is kept stationary after it has moved into the coil, (iii) the magnet is then rapidly pulled out of the coil.

(ii) How would the observation in (i) of part (a) change if a more powerful magnet is used?

Q5) (a) What is the composition of α , β and γ radiations?

[3]

(b) A body of mass 30 kg is sitting at a distance of 2 m from the middle of a see-saw. Where should a boy of mass 40 kg sit so as to balance the see-saw?

[3]

(c) What is meant by an echo? State the uses of echo by bats and in medical fields.

[4]

Q6) (a) State the advantages of using an A.C. over the D.C.

[3]

(b) A convex lens forms an inverted image of size same as that of the object which is placed at a distance 60 cm in front of the lens. Find: (i) The position of image, and (ii) The focal length of the lens

[3]

(c) A hot iron ball of mass 0.2 kg is added into 0.5 kg of water at 10°C . The resulting temperature is 30°C . Calculate the temperature of hot ball. Specific heat of iron = $336 \text{ J kg}^{-1} \text{ K}^{-1}$ and Specific heat of water = $4.2 \times 10^3 \text{ J kg}^{-1} \text{ K}^{-1}$

[4]