

SUBJECT: Physics

MAX. MARKS: 80

CLASS: X

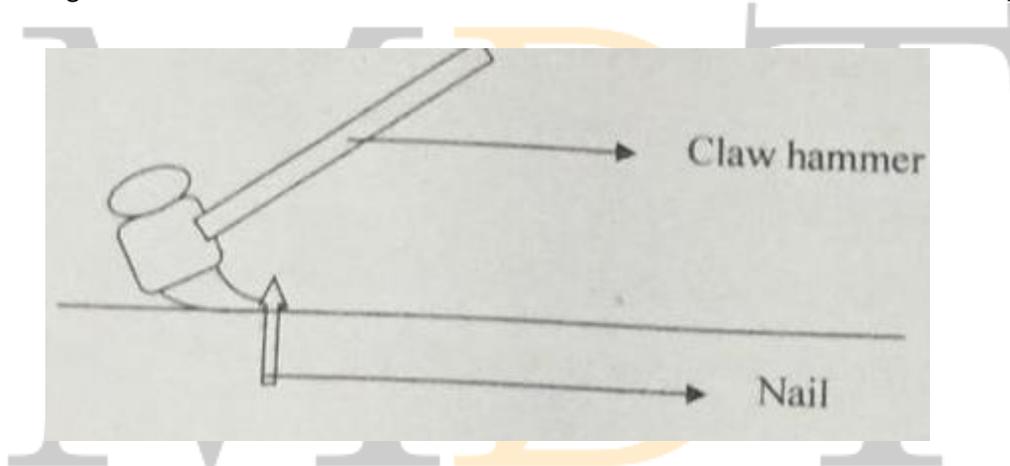
DURATION: 2 HRS

SECTION I (40 marks)

Attempt all questions from this section

Question 1

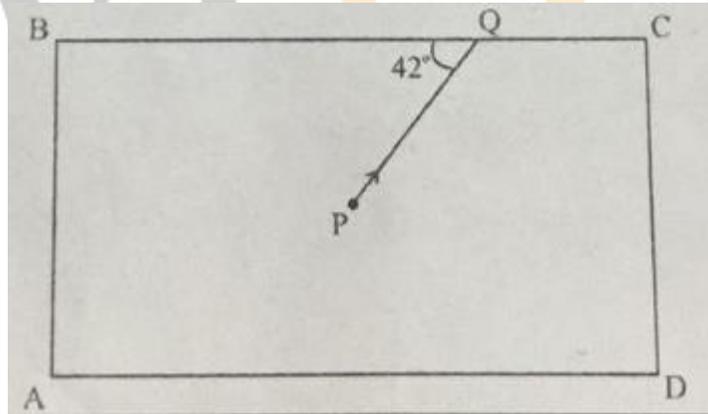
- a) The diagram below shows a claw hammer used to remove a nail: [2]



- i. To which class of lever does it belong? [2]
- ii. Give one more example of the **same class** of lever mentioned by you in (i) for which the mechanical advantage is greater than one.
- b) 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]
- c) (i.) Name the physical quantity which is measured in calories. [2]
(ii.) How is the calorie related to the S.I unit of that quantity?
- d) (i.) Define couple. [2]
(ii.) State the S.I unit of moment of couple.
- e) (i.) Define critical angle. [2]
(ii.) State one important factor which affects the critical angle of a given medium.

Question 2

- a) An electromagnetic radiation is used for photography in fog. [2]
(i.) Identify the radiation.
(ii.) Why is this radiation mentioned by you, ideal for this purpose?
- b) (i.) What is the relation between the refractive index of water with respect to air (${}_a\mu_w$) and [2]
the refractive index of air with respect to water (${}_w\mu_a$).
(ii.) If the refractive index of water with respect to air (${}_a\mu_w$) is $\frac{5}{3}$. Calculate the refractive index of
air with respect to water (${}_w\mu_a$).
- c) The specific heat capacity of a substance A is $3,800 \text{ J kg}^{-1}\text{K}^{-1}$ and that of a substance B is [2]
 $400 \text{ J kg}^{-1}\text{K}^{-1}$. Which of the two substances is a good conductor of heat? Give a reason for your
answer.
- d) A man playing flute is able to produce notes of different frequencies. If he closes the holes [2]
near his mouth, will the pitch of the note produced, increase or decrease? Give a reason.
- e) The diagram below shows a light source P embedded in a rectangular glass block ABCD of [2]
critical angle 42° . Complete the path of the ray PQ till it emerges out of the block. [Write
necessary angles]



Question 3

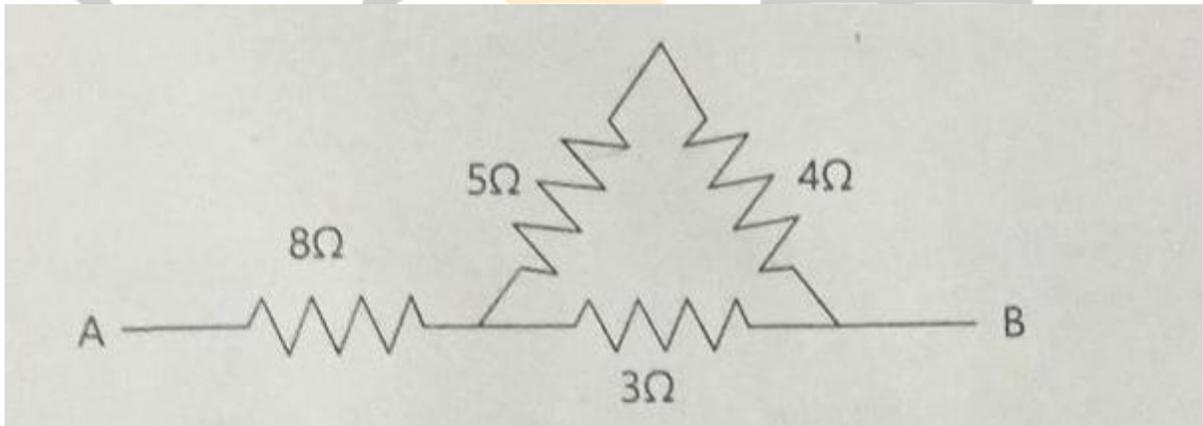
- a) (i.) If the lens is placed in water instead of air, how does its focal length change? [2]
(ii.) Which lens, thick or thin has greater focal length?
- b) Two waves of the same pitch have amplitudes in the ratio 1:3. [2]
What will be the ratio of their :
i. intensities and

ii. frequencies?

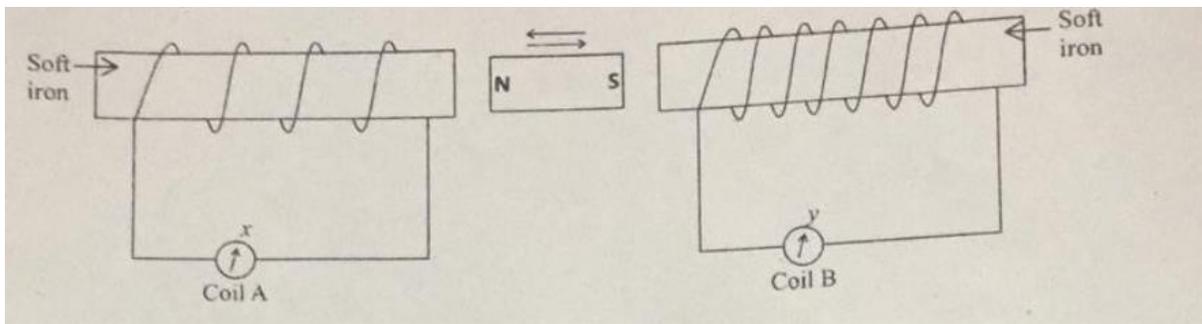
- c) How does an increase in temperature affect the specific resistance of a : [2]
- Metal and
 - Semiconductor?
- d) (i.) Define resonant vibrations. [2]
- (ii.) Which characteristic of sound, makes it possible to recognise a person by his voice without seeing him?
- e) Is it possible for a hydrogen (${}_1^1\text{H}$) nucleus to emit an alpha particle? [2]
- Give a reason for your answer.

Question 4

- a) Calculate the effective resistance across AB: [2]

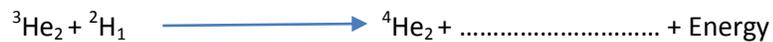


- b) (i.) State whether the specific heat capacity of a substance remains the same when its state changes from solids to liquid. [2]
- (ii.) Give one example to support your answer.
- c) A magnet kept at the centre of two coils A and B is moved to and fro as shown in the Diagram. The two galvanometers show deflection. [2]



State with a reason whether: $x > y$ or $x < y$ [x and y are magnitudes of deflection.]

- d) (i.) Why is a nuclear fusion reaction called a thermo nuclear reaction? [2]
 (ii.) Complete the reaction:



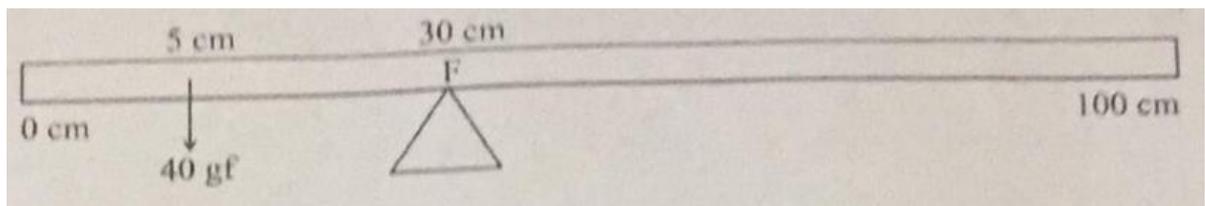
- e) State two ways to increase the speed of rotation of a D.C. motor. [2]

SECTION II (40 Marks)

Attempt any **four** questions from this section

Question 5

- a) A body of mass 10 kg is kept at a height of 5 m. It is allowed to fall and reach the ground. [3]
 i. What is the total mechanical energy possessed by the body at the height of 2 m assuming it is a frictionless medium ?
 ii. What is the kinetic energy possessed by the body just before hitting the ground? Take $g = 10 \text{ m/s}^2$.
- b) A uniform meter scale is in equilibrium as shown in the diagram: [3]



- i. Calculate the weight of the meter scale.
 ii. Which of the following options is correct to keep the ruler in equilibrium when 40 gf wt is shifted to 0 cm mark?

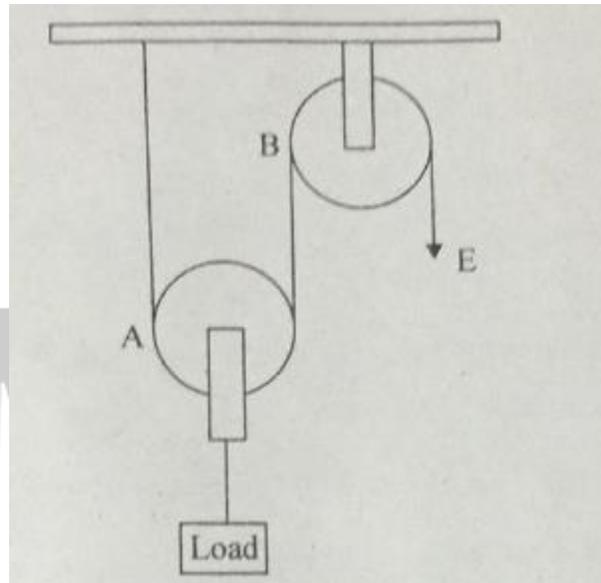
F is shifted towards 0 cm.

Or

F is shifted towards 100 cm.

c) The diagram below shows a pulley arrangement:

[4]



- i. Copy the diagram and mark the direction of tension on each strand of the string.
- ii. What is the velocity ratio of the arrangement ?
- iii. If the tension acting on the string is T , then what is the relationship between and effort E ?
- iv. If the free end of the string moves through a distance x , find the distance by which the load is raised.

Question 6

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

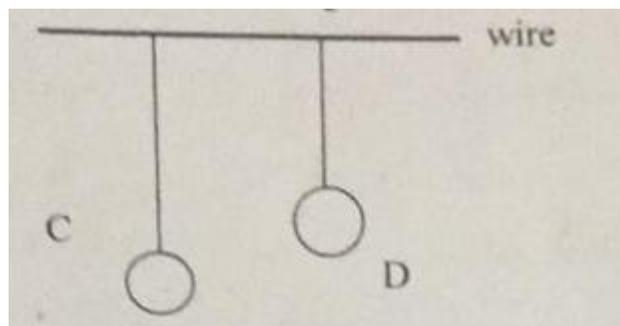
Draw a graph showing the variation in the angle of deviation with the angle of incidence at a prism surface.

- b) A virtual, diminished image is formed when an object is placed between the optical center 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

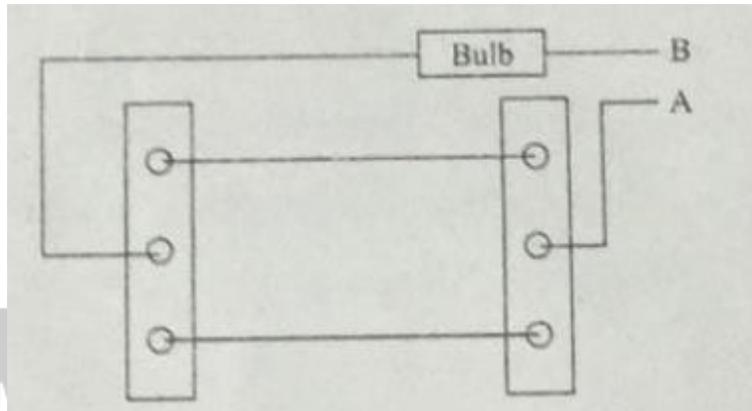
- a) It is observed that during march-past we hear a base drum distinctly from a distance compared to the side drums. [3]
- i. Name the characteristic of sound associated with the above observation.
 - ii. Give a reason for the above observation.
- b) A pendulum has a frequency of 4 vibrations per second. An observer starts the pendulum [3] And fires a gun simultaneously. He hears the echo from the cliff after 6 vibrations of the pendulum. If the velocity of sound in air is 340 m/s, find the distance between the cliff and the observer.
- c) Two simple pendulums C and D are suspended from a wire as shown in the figure given below. Pendulum C is made to oscillate by displacing it from its mean position. It is seen that D also starts oscillating.



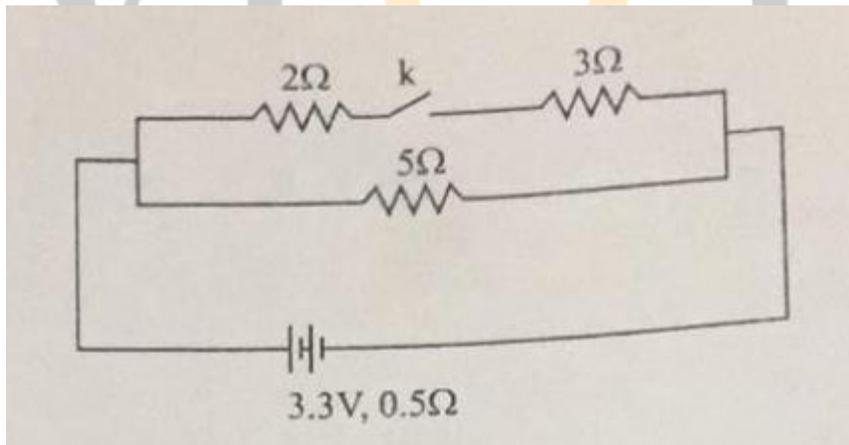
- i. Name the type of oscillation, C will execute.
- ii. Name the type of oscillation, D will execute.
- iii. If the length of D is made equal to C then what difference will you notice in the oscillations of D ?
- iv. What is the name of the phenomena when the length of D is made equal to C?

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) The diagram below shows a dual control switch circuit connected to a bulb. [3]



- i. Copy the diagram and complete it so that the bulb is switched ON.
ii. Out of A & B which one is the live wire and which one is the neutral wire?
- c) [4]



The diagram above shows a circuit with the key k open. Calculate:

- i. The resistance of the circuit when the key k is open.
ii. The current drawn from the cell when the key k is open.
iii. The resistance of the circuit when the key k is closed.

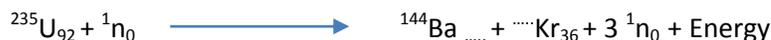
- iv. The current drawn from the cell when the key k is closed.

Question 9

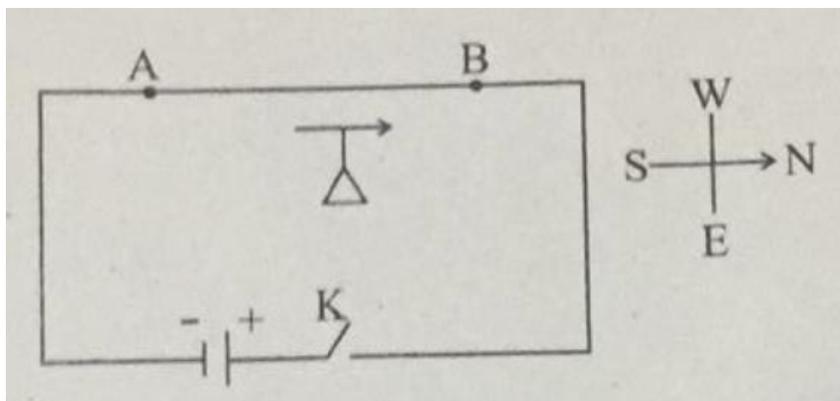
- a) (i.) Define Calorimetry. [3]
(ii.) Name the material used for making a Calorimeter.
(iii.) Why is a Calorimeter made up of thin sheets of the above material answered in (ii)?
- b) The melting point of naphthalene is 80 °C and the room temperature is 30 °C . A sample of [3]
Liquid naphthalene at 100 °C is cooled down to the room temperature. Draw a temperature
time graph to represent this cooling. In the graph, mark the region which corresponds to the
freezing process.
- c) 104 g of water at 30 °C is taken in a calorimeter made of copper of mass 42 g. When a [4]
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
copper = 0.4 J/g°C; Specific latent heat of fusion of ice = 336 J/g ; Specific heat capacity of water
= 4.2 J/g °C]

Question 10

- a) Draw a neat labeled diagram of an A.C generator. [3]
- b) (i.) Define nuclear fission. [3]
(ii.) Rewrite and complete the following nuclear reaction by filling in the atomic number of Ba
and mass number of Kr:



- c) The diagram below shows a magnetic needle kept just below the conductor AB which is kept [4]
In North South direction.



- i. In which direction will the needle deflect when the key is closed?
- ii. Why is the deflection produced?
- iii. What will be the change in the deflection if the magnetic needle is taken just above the conductor AB?
- iv. Name one device which works on this principle.

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