

MAR THOMA RESIDENTIAL SCHOOL, THIRUVALLA
FIRST MODEL EXAMINATION- 2018- '19

Mark-80

Std-X

PHYSICS
SCIENCE PAPER-1
(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 answer.

*Section I is compulsory. Attempt **any four** questions from Section II.*
The intended marks for questions or parts of questions are given in brackets ().

SECTION I (40 Marks)

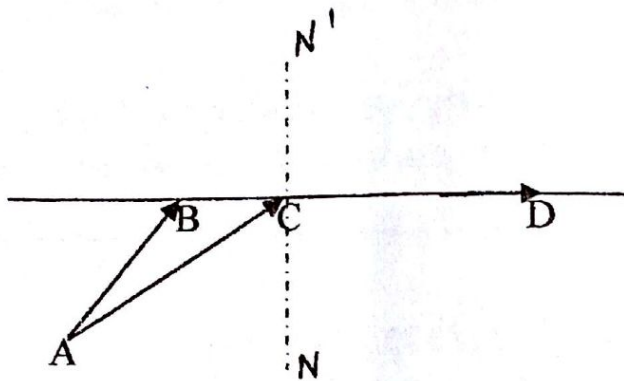
*Attempt **all** questions from this section.*

Question-1

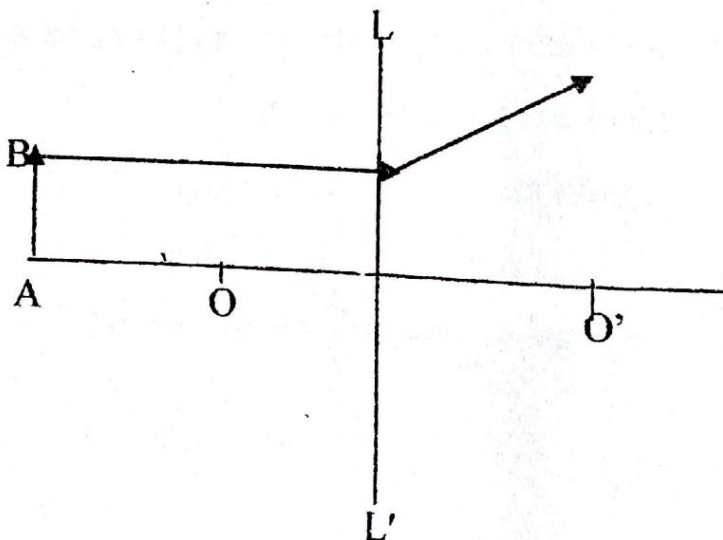
- a. Name and state the principle on which a physical balance works. (2)
- b. The iron door of a building is 3m broad. It can be opened by applying a force of 100N normally at the middle of the door. Calculate
- (i) the torque needed to open the door (2)
- (ii) the least force needed to open the door. (2)
- c. (i) State the factor on which the position of centre of gravity of a body depends. (2)
- (ii) State the position of centre of gravity of a rectangular lamina. (2)
- d. (i) Name the force required for circular motion. (2)
- (ii) State its direction. (2)
- e. (i) A light mass and a heavy mass have equal momentum. Which will have less kinetic energy? (2)
- (ii) Give reason for your answer in part (i).

Question-2

- a. How does the refractive index of a medium depend on
 (i) its temperature (ii) the wavelength of light used
- b. (i) Draw a ray diagram to show the refraction of a monochromatic ray through a prism when it suffers minimum deviation.
 (ii) If the angle of incidence is 48° and the minimum deviation is 36° , what will be its angle of emergence?
- c. Figure below shows two light rays AB and AC emerging from the object A. The ray AC is refracted as CD.



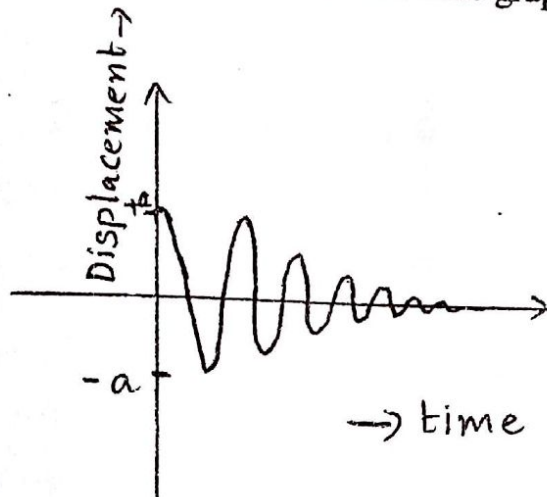
- (i) What special name is given to the angle of incidence $\angle ACN$ of the ray AC ?
 (ii) What is the angle of refraction for the refracted ray CD ?
- d. A convex lens forms an erect and three times magnified image of an object placed at a distance of 10cm in front of it. Find
 (i) the position of the image.
 (ii) the focal length of the lens.
- e. (i) Complete the diagram to form the image of the object AB.



- (ii) Name the lens LL'.

Question-3

- a. Sometimes when a vehicle is driven at a particular speed, a rattling sound is heard.
- Name the phenomenon taking place.
 - Why does this happen?
- b. (i) State Ohm's law. (2)
- (ii) Draw a $V-I$ graph for a conductor obeying Ohm's law. (2)
- c. (i) Name a material used for making the standard resistor. (2)
- (ii) Give a reason for your answer. (2)
- d. A given wire of resistance 2Ω is stretched to double its length. What will be its new resistance ? (2)
- e. The diagram shows the displacement-time graph of a vibrating body. (2)



- Name the kind of vibration.
- Why is the amplitude of vibration gradually decreasing? (2)

Question-4

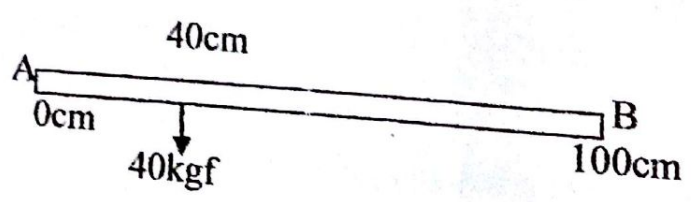
- a. (i) Name the term that will not change for a machine of a given design.
- (ii) State one reason why is the mechanical advantage less than the velocity ratio for an actual machine. (2)
- b. (i) What are background radiations ?
- (ii) State one safety precaution to be taken while handling the radioactive substances (2)
- c. Calculate the power of an electric heater required to melt 1kg of ice at 0°C in 30s if the efficiency of heater is 40%. (2)
- Take specific latent heat of ice = 336Jg^{-1} .

- d. (i) Same amount of heat is supplied to two liquids A and B. The liquid B shows a greater rise in temperature. What can you say about the heat capacity of A as compared to that of B?
- (ii) What is the principle of method of mixture ?
- e. A cook uses the fire tongs of length 30cm to lift a piece of burning coal of mass 240g. If he applies the effort at a distance of 6cm from the fulcrum, find the effort.
Take $g = 10 \text{ m/s}^2$.

SECTION II (40 Marks)
(Attempt any four questions)

Question-5

- a. A uniform metre rule AB is pivoted at its end A at the zero mark and supported at the other end B by a spring balance when a weight of 40kgf is supported at its 40cm mark. This rule stays horizontal. Find the reading of the spring balance when the rule is of
- i) negligible mass and ii) mass 20kg.



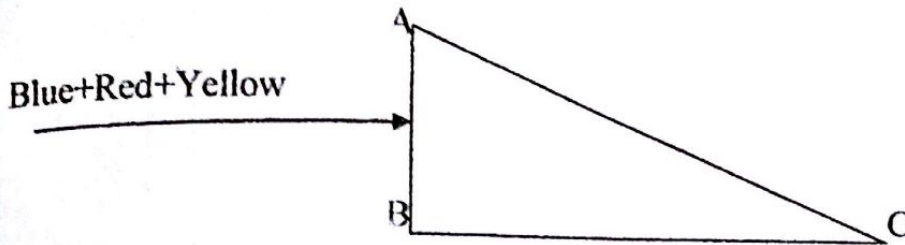
- b. Show that the total mechanical energy is always conserved in the case of a freely falling body under gravity from a height x by finding it when
- i) the body is at the top
ii) the body has fallen a distance y
iii) the body has reached the ground.
- c. A block and tackle system has the velocity ratio 4
- (i) Draw a labelled diagram of the system indicating the direction of the load and effort.
- (ii) A man can exert a pull of 200kgf. What is the maximum load he can raise with this pulley system if its efficiency is 70%?

- (iii) If the effort end moves a distance of 60cm, what distance does the load move? (4)

Question-6

- a. (i) Is it possible to burn a piece of paper using a convex lens in daylight without using the match box or any direct flame.
(ii) Draw a diagram to support your answer. (3)

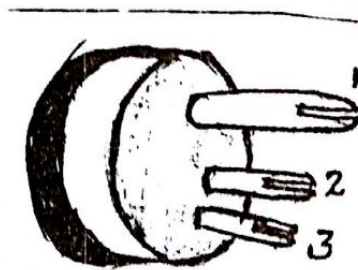
- b. A beam consisting of blue, yellow and red colours is incident normally on the face AB of an isosceles right angled prism ABC as shown below. Complete the diagram to show the refracted and emergent rays. Given that the critical angle of glass-air interface for yellow colour is 45° .



- c. (i) What is meant by the statement 'the critical angle for water-air surface is 49° '?
(ii) State two conditions necessary for the total internal reflection to occur.
(iii) Mention one difference between the reflection of light from a plane mirror and total internal reflection of light from a prism. (4)

Question-7

- a. (i) The diagram below shows a three pin plug. Name the three pins labelled
(ii) Why is the top pin thicker?
(iii) Why are the pins splitted at the ends?



- b. A man standing in front of a vertical cliff fires a gun. He hears the echo after 3s.

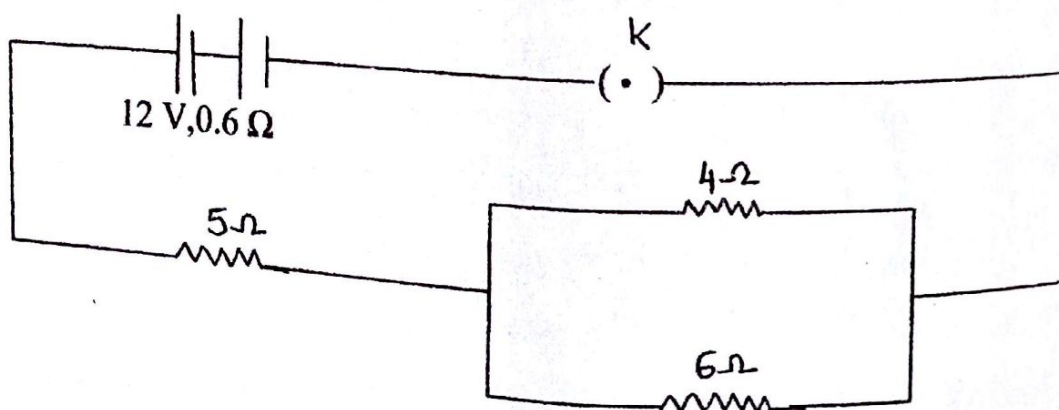
On moving closer to the cliff by 85m, he fires again and hears the echo after 2.5s.

Find

- (i) the distance of the cliff from the initial position of man.
 - (ii) the speed of sound.
- c.
- (i) What is the purpose of switch in a circuit?
 - (ii) Why is the switch put in the live wire?
 - (iii) Draw a circuit diagram using the dual control switches to light a staircase electric light.

Question-8

- a.
 - (i) What is the meaning of the statement "the current rating of a fuse is 5A.
 - (ii) Name the material used for making a fuse wire.
 - (iii) Give a reason for the above mentioned wire in part (ii).
- b. An electric press is rated '750W, 230V'. Calculate
 - (i) the safe limit of current flowing through it.
 - (ii) the energy consumed when it is used for two hours.
 - (iii) the cost of energy consumed at Rs 4.20 per kWh.
- c. Figure below shows a battery of emf 12V and internal resistance 0.6Ω , connected to three resistors. Calculate
 - (i) the current in resistors 5Ω and 6Ω
 - (ii) the potential difference across the resistor 4Ω .
 - (iii) the terminal voltage of the cell.

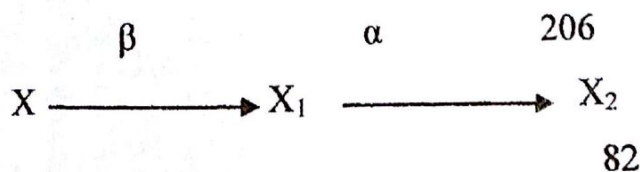


Question-9

- a. (i) Define the term specific latent heat of fusion of ice
(ii) Which requires more heat: 1g of ice at 0°C or 1g of water at 0°C to raise its temperature to 10°C ?
(iii) Give a reason for your answer in part (ii). (3)
- b. 1kg of ice at 0°C is heated at a constant rate and its temperature is recorded after every 30s till steam is formed at 100°C . Draw a temperature- time graph to represent the change of phases. (3)
- c. 50g of ice at 0°C is added to 300g of a liquid at 30°C . What will be the final temperature of the mixture when all the ice has melted?
The specific heat capacity of the liquid is $2.5 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$ while that of water is $4.2 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$. Specific latent heat of fusion of ice is $336 \text{ Jg}^{-1} \text{ }^{\circ}\text{C}^{-1}$. (4)

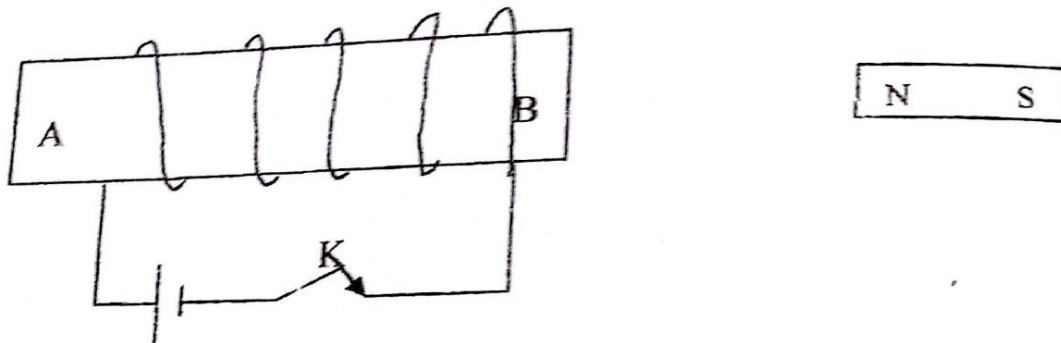
Question-10

- a. A radioactive substance is oxidised.
(i) What changes would you expect to take place in the nature of radioactivity?
(ii) Give reason for your answer in part (i) above.
(iii) Complete the following nuclear changes.



- b. (i) Why is a very high temperature required for the process of nuclear fusion?
(ii) Name the isotope of Uranium which is more easily fissionable.
(iii) What is responsible for the energy release in nuclear fission and fusion? (3)
- c. (i) The diagram below shows a small magnet placed near a solenoid with its north pole N near the end B. Current is switched on in the solenoid by pressing

the key K.



State the polarity at ends A and B.

- (ii) State the law which is used to determine the direction of force on a current carrying conductor placed in a magnetic field.
- (iii) In a d.c motor, when is the deflecting couple maximum.
- (iv) State the principle on which a transformer works.

(4)