

MAR THOMA RESIDENTIAL SCHOOL, THIRUVALLA
FIRST TERMINAL EXAMINATION 2017-18

STD X

PHYSICS

MARK:80

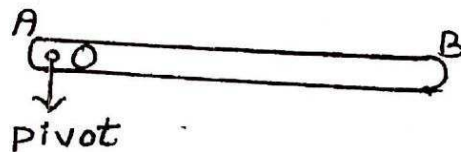
TIME:2h

SECTION A (40 marks)

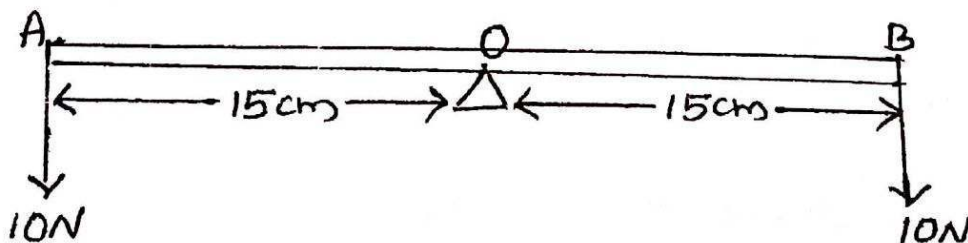
Answer all questions

Question 1

- a) (i) State one way to reduce the moment of a given force about a given axis of rotation.
(ii) Is moment of force a scalar or vector quantity? (2)
- b) The given figure shows an axle AB pivoted at a point O. Draw diagrams showing the point of application and direction of minimum force to rotate it
(i) clockwise (ii) anti clockwise directions. (2)



- c) A horizontal bar is pivoted on a knife edge O. two forces each of 10N are acting on the bar as shown in the figure.
(i) Find the total moment of the two forces about O.
(ii) Is the bar in the state of equilibrium or not? (2)



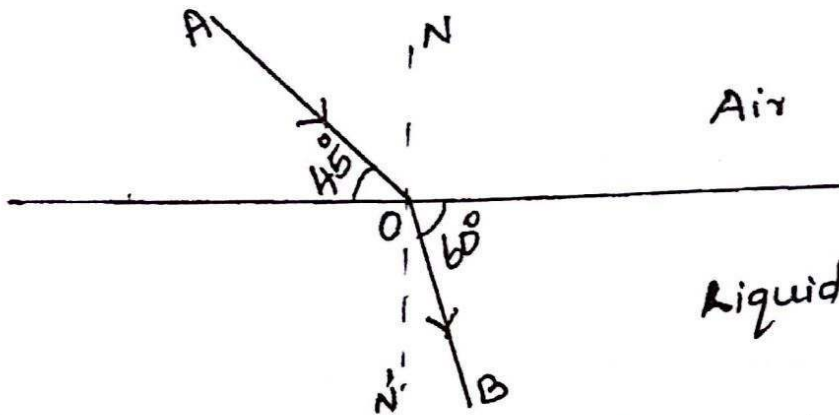
- d) State two differences between uniform linear motion and uniform circular motion. (2)
- e) i) "The refractive index of diamond is 2.41." What do you mean by this statement?
ii) The refractive indices of medium 1 and medium 2 are equal. How does the path of a ray of light change as it passes from medium 1 to medium 2? (2)

Question 2

a) The diagram below shows the refraction of a ray of light from air to a liquid.

i) Write the values of angle of incidence and angle of refraction.

ii) Using these angles write the expression for refractive index of liquid with respect to air.

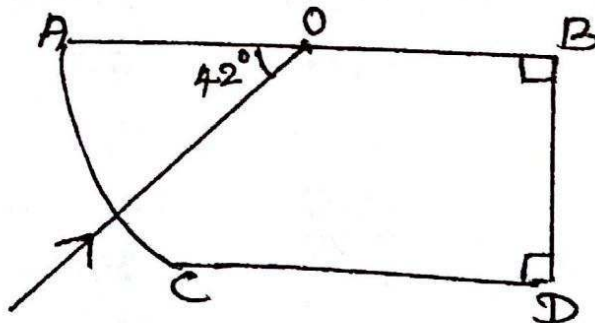


b) Draw a labelled diagram showing the path of a monochromatic ray of light through an equilateral prism in the minimum deviation position. How are the angle of incidence (i) and angle of emergence (e) related? (2)

c) i) Water in a pond appears to be only three-quarter of its actual depth. What property of light is responsible for this observation?

ii) Mention one difference between the reflection of light from a prism and from total reflecting prism. (2)

d) A ray of light enters a glass slab ABCD as shown in the figure. The ray strikes at the centre O of the circular part AC of the slab. Complete the path of the ray till it emerges out from the slab. Mark angles in the diagram wherever necessary. [The critical angle of glass is 42°] (2)



e) The focal length of a camera lens is 20cm.

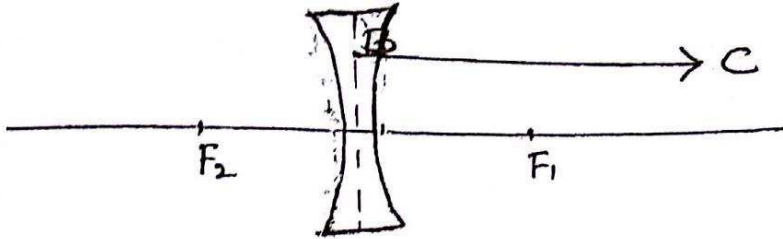
i) Find how far away from the film must the lens be set in order to photograph an object located at a distance of 100cm from the lens.

ii) Is the image real or virtual?

(2)

Question 3

a) Complete the diagram to show the path of the incident ray.



ii) A convex lens and a concave lens each having power 2.5D are kept in contact. Will the combination act as a lens? Give reason for your answer. (2)

b) Name the electromagnetic radiation used for the following purposes.

i) Radiography

ii) analysing atomic and molecular structure (2)

c) An electromagnetic radiation has frequency 5×10^{15} Hz.

1) Calculate its wavelength

(2)

2) Name the radiation.

d) i) Name the waves used for echocardiography.

ii) Give one property of the above mentioned wave.

(2)

e) Two waves A and B given out from a source are of amplitudes in the ratio 2:3 and frequencies in the ratio 3:2.

Compare their : i) loudness ii) pitch

(2)

Question 4

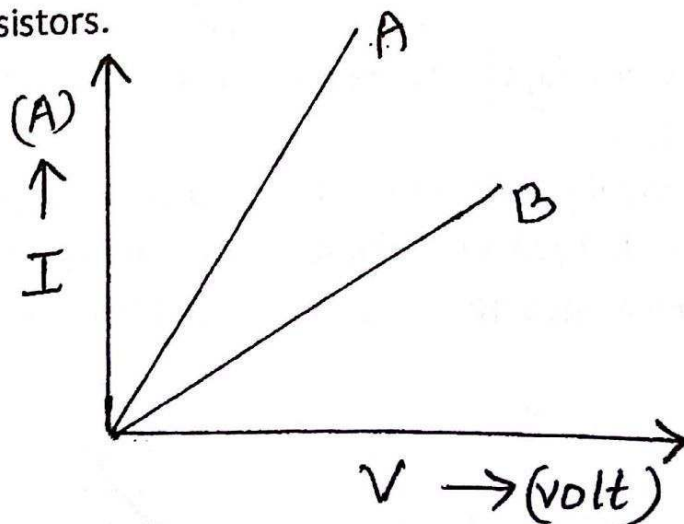
a) State two ways by which the frequency of transverse vibrations of a stretched string can be increased? (2)

b) What do you mean by noise pollution? Name one source of sound causing noise pollution. (2)

c) An electric heater is rated 2.2 kW, 220V. i) What do you mean by this statement?

ii) Calculate the safe limit of current which can be passed through it. (2)

d) The figure below shows the I-V graph for a series combination and for a parallel combination of two resistors.



- i) Which of the two A or B represents series combination?
 ii) Give reason for your answer. (2)
- e) Name a material which is used for making the standard resistor.
 Give reason for your answer.

SECTION B

Question 5

- a) State the condition :
 i) when a force produces translational motion
 ii) when a force produces rotational motion
 iii) for a body acted upon by several forces to be in equilibrium (3)

b) A uniform meter rule of mass 100g is balanced on a fulcrum at mark 60cm, suspending an unknown mass 'm' at the mark 85cm.

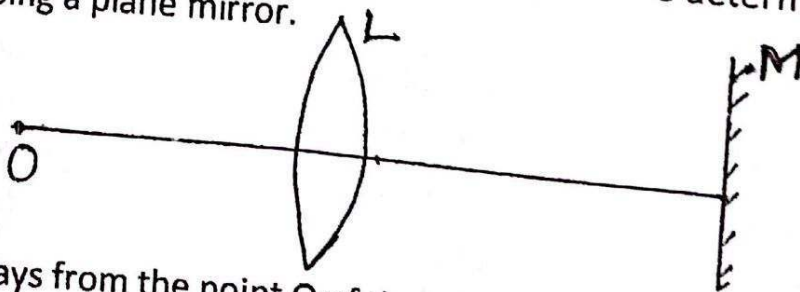
- i) Find the value of m.
 ii) To which side the rule will tilt if the mass is moved to the mark 90cm?
 iii) What is the resultant moment now?
 iv) How can it be balanced by another mass of 20g? (4)

c) An empty test tube placed in water in a beaker with mouth outside the water surface, shines like a plane mirror when seen at a certain angle.

- i) Name the phenomenon responsible for this observation.
 ii) State the essential condition for this phenomenon. (3)

Question 6

a) The diagram shows the experimental setup for the determination of focal length of a lens using a plane mirror.



- i) Draw two rays from the point O of the object to show the formation of image at O itself.
 ii) Name the distance of the object O from the optical centre of the lens.
 iii) To what point will the rays return if the mirror is moved away from the lens by a distance equal to the focal length of the lens? (4)

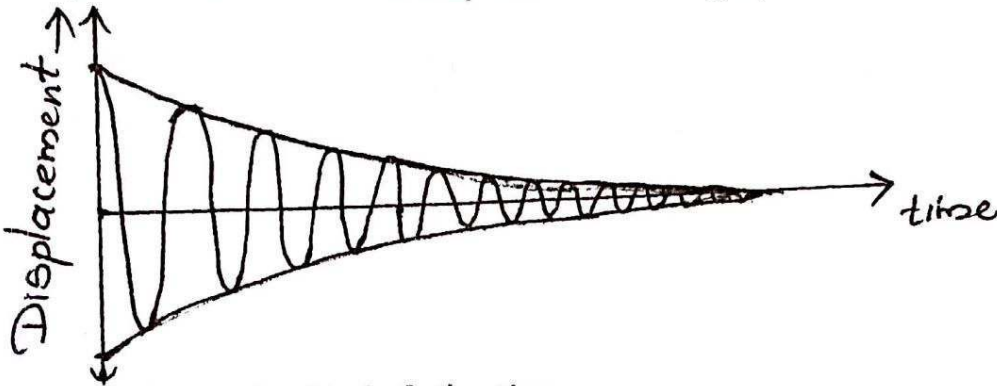
- b) A lens forms an upright and magnified image of an object.
- Name the lens.
 - Where is the object placed with respect to the lens?
 - State one application in which the lens is used in the manner. (3)

- c) i) Name and define the phenomenon responsible for the formation of band of colours on a screen by passing white light through a glass prism.
- ii) Which colour of the spectrum deviates the most? (3)

Question 7

- (a) i) Name the electromagnetic radiation produced by the changes in the nucleus of an atom.
- ii) Give the approximate wavelength of this radiation.
- iii) State two uses of this radiation. (4)

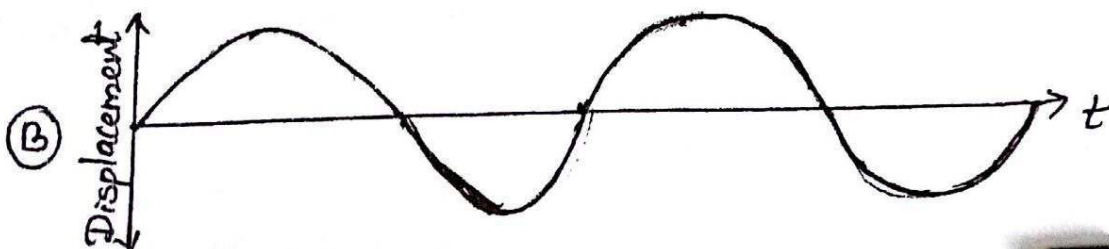
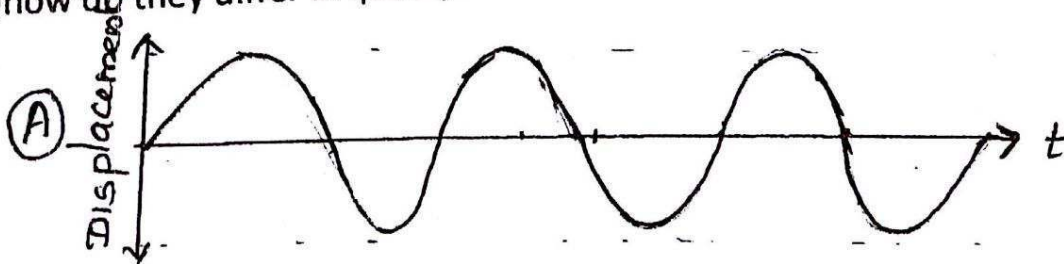
b) The diagram below shows the displacement-time graph of a vibrating body.



- (i) Name and define the kind of vibration.
- ii) Why is the amplitude of vibrations gradually decreasing? (3)

c) The figure shows the displacement-time graph for two sound waves when they pass through air. Compare their:

- wavelengths
- frequencies
- how do they differ in quality? (3)

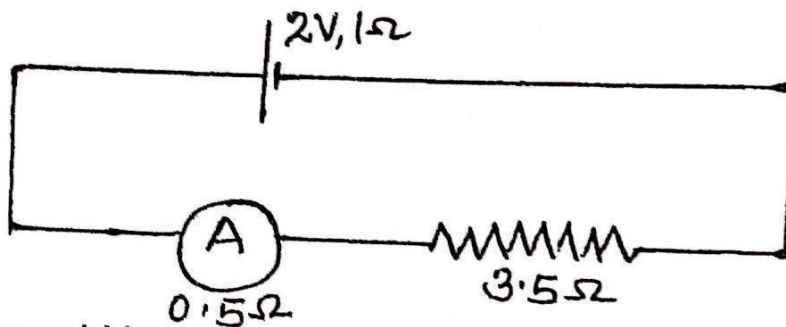


Question 8

a)i) Define specific resistance of a substance.

ii) A wire of resistance R and specific resistance ' ρ ' is stretched to double its length. What will be its new: i) resistance ii) specific resistance (3)

b) A cell of emf 2 V and internal resistance 1Ω is connected in series with an ammeter of resistance 0.5Ω and a resistor of 3.5Ω as shown in the figure.



1) What would be the reading of the ammeter?

2) What is the potential difference across the terminals of the cell? (3)

c) You are given three resistors 2Ω , 3Ω and 6Ω . How will you connect these resistors to get an equivalent resistance of: i) 4Ω ii) 1Ω

Draw the diagrams to show the arrangement for each case. (4)