Bombay Scottish School, Mahim

PRELIMINARY EXAMINATION-

PHYSICS

Std : 10
Date : 11.01.2019
Duration : 2 hours

Max. Marks : 80
No. of Questions : 10
No. of Printed sides : 06

[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 top of this paper is the time allowed for writing the answers.

***Section 1** is compulsory. Attempt **any four questions** from **Section 2**.*
The intended marks for questions or parts of questions are given in [ ]

SECTION 1 (40 Marks)

Attempt all questions from this section.

Question 1

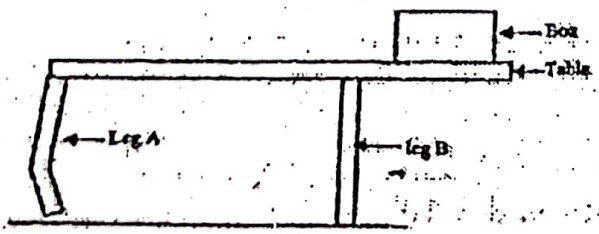
(a) A pulley system is slightly rusted. With reference to the terms Mechanical Advantage, Velocity Ratio and Efficiency, name and define the term that remains unaffected in the given situation. [2]

(b) A man of mass 80 kg climbs 300 steps to reach a temple on the hill. If the height of each step is 30 cm, then calculate the gain in his potential energy when he is at the top. [g = 10 ms^{-2}] [2]

(c) The given diagram of a nail cutter below shows a combination of two levers. [2]

(i) Name the classes of the levers.
(ii) Draw a simple sketch of the lever which cuts the nail and mark the position of Load, Effort and Fulcrum with their directions.

(d) The diagram shows a heavy box kept on a table whose leg A is broken. Redraw the diagram and mark the forces that prevent the table from overturning. [2]



(e) Calculate the heat absorbed by 200g of ice at 0 ^{0}C to change to water at 40 ^{0}C. [2]
[Sp. heat capacity of water = 4.2 $Jg^{-1}{}^0C$; Sp. latent heat of ice = 336 Jg^{-1}.]

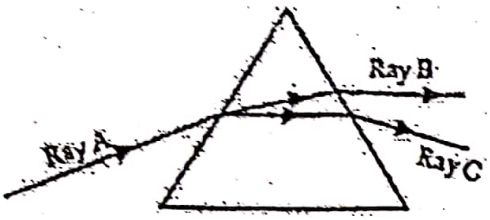
Question 2

(a) State whether the work is done by gravity in the following cases. [2]

(i) A boy walks on a levelled road.

(ii) A moon revolving round the ~~sun.~~ earth.

(b) Observe the diagram given below and answer the questions that follow:



(i) State whether the ray A is monochromatic or polychromatic. [2]

(ii) Which colour will scatter more, colour of ray B or colour of ray C?

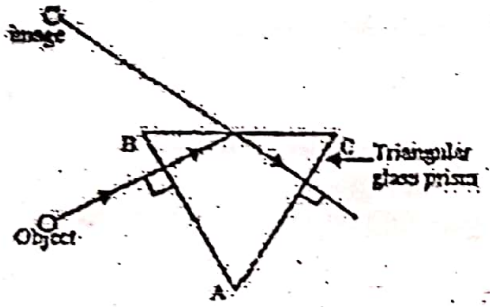
[2]

(c) Name the energy changes in the following while in use

(i) A burning candle.

(ii) A working steam engine.

(d) Observe the diagram given below and answer the questions that follow: [2]



(i) State the angle of incidence at the surface AB.

(ii) Name the phenomenon taking place through the prism in forming the image of the object.

(e) Two sound waves of the same pitch have amplitudes in the ratio 2:5. [2]
Calculate the ratio of

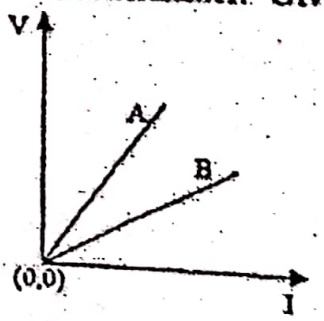
(i) their intensities (ii) their frequencies.

Question 3

(a) State *two* ways by which the frequency of transverse vibrations of a stretched string can be increased. [2]

(b) The refractive index of kerosene oil is 1.4. Calculate the speed of light in it, if the speed of light in vacuum is $3 \times 10^8 ms^{-1}$. [2]

(c) The 'V' against 'I' graph for a series and for parallel combination of two resistors is shown in the figure below. Which of the two: A or B, represents the parallel combination? Give a reason for your answer. [2]



(d) The power of a lens is +5D. [2]
(i) Name the type of lens. (ii) Calculate its focal length.

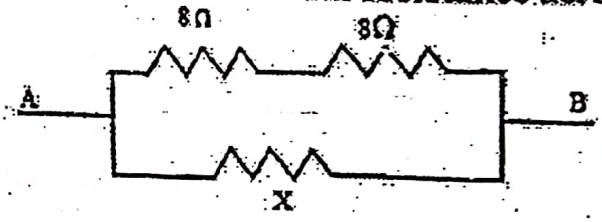
(e) How does the resistivity change with the increase in temperature in the following cases: [2]
(i) a metal conductor. (ii) a semi-conductor.

Question 4

(a) It is observed that the water in a container starts boiling at 105 °C. Give two possible reasons to explain why water is boiling at a higher temperature. [2]

(b) Radioactive isotope of carbon gets oxidised. State the effect on its radioactivity with a reason. [2]

(c) Calculate the value of X if the total resistance across AB is 3.2 Ω. [2]



(d) State two differences between a step up transformer and a step down transformer. [2]

(e) Copy and complete the following nuclear fission reaction: [2]

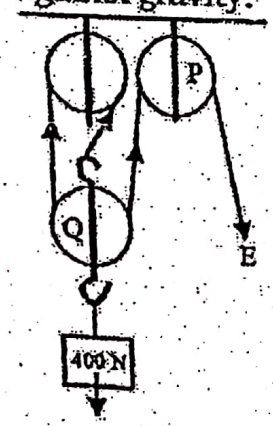
$$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{}_{57}La + {}^{85}_{\_\_}Br + 3{}^{1}_{0}n + energy$$

Section 2 (40 Marks)

Attempt any four questions from this section.

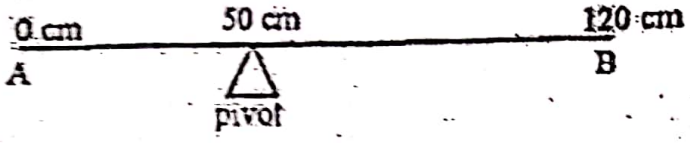
Question 5

(a) The diagram below shows a pulley system used to lift a load of 400N against gravity. [3]

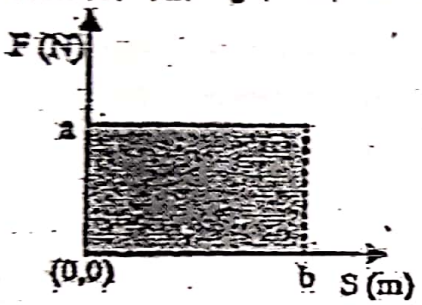


(i) State the purpose of pulley P.
(ii) State the V.R. of the pulley system.
(iii) State the M.A. if the efficiency of this system is 80%.

(b) The diagram below shows a metal rod of length 120 cm and weight 420gf balanced on a pivot. How much **minimum** weight needs to be suspended on it if it has to be balanced at its centre. [3]



(c) The diagram below shows a force-displacement graph for a freely falling body of mass 200 g. If the shaded area is 40 sq. unit, then answer the questions that follow [given g = 10 ms^{-2}] [4]



i) Calculate the value of 'a'
ii) What is the work done corresponding to the displacement 'b' m?
iii) Calculate the value of 'b'.

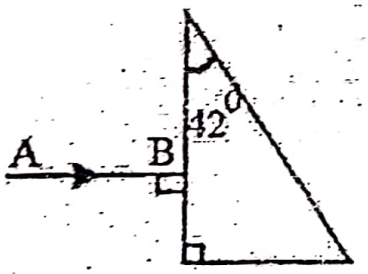
Question 6

(a) A lens forms an inverted image of the same size at a distance of 30 cm from the lens [3]
(i) Name the type of lens used.
(ii) Calculate the focal length of the lens.

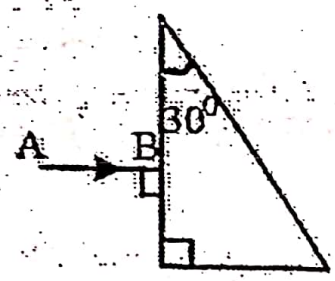
(b) (i) Why does smoke appear white? [3]
(ii) Define the phenomenon related to this.

(c) Complete the path of the ray AB through the prisms of critical angle 42° [4]

(i)



(ii)



Question 7

(a) (i) What is the principle of method of mixtures? [3]
(ii) What is the other name given to it?
(iii) Name the law on which this principle is based.

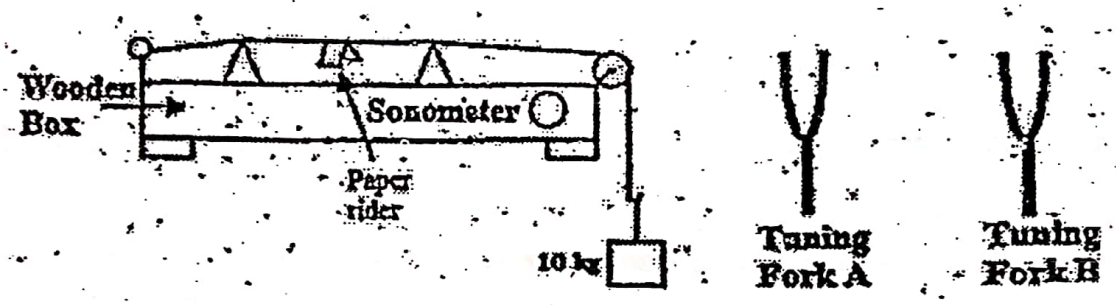
(b) Some amount of bees wax having melting point 62 °C is heated from room temperature 35 °C till it melts completely. Draw its heating curve corresponding to the information given above. [3]

(c) A copper vessel of mass 84 g contains 168 g of water at 40 °C. How much ice is needed to cool it to 8 °C? [4]

Given: Specific heat capacity of copper = 0.4 $jg^{-1}°C^{-1}$
Specific heat capacity of water = 4.2 $jg^{-1}°C^{-1}$
Specific latent heat of fusion of ice = 336 jg^{-1}

Question 8

(a) The diagram below shows a wire stretched over a sonometer. Stems of two vibrating tuning forks A and B are touched to the wooden box of the sonometer. It is observed that the paper rider present on the wire flies off when the stem of vibrating tuning fork B is touched to the wooden box but the paper just vibrates when the stem of vibrating tuning fork A is touched to the wooden box. [3]



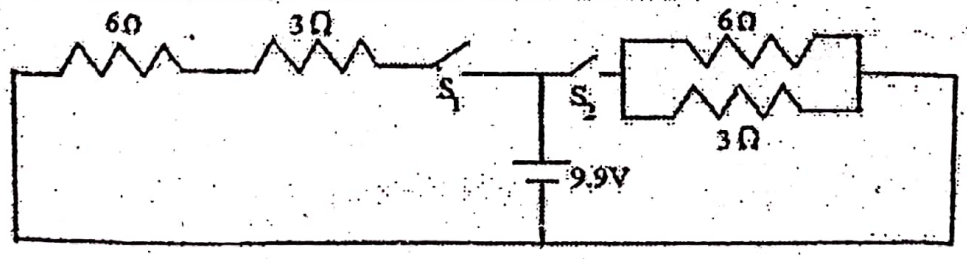
(i) Name the phenomenon when the paper rider just vibrates.
(ii) Name the phenomenon when the paper rider flies off.
(iii) Why does the paper rider fly off in the case of tuning fork B?

(b) (i) State one important property of ultrasonic waves which is useful in SONAR. [3]
(ii) A sonar signal of frequency 1×10^6 Hz has wavelength 1.5×10^{-3} m in water. What is the speed of the signal in water?

(c) A sound wave sent from a stationary submarine returns 10 s later after hitting an underwater object. Another signal sent after 5 s returns in 8 s. If the speed of the signal in water is 1500 ms^{-1}, then calculate the speed at which the under water object is moving towards the submarine. [4]

Question 9

(a) In the diagram below calculate the current drawn from the cell when [3]
(i) the switch S_1 is closed and S_2 is open.
(ii) the switches S_1 and S_2 are both closed.



(b) (i) State one advantage of connecting the appliances in parallel combination as compared to series combination. [3]

(ii) Why is earthing absolutely necessary in a power circuit?

(c) (i) Why is the earth pin of the socket made thicker? [4]

(ii) State a difference and a similarity between M.C.B. and a fuse.

Question 10

(a) A nucleus $_{11}Na^{24}$ emits a beta particle to change into Magnesium (Mg) [3]

(i) Write a balanced nuclear equation for the process.

(ii) What are the numbers 24 and 11 called?

(iii) What is the general name of the reactant element and product element with respect to each other.

(b) Copy and complete the following nuclear equation: [3]

(i) $^{y}_{x}A \rightarrow {}^{}_{}B + {}^{4}_{2}He + \gamma$

(ii) State the effect on the atomic and mass number of a nucleus when it emits gamma radiations.

(c) During the rotation of an armature coil in a D.C. motor [4]

(i) State for which position of coil, is the couple acting maximum.

(ii) State for which position of coil, is the couple acting minimum.

(iii) Is the magnitude of force constant when the split rings are in contact with brushes?

(iv) What is the function of the split rings?