Bombay Scottish School, Mahim

ASSESSMENT 3

SCIENCE PAPER I - PHYSICS

Grade	**: 10**	**Max Marks**	**: 80**
Date	**: 17.11.2025**	**No. of Questions**	**: 09**
Duration	**: 2 Hours**	**No. of Printed Sides**	**: 11**

[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.

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

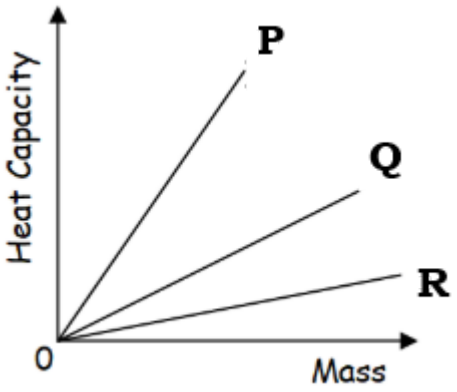
SECTION A

(*Attempt **all** questions from this Section.*)

Question 1

Choose the correct answers to the questions from the given options. [15]
(Do not copy the question, write the correct answers only.)

(i) For three different substances P, Q and R, the graph of heat capacity versus mass is shown below. Then which of the three substances will show rapid rise in temperature when equal amount of heat is supplied?



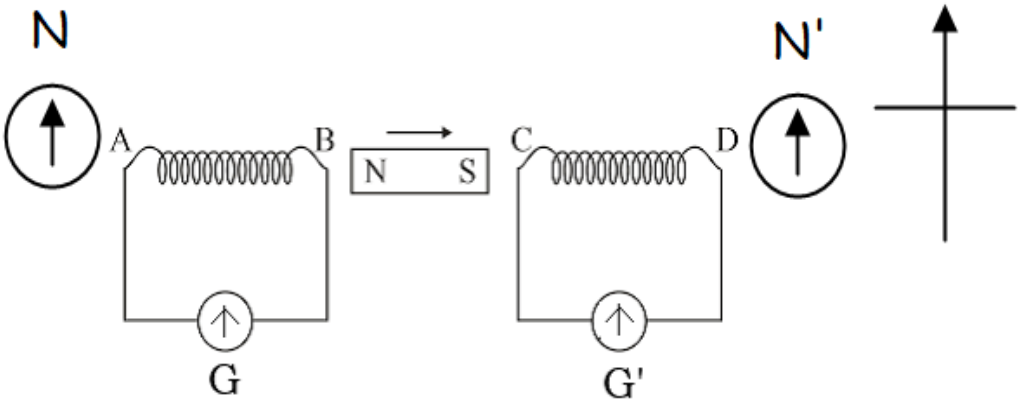
(a) P
(b) Q
(c) R
(d) Given data is insufficient

(ii) **Match the following**:

Source while in use	Energy conversion
1. Sun	(P) Mechanical to Electrical
2. Thermo couple	(Q) Light to Electrical
3. Dynamo	(R) Heat to Electrical
4. Photocell	(S) Light to Chemical

(a) 1 – S, 2 – Q, 3 – P, 4 – R
(b) 1 – Q, 2 – S, 3 – R, 4 – P
(c) 1 – S, 2 – R, 3 – P, 4 – Q
(d) 1 – Q, 2 – R, 3 – P, 4 – S

(iii) If a bar magnet is kept between two coils AB and CD. Two magnetic needles N and N' are kept near the ends A and D of two coils respectively. If the magnet is moved towards right side, then identify the correct positions of the magnetic needles.



(a) N -  N' – 

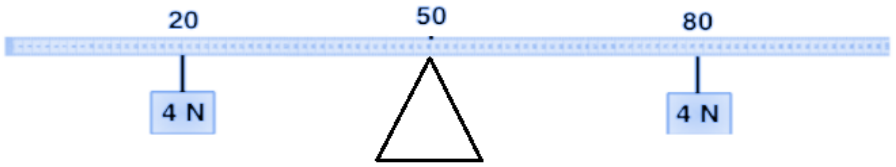
(b) N -  N' – 

(c) N -  N' – 

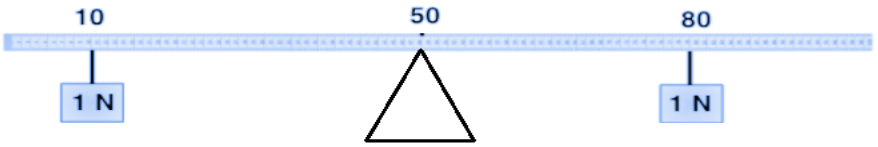
(d) N -  N' – 

(iv) In which one of the following is the uniform metre stick **not** balanced?

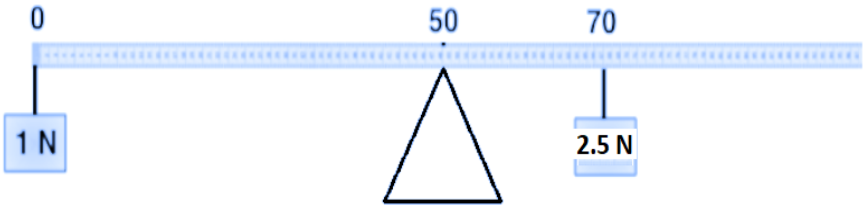
(a)



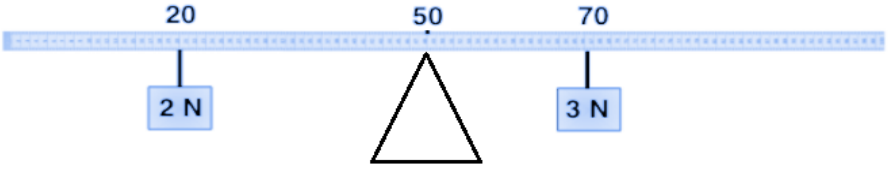
(b)



(c)



(d)



(v) In beta emission, the daughter element is an ..... of the parent atom.

(a) isotone
(b) isobar
(c) isotope
(d) allotrope

(vi) If 200 V is applied to the primary coil of an ideal step-up transformer with turns ratio 5, then the voltage in the secondary coil is:

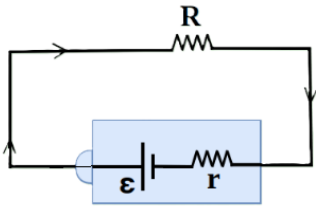
(a) 200 V
(b) 40 V
(c) 400 V
(d) 1000 V

(vii) Assertion (A): It is advisable to transmit electric power at a high voltage.
Reason (R): High voltage implies high current can transmit electric power easily over a long distance.

(a) Both A and R are true, R is the correct explanation of A
(b) Both A and R are true, R is not the correct explanation of A
(c) A is true and R is false
(d) A is false and R is true

(viii) For a given cell, If e.m.f. is twice its terminal voltage, then which of the following relation is true?

(a) $R = r$
(b) $R > r$
(c) $R < r$
(d) $R = 2r$



(ix) **Assertion (A):** In the process of total internal reflection 100 % of light energy is reflected back as it happens in a plane mirror.
Reason (R): During TIR, there is no absorption of light taking place, as light passes from a denser to a rarer medium.

(a) Both A and R are true, R is the correct explanation of A
(b) Both A and R are true, R is not the correct explanation of A
(c) A is true and R is false
(d) A is false and R is true

(x) Which of the following pairs is **correctly matched**?

(a) Scissors – Class II
(b) Wheelbarrow – Class III
(c) Human jaw (biting) – Class III
(d) Nutcracker – Class I

(xi) An opera singer sings a very high-pitched note and causes a glass to shatter. Which of the following is the correct reason for the glass to shatter?

(a) The amplitude of a sound is very large
(b) The frequency of a sound is high
(c) Due to resonance
(d) The quality of sound is high

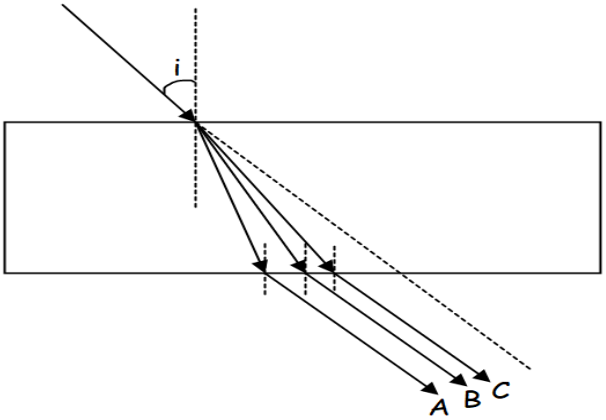
(xii) The electromagnetic radiation which are useful in night photography is:

(a) infra-red rays
(b) ultra-violet rays
(c) visible light
(d) X-rays

(xiii) Two bodies A and B of masses m and M such that $\boldsymbol{M >> m}$. If both the bodies have same kinetic energy, then:

(a) B has more momentum than A
(b) A has more momentum than B
(c) both the bodies will have equal momentum
(d) A has more velocity than B

(xiv) **Three** monochromatic light rays are incident on a glass slab at the same angle of incidence **one by one**. If three incident rays are of colours **yellow**, **blue** and **green** respectively, then identify the colours of the emergent rays in order.



(a) A - Blue B - Green C - Yellow
(b) A - Blue B - Yellow C - Green
(c) A - Yellow B - Blue C - Green
(d) A - Yellow B - Green C - Blue

(xv) Which of the following lens would you prefer to use while reading small letters found in a dictionary ?
(a) A convex lens of focal length 50 cm.
(b) A concave lens of focal length 50 cm.
(c) A convex lens of focal length 5 cm.
(d) A concave lens of focal length 5 cm.

Question 2

(i) Complete the following by choosing the correct answers from the bracket: [6]

(a) The centrifugal force is ..... (a real force, the force of reaction of centripetal force, a fictitious force)

(b) If the amplitude of a sound wave is halved, its intensity becomes ..... (four times, one – fourth, 2 times)

(c) For a pure substance, the specific latent heat of fusion is ..... (same, less, more) as the specific latent heat of freezing.

(d) Foot treadle is an example of class ..... (I, II, III) lever.

(e) If a ray of light incident at an angle of incidence 48^0 on a prism of refracting angle 60^0 suffers minimum deviation, then the angle of minimum deviation is ..... (30^0, 36^0, 40^0)

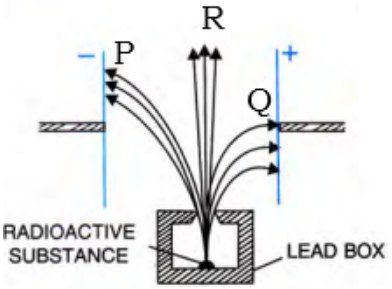
(f) The focal length of a thick convex lens is ..... (more than, less than, same as) that of a thin convex lens, if placed in the same medium.

(ii) Write any two **common** properties of electromagnetic waves. [2]

(iii) Observe the figure and answer the following questions: [2]

(a) Out of the two radiations P and Q, which one would cause more biological damage?

(b) Arrange the radiations P, Q and R in the increasing order of their ionising power.

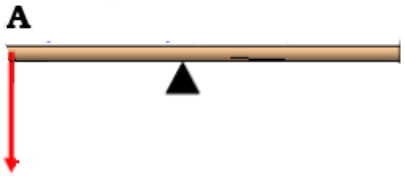


Question 3

(i) A stick is balanced on a point as shown in the figure and is kept horizontal by a force of 30 N hanging **from A** at a distance of 0.35 m from the pivot. If the weight of the stick is greater than 30 N, [2]

(a) Copy the diagram and mark the probable position of C.G. of a stick as G.

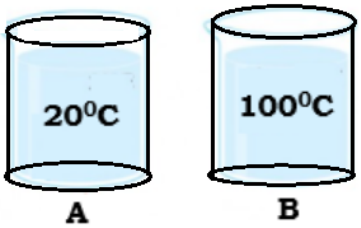
(b) If the fulcrum moves towards the C.G. then in which direction the stick will turn?



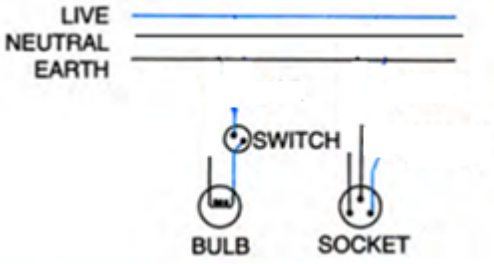
(ii) Find the power of an engine **in kW** required to lift 10^5 kg of coal per hour from a mine 360 m deep. (Take g = 10 m s^{-2}) [2]

(iii) Give reason: The vessel used for measurement of heat is made of a thin sheet of copper. [2]

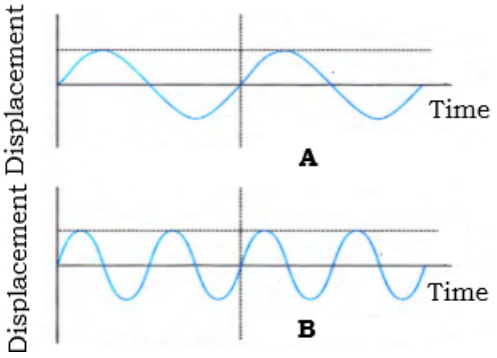
(iv) The diagram below shows two beakers **A** and **B** containing **same liquid,** being heated to two different temperatures. If the ray of light is enters from air to the liquid in both the beakers, then in which beaker does the light ray bend more? Justify your answer. [2]



(v) Copy the diagram given below and connect the electrical wires of electric bulb and three pin socket to complete the circuit. [2]



(vi) The figure shows the wave patterns of two tuning forks A and B. State one **similarity** and **difference** between these two waves. [2]



(vii) (a) A block and tackle has two pulleys in each block such that M.A. of the system is 5. Draw a neat diagram to show this arrangement. [3]

(b) In the system (a), if the load moves up by distance *x*, find by what distance will the free end of the string move up.

SECTION B

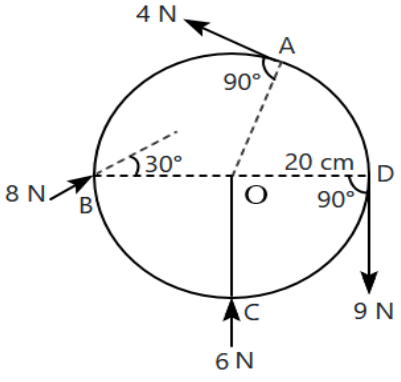
(*Attempt **any four** questions from this Section.*)

Question 4

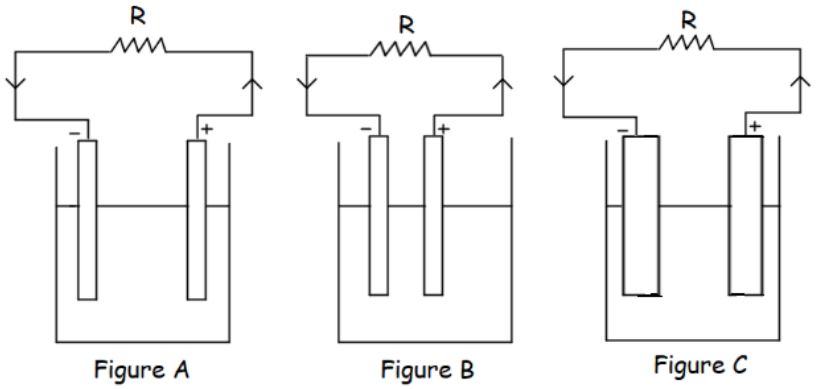
(i) A wheel of radius 20 cm is pivoted at its centre O as shown in the picture below. Then: [3]

(a) Which of the given forces will produce **maximum** torque about O?

(b) Calculate the torque produced by force 8N about O.



(ii) Figure A shows electric cell and figures B and C show some changes made in the original cell A. [3]



(a) Which factor will be **affected** by the changes made to the cell in figure A?

(b) How do the changes made in figures B and C affect the factor stated by you?

(iii) A vibrating tuning fork is placed over the mouth of a burette filled with water. The tap is opened and the water level gradually falls. It is observed that sound becomes the loudest for a particular length of the air column. [4]

(a) What is the name of the phenomenon taking place when this happens?

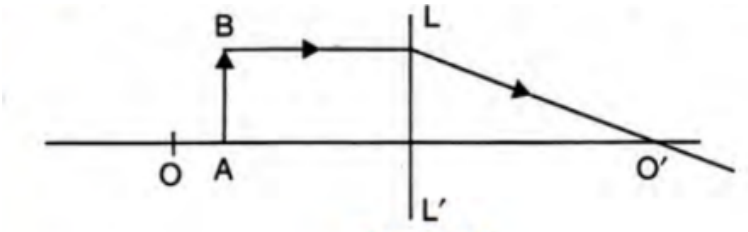
(b) Why does the sound become the loudest?

(c) What is the name of the phenomenon taking place when sound is produced for another length of air column and is not the loudest?

(d) If the water level in the burette falls further, will you notice the same observation again?

Question 5

(i) **Copy** and complete the diagram to form the image of the object AB. Name a device in which this action of the lens is used. [3]



(ii) A piece of ice at - 20^0C is heated at a constant rate and its temperature recorded at regular intervals till 100^0C. Draw a **temperature - time** graph to represent the change in phase. Label the different parts of your graph. [3]

(iii) A **uniform** chain of length 30 m has a mass of 0.3 kg. Two third part of the chain is on a frictionless table and one third part is vertically suspended as shown in the figure. [4]

Then calculate:

(a) the work done to bring the C.G of the **present hanging part** of the chain, up onto the corner of the table.

(b) the amount of force applied on the chain to pull the chain just completely on the table.

Take g = 10 m s^{-2}.

Question 6

(i) (a) How does specific resistance of a semi-conductor change with the increase in temperature? [3]

(b) Name the materials which are used for making standard resistors. Give reason to support your answer.

(ii) Calculate the power of an electric heater required to melt 1 kg of ice at 0^0C in 30 s if the efficiency of the heater is 40%. Specific latent heat of ice = 336 J g^{-1}. [3]

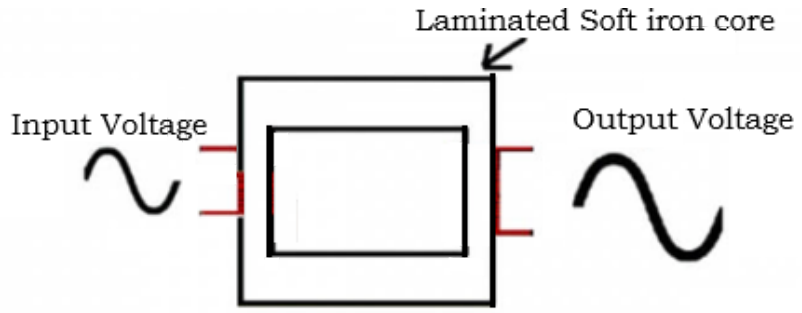
(iii) Study the picture given below and answer the questions: [4]

(a) Identify the electric device shown in the picture.

(b) Name the principle on which this device works.

(c) If the a.c. input is replaced by d.c, then what will be the impact on the output voltage? Give reason to support your answer.

(d) Why is the soft iron core used in this device laminated?



Question 7

(i) The body of mass m is thrown vertically upward under gravity with some initial velocity u. After some time interval t, body reaches its maximum height h and falls back to the ground. Then: [3]

(a) How are the quantities u and h are related to each other?

(b) What assumption have you made in part (a)?

(ii) A wave has a wavelength 10^{-3} nm. [3]

(a) Name the wave.

(b) State its one property different from other electromagnetic waves.

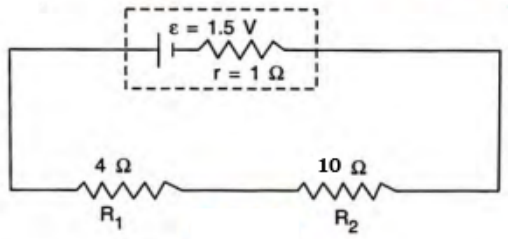
(c) State its one use.

(iii) A cell of e.m.f. 1.5 V, internal resistance 1 Ω is connected to the resistors of 4 Ω and 10 Ω in series. Calculate: [4]

(a) the current through 10 Ω resistor.

(b) the voltage drop across cell when the current is flowing

(c) terminal voltage



Question 8

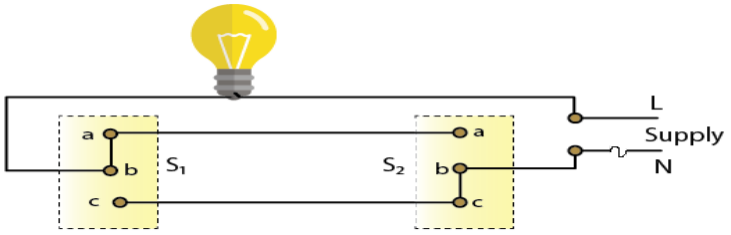
(i) The circuit diagram below shows dual control switch to start a staircase electric light in off condition. [3]

Copy the diagram and show the circuit in the ON condition when

(a) switch S_1 is operated

(b) switch S_2 is operated

(c) Identify and write the error in the given diagram.



(ii) An object of height 4 cm is placed at a distance 24 cm in front of a convex lens of focal length 8 cm. Find the position and the size of the image. [3]

(iii) Answer the following questions: [4]

(a) Copy and complete the following nuclear fission reaction:

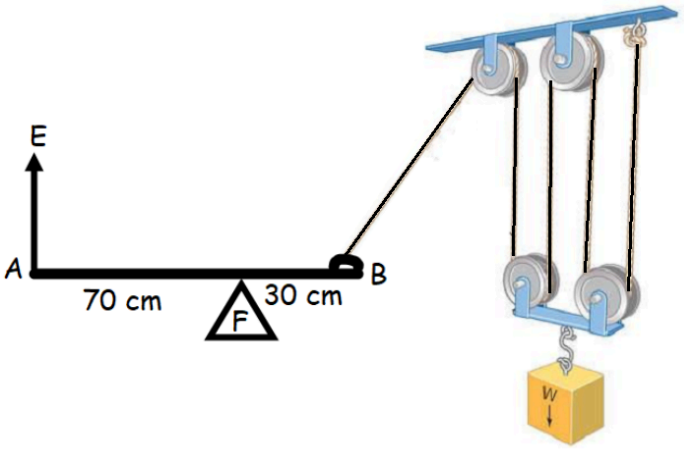
$$^{235}_{92}U + {}^{1}_{0}n \rightarrow {}^{\cdots\cdots}_{57}La + {}^{85}_{\cdots\cdots}Br + {}^{1}_{\cdots\cdots 0}n + energy$$

(b) What is another name given to nuclear fusion? Give a reason.

Question 9

(i) A boy stands 102 *m* in front of a wall and claps. The boy continues to clap every time an echo is heard. Another boy finds that the time between the first and the thirty first clap is 18s. Calculate the speed of the sound in the air. [3]

(ii) The diagram below shows the combination of pulleys with the lever. If the efficiency of the block and tackle system is 90% and weight of metallic block is 72 N, then calculate the effort **E** required at **end A** to lift the metallic block. [3]



(iii) Figure shows the section of a semi-circular glass slab having its centre at O. Three rays of light A, B and C of the same colour are incident on the slab and strike on the edge XY at the point O. The light ray B suffers refraction along OB'. [4]

(a) **Copy** the diagram and show the critical angle by C'.

(b) Draw the path of rays A and C after they strike the edge XY.

(c) Name the phenomenon which ray C exhibits.