

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 answers.

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) (i) Define the least count of an instrument. [2]
- (ii) What is the least count of a standard laboratory micrometer screw gauge?
- (b) A spring balance is used to find the weight of a body X on the surface of the moon. The mass of the body X is 2 kg and its weight is recorded as 3.4 N. The weight of another body Y recorded by the same balance is found to be 7.65 N. Calculate the mass of the body Y. [2]
- (c) State two differences between mass and weight. [2]
- (d) Two pendulums P and Q have equal lengths but their bobs weigh 10gf and 20gf respectively. [2]
- (i) Compare their time periods.
- (ii) Give a reason for your answer.
- (e) Why do we need to run a certain distance before getting into a moving bus? [2]
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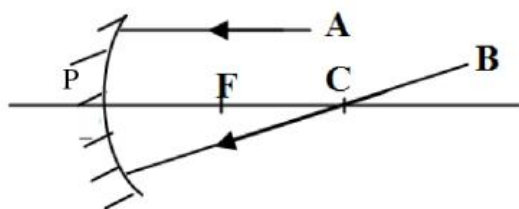
This Paper consists of 7 printed pages.

Question 2

- (a) Copy the diagram below and clearly mark the directions of the forces that act on it and name the forces. [2]



- (b) If I travel from Mumbai to Pune (150 Km) in $2\frac{1}{2}$ hrs via the Express Highway and return to Mumbai via the old High way (180 km) in $3\frac{1}{2}$ hrs, calculate the average velocity during the entire journey. [2]
- (c) Define retardation and give an example of a body having this motion. [2]
- (d) Copy the diagram and complete the path of the rays A and B. [2]



- (e) State the purpose of using the following in an electric circuit. [2]
- (i) Ammeter
 - (ii) Rheostat

Question 3

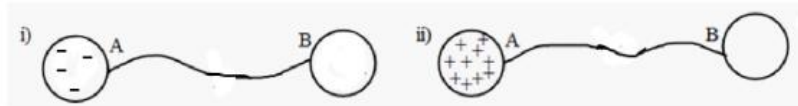
- (a) A sound wave of frequency 500Hz and wavelength 0.66m is travelling in a medium. Calculate the velocity of the wave in the medium. [2]
- (b) Sound waves A & B are travelling in two different media. Find which wave will be travelling faster, when: [2]
- (i) A is travelling in water and B is travelling in CO_2 .
 - (ii) A is travelling in CO_2 and B is travelling in hydrogen

Also support your answers with reasons.

- (c) A body is completely immersed in a fluid. [2]

State two factors on which the upthrust acting on the body depends.

- (d) A and B are two metal spheres which are connected with the help of a metal wire. State the direction of flow of electrons in each case. [2]



- (e) Why do we use a convex mirror as a rear view mirror? [2]

Question 4

- (a) State two differences between an electromagnet and a permanent magnet. [2]
- (b) Why does a magnet suspended freely from its CG, always come to rest along the north south direction of the earth? [2]
- (c) State the second law of Thermodynamics in energy flow (Law of conservation of energy). [2]
- (d) Name and state the principle on which the hydraulic brakes of a car work. [2]
- (e) State two main human activities which are responsible for the increase of carbon dioxide gas in the atmosphere. [2]

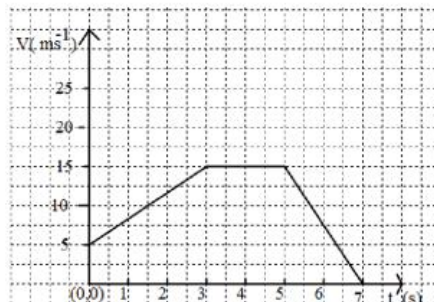
SECTION II (40 Marks)

*Attempt any **four** questions from this Section*

Question 5

- (a) A train is moving at a velocity of 25 ms^{-1} . It is brought to rest by applying the brakes which produces a uniform retardation of 0.5 ms^{-2} . Calculate [3]
- (i) the velocity of the train after 10 s
- (ii) If the mass of the train is 20000 kg then calculate the force required to stop the train.

- (b) (i) State the universal law of gravitation. [3]
- (ii) Express it in a mathematical form. (Explain the symbols used.)
- (iii) State the value of universal gravitation constant in S.I. unit.
- (c) Using the following velocity time graph of a body answer the following questions. [4]



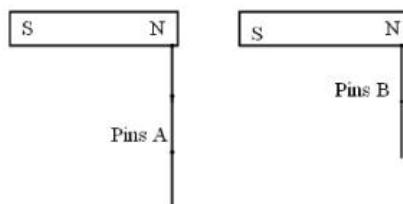
- (i) During which time intervals is the body moving with variable velocity?
- (ii) What is the acceleration of the body during the interval 3 s to 5 s?
- (iii) What is the displacement of the body in the last four seconds of its motion?

Question 6

- (a) (i) Differentiate between the terms supersonic and ultrasonic. [3]
- (ii) State two uses of ultrasound.
- (b) State three factors on which the speed of sound depends. [3]
- (c) The speed of sound in air is 320 ms^{-1} and in water it is 1600 ms^{-1} . It takes 2.5 s [4]
for sound to reach a certain distance from the source placed in air.
- (i) Find this distance.
- (ii) How much time will it take for sound to travel the **same distance** when the source is in water?

Question 7

- (a) The diagrams below show pins suspended from the same magnet to their maximum limit in two different cases. State with a reason whether the set of pins A or the set of pins B are made out of soft iron. Also define the magnetic process which enables us to suspend the pins one below the other. [3]



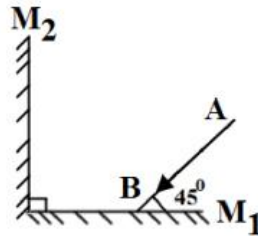
- (b) (i) Define a secondary cell. [3]
(ii) Give one example of a secondary cell.
(iii) State one advantage of a secondary cell over a primary cell.
- (c) (i) Define a neutral point. [4]
(ii) In the diagram below AB is a magnet and CD is an iron bar.
Study the diagram and determine the polarities at the ends A, B and D.



Question 8

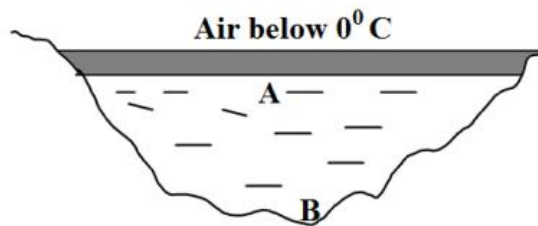
- (a) The area of pistons in hydraulic machine are 6 cm^2 and 576 cm^2 . What force on the smaller piston will support a load of 1152 N on the larger piston? [3]
State the assumption made in the above calculation.
- (b) (i) Define global warming. [3]
(ii) State two ways by which global warming impacts on life on earth.

- (c) Complete the path of the ray AB over plane mirrors M_1 and M_2 and label all the angles of incidences. [4]



Question 9

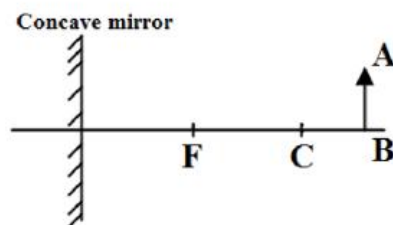
- (a) (i) Why does a piece of steel sink in water but float on mercury? [3]
- (ii) If a bowl is formed from the same steel piece then it can float in water. Why?
- (b) The diagram below shows a frozen pond in a cold region. [3]
- (i) State the expected temperatures at A and B.
- (ii) Name the phenomenon responsible for these temperatures mentioned in part (i)



- (c) A metal piece weighs 200 gf in air and 150 gf when completely immersed in water. [4]
- (i) Calculate the relative density of the metal piece.
- (ii) How much will it weigh in a liquid of density 0.8 gcm^{-3} ?

Question 10

- (a) Copy and complete the following ray diagram to obtain the image of the object AB kept in front of the concave mirror. [3]



- (b) An object of height 20 cm is kept at a distance of 48 cm in front of a mirror of focal length 12 cm. If the mirror forms a virtual, diminished image of the object then calculate [3]

- (i) the distance of the image from the mirror.
- (ii) its magnification.

- (c) Study the diagram below and [4]

- (i) Identify the electrical components labelled A, B and C.
- (ii) State whether the circuit given below is open or closed.

