STD: IX                                                                                              Marks: 80
Date: 03/10/2024                                                                            Time: 2 hrs

## Section-1

### (Attempt all questions from this section)

**Question 1   Choose the correct answers to the questions from the given options.**

**(Do not copy the question, write the correct answers only.)              [15]**

i.      Which of the following is not a fundamental unit?
        (a) Second            (b) Ampere           (c) Candela          (d) Newton

ii.     Unit of thrust in SI system is
        (a) dynes             (b) joule            (c) $N/m^2$          (d) newton

iii.    When a body is floating in a liquid:
        (a) The weight of the body is less than the upthrust due to immersed part of the body
        (b) The weight of body is more than the upthrust due to the immersed part of the body
        (c) The weight of body is equal to the upthrust due to the immersed part of the body
        (d) none of the above

iv.     The ratio between the mass of a substance and the mass of an equal volume of
        water at 4°C is called:
        (a)  relative density  (b)  density        (c)  weight          (d)  pressure

v.      Which of these will produce the maximum acceleration?
        (a) A force of 1000 N acting on a mass of 10 kg
        (b) A force of 3000 N acting on a mass of 10 kg
        (c) A force of 1000 N acting on a mass of 5
        (d) A force of 3000 N acting on a mass of 30 kg

vi.     A piece of wood is held under water. The upthrust on it will be:
        (a) Equal to the weight of wood piece.    (b) Less than the weight of wood piece.
        (c) More than the weight of wood piece.  (d) Zero.

vii.    The unit torr is related to the barometric height as:
        (a)     1 torr = 1cm of Hg                      (b)     1 torr = 0.76 m of Hg
        (c)     1 torr = 1 mm of Hg                     (d)     1 torr = 1 m of Hg

**viii.** A man sitting in a train in motion is facing the engine. He tosses a coin up, the coin falls behind him. The train is moving:
(a) Forward with uniform speed         (b) Backward with uniform speed
(c) Forward with acceleration           (d) Forward with retardation

**ix.** China and glass wares are packed with soft material when transported. This is done to:
(a) Increase impulse                (b) Reduce Impulsive force
(c) For cost cutting                 (d) None of these

**x.** The unit of the physical quantity obtained from the slope of acceleration v/s time graph is

(a) m/s          (b) $m/s^2$          (c) $m/s^3$         (d) None of these

**xi.** Calculate the change in displacement from the given graph.
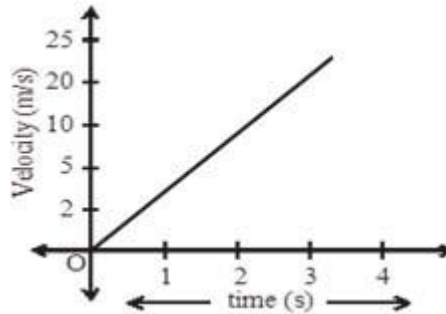


(a) 25m          (b) 50m          (c) 75m         (d) 100m

**xii.** The absolute zero on Celsius scale is:
(a) 0°C          (b) -32°C        (c) 100°C       (d) -273°C

**xiii.** 45°C equals to:
(a) 77°F          (b) 318 K        (c) 45 K         (c) 8° F

**xiv.** The energy enters in the food chain through:
(a) Primary consumers            (b) Producers
(c) Secondary consumers         (d) Tertiary consumers

**xv.** The place of human being in food chain in ecosystem is as:
(a) Producer     (b) consumer     (c) Decomposer     (d) Both (a) & (b)

**Question 2**

**a.** A solid weighs 0.08 kgf in air and 0.065 kgf in water. Find
(1) R.D. of solid
(2) Density of solid in SI system. [Density of water = 1000 kgm $^{-3}$]                    **[2]**

**b.** An iceberg floats in sea water of density 1.17 g cm $^{-3}$, such that 2/9 of its volume is above sea water. Find the density of iceberg.                    **[2]**

**c.** Define retardation and give an example of a body having this motion.                    **[2]**

**d.** Copy the diagram below and clearly mark the directions of the forces that act on it and name the forces.                    **[2]**

**e.** State the second law of thermodynamics in energy flow.                    **[2]**

**f.** In a hydraulic machine, a force of 2N is applied on the piston of area of cross-section 10 cm$^2$. What force is obtained on its piston of area of cross-section 100 cm$^2$?                    **[2]**

**g.** State briefly how and why the atmospheric pressure of a place varies with the altitude. Draw an approximate graph to illustrate this variation.                    **[3]**
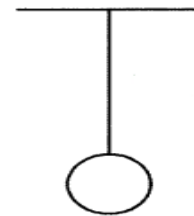
**Question 3**

**a.** Calculate the equivalent height of mercury, which will exert as much pressure as 680 m of sea water of density 1040 kgm$^{-3}$. Density of mercury is 13600 kgm$^{-3}$.                    **[2]**

**b.** A wooden block is weighed with iron, such that combination just floats in water at room temperature. State your observations when:
(1)    water is heated above room temperature
(2)    water is cooled below 4°C. Give reasons to your answers in (1) and (2).                    **[2]**

**c.** Distinguish between heat and temperature.                    **[2]**

**d.** Express the (i) angstrom, and (ii) micron in metre.                    **[2]**

**e.** Explain, why does a glass bottle completely filled with water and tightly capped burst when placed in a freezer?                    **[2]**

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**Section – II**
**(Attempt any four questions from this section)**

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**Question 4**

**a.** Why is the weight of an object on the moon 1/6th its weight on the earth?                    **[2]**

**b.** A car is moving with a uniform velocity of 30m/s. It is stopped in 2s by applying a force of 1500N through its brakes. Calculate:                    **[2]**

**c.** **i.** How does the force of gravitation between two objects change when the distance between them is reduced to half?

**ii.** A sphere of iron and another of wood of the same radius are held under water. Compare the upthrust on the two spheres.

**iii.** Compare the time period of two pendulums of length 1 m and 9 m. **[3]**

**d.** **(i)** State the universal law of gravitation.

**(ii)** Express it in a mathematical form. (Explain the symbols used.)

**(iii)** State the value of universal gravitation constant in S.I. unit. **[3]**
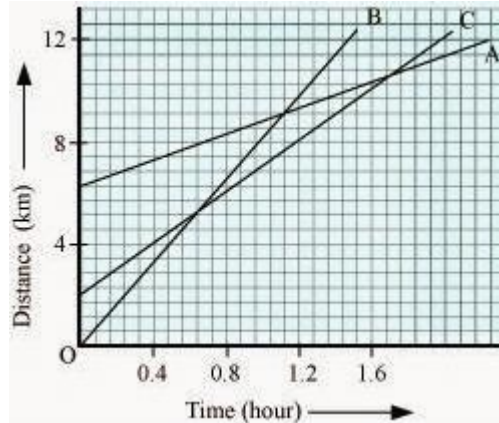
## Question 5

**a.** When will you say a body is in (i) uniform acceleration? (ii) Non-uniform acceleration? **[2]**

**b.** A student measures the length of a line with an (ordinary) meter scale and quotes his result as 15.78 cm. Is this result acceptable? **[2]**

**c.** A pile of books is kept on a cardboard sheet on a table. If the cardboard sheet is suddenly withdrawn, what happens to the pile, and why? **[2]**

**d.** A ball thrown up vertically returns to the thrower after 6 s. Find

(a) the velocity with which it was thrown up,

(b) the maximum height it reaches, and

(c) its position after 4 s. **[4]**

## Question 6

**a.** Fill in the blanks:
  **(i)** The velocity-time graph of a particle in uniform motion is a straight line ………… to the time axis.
  **(ii)** The time-distance graph of a particle in uniform motion is a straight line ………… to the time axis. **[2]**

**b.** State the weather forecast in the following situations:
  (i) Air is humid and barometer pressure falls suddenly.
  (ii) Barometric pressure rises steeply. **[2]**

**c.** The bob of a simple pendulum is hollow with a pinhole at its lower end. It is filled with water and allowed to oscillate. How does its time period vary with time? **[2]**

**d.** A solid of density 2700 kg m$^{-3}$ and of volume 0.0015 m$^3$ is completely immersed in alcohol of density 800 kg m$^{-3}$. Calculate:
  i. Weight of solid in SI system.
  ii. Upthrust on solid in SI system.
  iii. Apparent weight of solid in alcohol.
  iv. Will the apparent weight of solid be less or more, if it is immersed completely in brine solution? Give a reason, [g = 10 ms$^{-2}$] **[4]**

4

**Question 7**

a.     Obtain the relationship between S.I. and C.G.S. units of force.          **[3]**

b.     Mention three uses of velocity time graphs.                               **[3]**

C.     Shows the distance-time graph of three objects A, B and C. Study the graph and answers the following questions:



(a) Which of the three is travelling the fastest?

(b) Are all three ever at the same point on the road?

(c) How far has C travelled when B passes A?

(d)How far has B travelled by the time it passes C?                             **[4]**

**Question 8**

a.     Using the following velocity time graph of a body answer the following questions.     **[3]**
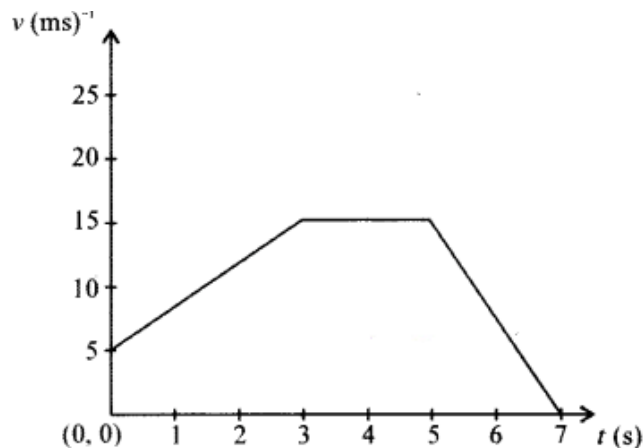


(i)     During which time intervals is the body moving with variable velocity?

(ii)    What is the acceleration of the body during the interval 3s to 5s?

(iii)   What is the displacement of the body in the last 2 seconds of its motion?

**b.** The diagram below shows a frozen pond in a cold region.

    (i)     State the expected temperatures at A and B.

    (ii)    Name the phenomenon responsible for these temperatures mentioned in part (i). **[3]**



Air below 0°C
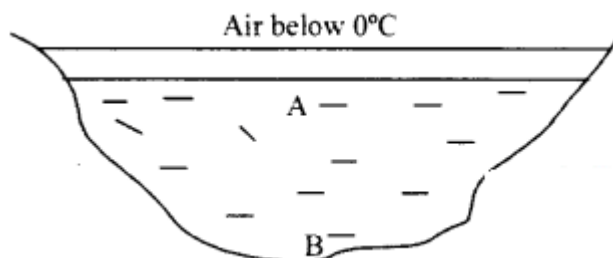
**c.** The table below shows the distance, in cm, travelled by objects A, B and C during each second:

| Time | Distance (in cm) covered each second by A, B and C | | |
|---|---|---|---|
| | Object A (cm) | Object B (cm) | Object C (cm) |
| 1$^{st}$ second | 20 | 20 | 20 |
| 2$^{nd}$ second | 20 | 36 | 60 |
| 3$^{rd}$ second | 20 | 24 | 100 |
| 4$^{th}$ second | 20 | 30 | 140 |
| 5$^{th}$ second | 20 | 48 | .180 |

    (i)    Select the object which is moving with constant speed. Give reason for your choice.

    (ii)    Select the object which is moving with a constant acceleration. What is the value this acceleration?

    (iii)    Select the object which is moving with a variable acceleration.

    (iv)    Find how much distance each of the objects A, B and C cover in 5 seconds.    **[4]**

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