

Self Assessment Paper

All questions are compulsory.

This question paper is divided into 4 Sections, A, B, C and D as follows :

Section A

Question number 1 is of twelve marks. All parts of this question are compulsory.

Section B

Question numbers 2 to 12 carry 2 marks each with two questions having internal choice.

Section C

Question numbers 13 to 19 carry 3 marks each with two questions having internal choice.

Section D

Question numbers 20 to 22 are long-answer type questions and carry 5 marks each. Each question has an internal choice.

The intended marks for questions are given in brackets [].

All working, including rough work, should be done on the same sheet as and adjacent to the rest of the answer.

Answers to sub parts of the same question must be given in one place only. A list of useful physical constants is given at the end of this paper.

A simple scientific calculator without a programmable memory may be used for calculations.

SECTION- A

Answer all questions.

1. (A) Choose the correct alternative (a), (b), (c) or (d) for each of the questions given below : 5 × 1
- (i) The dimensional formula of mc^2 is :
(a) $[MLT^{-1}]$ (b) $[ML^2T^{-2}]$
(c) $[ML^2T^{-1}]$ (d) $[ML^2T^2]$
- (ii) A train is 100 m long and is moving with a uniform velocity of 54 km/h. The time taken by it to cross the bridge 150 m long is :
(a) 10 s (b) 50/3 s
(c) 20/3 s (d) None of these
- (iii) A block of mass 2.0 kg is on a horizontal plane of coefficient of friction 0.5. By applying 6.0 newton force on it, frictional force will be ($g = 10 \text{ m/s}^2$).
(a) 10 newton (b) 6 newton
(c) 16 newton (d) 4 newton
- (iv) When water freezes the distance between its molecules :
(a) decreases (b) increases
(c) remain unchanged (d) becomes zero

(v) The radius of gyration of a spherical shell about its diameter is :

(a) $\sqrt{\frac{5}{3}} R$

(b) $\sqrt{\frac{3}{5}} R$

(c) $\sqrt{\frac{2}{5}} R$

(d) $\sqrt{\frac{2}{3}} R$

(B) (Answer the following questions briefly and to the point :)

7 × 1

- (i) Two particles of same mass are revolving in circular paths having radii r_1 and r_2 with the same speed. Compare their centripetal forces.
- (ii) Under what condition the sum and difference of two vectors will be equal in magnitude ?
- (iii) What is the order of mass of our universe ?
- (iv) What is the location of the centre of mass of a uniform triangular lamina ?
- (v) Write the coefficient of thermal conductivity of a perfect heat conductor and that of a perfect heat insulator.
- (vi) What is called reciprocal of bulk modulus of elasticity ?
- (vii) Explain the meaning of force-constant of a spring.

SECTION- B

Answer *all* questions.

- 2. Subtract 98.767 gm from 172.4 kg giving the result in appropriate significant figures. 2
- 3. Find the dimensions of the constants $a \times b$ in the relation $E = (b - x^2)/at$, where E is energy x is distance and t is time. 2
- 4. Why is it difficult to walk on sand or ice ? 2
- 5. (a) Nuclear fission and fusion are examples of conversion of mass into energy. Is strictly speaking mass converted into energy even in an exothermic chemical reaction ? 2

OR

- (b) What percentage of kinetic energy of a moving particle is transferred to a stationary particle it strikes when the stationary particle has a mass (a) 19 times (b) equal to (c) 1/19 times the mass of the moving particle ? 2
- 6. Explain in detail the state of weightlessness of a person inside an artificial satellite. 2
- 7. Two wires P and Q are equally thick and made of the same material but the length of P is twice that of Q. 2
 - (a) Which wire will have a greater extension for a given load ?
 - (b) Which one will undergo a greater strain ?
- 8. To empty an oil tin, two holes are made, why ? 2
- 9. (a) What do you understand by cyclic process ? 2

OR

- (b) What do you mean by internal energy (U) of a gas ? 2
- 10. A body with large reflectivity is a poor emitter. Explain. 2
- 11. The length of an organ pipe open at both ends is 0.5 m. Calculate the fundamental frequency of the pipe, if the velocity of sound in air be 350 m/s. If one end of the pipe is closed then what will be the fundamental frequency ? 2
- 12. What do you understand by restoring force acting on a vibrating body. Give one example. 2

SECTION- C

Answer *all* questions.

- 13. (a) What is a plane progressive simple harmonic wave ? Establish equation for this wave in two different forms. 3

OR

- (b) A string of mass 2.50 kg is under a tension of 200 N. The length of the stretched string is 20.0 m. If a transverse jerk is struck at one end of the string of how long does the disturbance take to reach the other end ? 3

Sample Question Papers

3

14. Distinguish between Centrifugal and centripetal forces. Give examples. 3
15. Explain why friction is a necessary evil. Show that pulling is easier than pushing of a roller ? 3
16. What are conservative and non - conservative forces ? Explain with examples. Mention some of their properties. 3
17. (a) A ring of radius α m weighs 100 kg. It rolls on a horizontal floor so that its centre of mass has a speed of 20 cm/s. How much work has to be done to stop it ? 3
- OR**
- (b) Define angular momentum, write its unit and obtain relation for angular momentum in terms of moment of inertia and angular velocity. 3
18. Define 'coefficient of thermal conductivity' and state its SI unit and dimensions. 3
19. Three students obtained the following three sets of C_P and C_V for a gas. Which one of these is most reliable? All values are in $\text{cal mol}^{-1} \text{K}^{-1}$. 3
- (i) $C_P = 5.0, C_V = 3.0$
- (ii) $C_P = 6.0, C_V = 4.0$
- (iii) $C_P = 4.2, C_V = 3.0$

SECTION- D

Answer *all* questions.

20. (a) Define frictional force and explain it by taking an example. Plot a graph of frictional force against applied force and explain why kinetic friction is lesser than static friction. 5
- OR**
- (b) An aeroplane of mass 10,000 kg requires a speed of 20 ms^{-1} for take-off run of 100 m on the ground. The coefficient of kinetic friction between the wheels of the plane and ground is 0.3. Assume that the plane accelerates uniformly during the take off. Determine the minimum force required by the engine of the plane to take off ($g = 10 \text{ ms}^{-2}$).
21. (a) Two bodies of masses m_1 and m_2 moving with velocity u_1 and u_2 respectively in the same direction collide with each other elastically. Calculate their velocities after the collision. Discuss what happens when 5
- (i) Both the colliding bodies have the same mass.
- (ii) One of the bodies is initially at rest.
- (iii) A light body collides with a heavy body at rest
- (iv) A heavy body collides with a light body at rest
- OR**
- (b) A body falls on the ground from a height of 10 m and rebounds to a height of 2.5 m calculate (i) the percentage loss of kinetic energy of the body during its collision with the ground (ii). The ratio of the velocities of the body just before and just after the collision. 5
22. (a) Define longitudinal stress and lateral strain and show that work done per unit volume of a stretched wire is $\frac{1}{2}$ stress $\times$ strain. 5
- OR**
- (b) The Marina trench is located in the pacific ocean and at one place it is nearly eleven k.m. beneath the surface of water. The water pressure at the bottom of the trench is about $1.1 \times 10^8 \text{ Pa}$. A steel ball of initial volume 0.32 m^3 is dropped into the ocean and falls to the bottom of the trench. What is the change in the volume of the ball when it reaches the bottom ? Bulk modulus of steel is 160 GPa. 5

Finished Solving the Paper ?
 Time to evaluate yourself !
<https://qrgo.page.link/zVLE4>

OR

SCAN THE CODE



For elaborate Solutions

OSWAAL COGNITIVE LEARNING TOOLS



