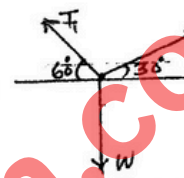


Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

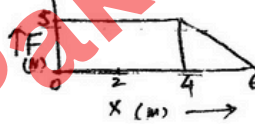
- 1) In general, the conditions for different orders of minima on either side of centre are given by $d \sin \theta = m \lambda$. Here 'm' is.
(A) $m = \pm(1, 2, 3, 4, \dots)$ (B) $m = \pm(0, 1, 2, 3, 4, \dots)$ (C) $m = 0, 2, 4, 6, 8, \dots$ (D) $m = 1, 3, 5, 7, \dots$
- 2) The speed of light in water is
(A) $2 \times 10^8 \text{ ms}^{-1}$ (B) $2.25 \times 10^8 \text{ ms}^{-1}$ (C) $2.75 \times 10^8 \text{ ms}^{-1}$ (D) $3 \times 10^8 \text{ ms}^{-1}$
- 3) The change in entropy of the system is important. This statement is just like.
(A) Potential energy and Kinetic energy (B) Kinetic energy and internal energy (C) Potential energy and internal energy (D) Potential energy, Kinetic energy and internal energy
- 4) The percentage loss in efficiency in petrol engine is
(A) 70 % to 75% (B) 60 % to 65% (C) 25 % to 30% (D) 35 % to 40%
- 5) 73.650 and 64.350 can be rounded off as
(A) 73.7 and 64.3 (B) 73.6 and 64.4 (C) 73.8 and 64.2 (D) 73.5 and 64.2
- 6) A number such as $5.0 \times 10^4 \text{ cm}$ can be expressed in scientific notation as
(A) $5.0 \times 10^2 \text{ m}$ (B) $5.0 \times 10^6 \text{ m}$ (C) $5.0 \times 10^4 \text{ cm}$ (D) $5.0 \times 10^{-2} \text{ cm}$

- 7) If $T_1 = 10 \text{ N}$ and $T_2 = 20 \text{ N}$. What is the value of weight in the fig.



- (A) 10 N (B) 30 N (C) 18.66 N (D) 8.60 N
- 8) What is the angle for which the values of cross product of two vectors becomes half of original value.
(A) 90° (B) 60° (C) 45° (D) 30°
- 9) At which angle, the height and range of projectile becomes equal.
(A) 76° (B) 66° (C) 56° (D) 46°
- 10) When a car is moving in a circle then its
(A) v and a are parallel (B) v and a are anti parallel (C) v and a are perpendicular to one another (D) v is zero but a is not zero

- 11) What is the work done in this fig



- (A) 5 J (B) 15 J (C) 20 J (D) 25 J
- 12) A satellite of orbital velocity 7.9 kms^{-1} is taking _____ to complete its circle around Earth.
(A) 5668 seconds (B) 84 Seconds (C) 84 minutes (D) 5060 minutes
- 13) When lift is moving upward, then what is the reason of varying weight of a body.
(A) Acceleration of system becomes more than gravity (B) Acceleration of system is added in gravity (C) Acceleration of system is subtracted from gravity (D) Acceleration of system becomes zero
- 14) The speed of efflux when fluid is falling through the height 5m. Take $g = 10 \text{ ms}^{-2}$
(A) 0.5 ms^{-1} (B) 1.0 ms^{-1} (C) 5 ms^{-1} (D) 10 ms^{-1}
- 15) What is the frequency of an object vibrating at the end of a spring, if the equation for its position is $x = 0.25 \cos\left(\frac{\pi}{2}t\right)$
(A) 1.0 Hz (B) 0.5 Hz (C) 0.25 Hz (D) 0.1 Hz
- 16) Laplace consider γ for _____ gas for 333 ms^{-1} speed of sound.
(A) Monoatomic (B) Diatomic (C) Polyatomic (D) Subatomic
- 17) For 10°C rise in temperature, the speed of sound becomes.
(A) 6.1 ms^{-1} (B) 0.61 ms^{-1} (C) 332.1 ms^{-1} (D) 338.1 ms^{-1}

Time Allowed: 2.40 hours Section ----- I

Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:-

8 × 2 = 16

SGD-11-1-23

- (i) What are conditions for a fluid to be ideal?
- (ii) How many years are in one second? How many seconds are there in one year?
- (iii) Give the drawbacks to use the period of pendulum as a time standard.
- (iv) What are supplementary units? Explain any one. (v) What is rounding off data? Explain.
- (vi) Can a body rotate about its centre of gravity under the action of its weight?
- (vii) Name the three different conditions that could make $\vec{A}_1 \times \vec{A}_2 = \vec{0}$
- (viii) Can the scalar product of two vectors be negative? (ix) State law of conservation of linear momentum.
- (x) Draw the velocity-time graph for uniformly retarded motion.
- (xi) What happens to KE of a fired bullet when it penetrates into a target?
- (xii) At What angle of projection, range and vertical height of a projectile are equal?

3. Answer briefly any Eight parts from the followings:-

8 × 2 = 16

- (i) What is meant by solar constant?
- (ii) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?
- (iii) In which case is more work done when a 50 kg bag of books is lifted through 50 cm, or when a 50 kg crate is pushed through 2m across the floor with a force of 50 N. (iv) Show that $S = r\theta$.
- (v) Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission.
- (vi) What is meant by angular momentum? (vii) Define SHM and give its formula for acceleration.
- (viii) Explain the relation between the total energy, potential energy and kinetic energy of a body in SHM.
- (ix) What is the total distance travelled by an object moving with SHM in a time equal to the period, if its amplitude is A.
- (x) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C.
- (xi) What features do longitudinal waves have in common with transverse waves?
- (xii) Explain the terms (i) trough (ii) antinode.

4. Answer briefly any Six parts from the followings:-

6 × 2 = 12

- (i) How is the distance between interference fringes affected by the separation between the slits of Young's experiment?
- (ii) Could you obtain Newton's rings with transmitted light? If yes, would the pattern be different from that obtained with reflected light? (iii) Define wave front and a ray of light.
- (iv) Explain the difference between angular magnification and resolving power of an optical instrument.
- (v) Define critical angle and which formula is used to find critical angle? (vi) State Carnot theorem.
- (vii) Is it possible to convert internal energy into mechanical energy? Explain with an example.
- (viii) A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?
- (ix) As we know $PV^\gamma = \text{Constant}$. What do you know about " γ " (gamma) in this relation?

Note: Attempt any three questions.

Section ----- II

(8 × 3 = 24)

5. (a) Define and explain dot product of two vectors. Give two examples and write down its four characteristics.
(b) Ten bricks, each 6.0 cm thick and mass 1.5 kg, lie flat on a table. How much work is required to stack them one on the top of another?
6. (a) Define rotational kinetic energy. Also derive the expression for rotational K.E of a disc and a hoop moving down from the top of an inclined plane.
(b) Find the angle of projection of a projectile for which its maximum height and horizontal range are equal.
7. (a) Define terminal velocity and prove that $v_t = \frac{2gr^2\rho}{9\eta}$
(b) Estimate the average speed of nitrogen molecules in air under standard conditions of pressure and temperature.
8. (a) What is Simple Pendulum, Show that its motion is SHM. Derive an expression for its time period.
(b) Find the temperature at which the velocity of sound in air is two times its velocity at 10°C
9. (a) Describe the Young's double slit experiment for demonstration of interference of light. Derive an expression for fringe spacing.
(b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses.