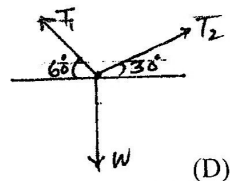
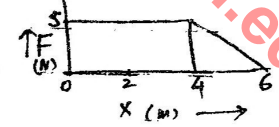


Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write PAPER 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

- 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)  $m = 1, 3, 5, 7, \dots$
- 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)  $3 \times 10^8 \text{ ms}^{-1}$
- 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
- 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%
- 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
- 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)  $5.0 \times 10^{-2} \text{ cm}$

- If  $T_1 = 10\text{N}$  and  $T_2 = 20\text{N}$ . What is the value of weight in the fig.   
 (A) 10N (B) 30N (C) 18.66N (D) 8.60N
- What is the angle for which the values of cross product of two vectors becomes half of original value.  
 (A)  $90^\circ$  (B)  $60^\circ$  (C)  $45^\circ$  (D)  $30^\circ$
- At which angle, the height and range of projectile becomes equal.  
 (A)  $76^\circ$  (B)  $66^\circ$  (C)  $56^\circ$  (D)  $46^\circ$
- 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

- What is the work done in this fig   
 (A) 5 J (B) 15 J (C) 20 J (D) 25 J
- A satellite of orbital velocity  $7.9 \text{ kms}^{-1}$  is taking \_\_\_\_\_ to complete its circle around Earth.  
 (A) 5668 seconds (B) 84 Seconds (C) 84 minutes (D) 5060 minutes
- 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
- The speed of efflux when fluid is falling through the height 5m. Take  $g = 10 \text{ ms}^{-2}$   
 (A)  $0.5 \text{ ms}^{-1}$  (B)  $1.0 \text{ ms}^{-1}$  (C)  $5 \text{ ms}^{-1}$  (D)  $10 \text{ ms}^{-1}$
- What is the frequency of an object vibrating at the end of a spring, if the equation for its position is  $x = 0.25 \cos\left(\frac{\pi}{2}\right)t$   
 (A) 1.0 Hz (B) 0.5 Hz (C) 0.25 Hz (D) 0.1 Hz
- Laplace consider  $\gamma$  for \_\_\_\_\_ gas for  $333 \text{ ms}^{-1}$  speed of sound.  
 (A) Monoatomic (B) Diatomic (C) Polyatomic (D) Subatomic
- For  $10^\circ\text{C}$  rise in temperature, the speed of sound becomes.  
 (A)  $6.1 \text{ ms}^{-1}$  (B)  $0.61 \text{ ms}^{-1}$  (C)  $332.1 \text{ ms}^{-1}$  (D)  $338.1 \text{ ms}^{-1}$

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

Maximum Marks: 68

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

8 × 2 = 16

- (i) What are conditions for a fluid to be ideal? SGD-11-1-23  
(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 " $\gamma$ " (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.

Warning:- Please write your Roll No. in the space provided and sign. Roll No. \_\_\_\_\_  
(Inter Part – I) (Session 2019-21 to 2022-24) Sig. of Student \_\_\_\_\_  
Marks (Objective) *SGD-11-2-23* (Group II) Paper (I)

Time Allowed:- 20 minutes

PAPER CODE 2474

Maximum Marks:- 17

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) The shortest distance between two points is called  
(A) speed (B) Velocity (C) Acceleration (D) Displacement
- 2) The efficiency of diesel engine is  
(A) 80 % (B) 90 % to 100% (C) 35% to 40% (D) 15%
- 3) The diameter of milky way galaxy is.  
(A)  $10^0 m$  (B)  $10^{30} m$  (C)  $10^{10} m$  (D)  $10^{20} m$
- 4) Steradian is the unit of  
(A) Plane angle (B) Solid Angle (C) Time (D) Distance
- 5) The unit vector is expressed as  
(A)  $\hat{A} = \frac{\vec{A}}{|\vec{A}|}$  (B)  $\hat{A} = \frac{\vec{A}}{|A|}$  (C)  $\hat{A} = \vec{A} \times \frac{\vec{A}}{|\vec{A}|}$  (D)  $\hat{A} = A \times \vec{A}$
- 6) Turning effect of force is called.  
(A) Momentum (B) Acceleration (C) Torque (D) Velocity
- 7) The rate of change of momentum is called.  
(A) Force (B) Torque (C) Time (D) Impulse
- 8) The increase in entropy means  
(A) disintegration of energy (B) degradation of energy (C) degradation of mass (D) disintegration of mass
- 9) Biomass is a potential source of  
(A) Energy (B) Non renewable energy (C) Renewable Energy (D) Power
- 10) One radian is equal to  
(A)  $5.73^\circ$  (B)  $0.73^\circ$  (C)  $57.3^\circ$  (D)  $2\pi$
- 11) Moment of inertia of hoop  
(A)  $I = \frac{1}{3} mr^2$  (B)  $I = mr^2$  (C)  $I = \frac{2}{3} mr^2$  (D)  $I = \frac{2}{5} mr^2$
- 12) The dolphins have  
(A) streamlined bodies (B) Turbulent bodies (C) Unsteady bodies (D) Steady bodies
- 13) The SI units of spring constant are  
(A)  $m^{-1}$  (B)  $Nm^{-1}$  (C)  $Nm^{-2}$  (D)  $Nm^2$
- 14) The CRO is a device to display the input signal into  
(A) Pulses (B) Wave form (C) Data form (D) blank form
- 15) The distance between the node and adjacent antinode is  
(A)  $\lambda/2$  (B)  $\lambda/4$  (C)  $\lambda$  (D)  $\lambda/3$
- 16) Michelson's interferometer was devised in  
(A) 1864 (B) 1687 (C) 1881 (D) 1786
- 17) The light signals in optical fibres must be regenerated by a device called.  
(A) Generators (B) Repeaters (C) Transmitter (D) Transistors

1121 - 1123 - 15000 (2)

123 Warning:- Please, do not write anything on this question paper except your Roll No.  
 Physics (Subjective) Group (II) (Session 2019-21 to 2022-24) Paper (I)

Time Allowed: 2.40 hours Section ----- I (Inter Part - I) Maximum Marks: 68

2. Answer briefly any Eight parts from the followings:- 8 × 2 = 16
- (i) Why do we find it useful to have two units for the amount of substance, the kilogram and the mole?
  - (ii) Give the drawbacks to use the period of a pendulum as a time standard.
  - (iii) Show that the equation  $v_f = v_i + at$  is dimensionally correct.
  - (iv) Given that  $V = (5.2 \pm 0.1)$  volt. Find its percentage uncertainty.
  - (v) If two perpendicular vectors have same magnitudes, Find the angle between their sum and difference.
  - (vi) Define (a) position vector and (b) unit vector.
  - (vii) Can a vector have a component greater than the vector's magnitude?
  - (viii) Explain the circumstances in which the velocity ' $\vec{v}$ ' and acceleration ' $\vec{a}$ ' of a car are.
    - (a) antiparallel (b)  $\vec{v}$  is zero but  $\vec{a}$  is not zero.
  - (ix) Show that the range of projectile is maximum when projectile is thrown at an angle of  $45^\circ$  with the horizontal
  - (x) How impulse is related to linear momentum? (xi) Explain what do you understand by the term viscosity.
  - (xii) Prove that for angles of projection which exceed or fall short of  $45^\circ$  by equal amounts, the ranges are equal.
3. Answer briefly any Eight parts from the followings:- 8 × 2 = 16
- (i) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved.
  - (ii) What sort of energy is in the following (a) compressed spring (b) water in a high dam.
  - (iii) Prove that power is dot product of force and velocity.
  - (iv) State the direction of the following vectors in simple situations; angular momentum and angular velocity.
  - (v) when mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
  - (vi) Define artificial gravity. Give its significance.
  - (vii) Of a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop.
  - (viii) Can we realize an ideal simple pendulum? Explain. (ix) Differentiate between free and forced oscillations?
  - (x) What features do longitudinal, waves have in common with transverse wave?
  - (xi) Why does sound travel faster in solids than in gases?
  - (xii) What is doppler's Effect? Explain briefly one of its application?
4. Answer briefly any Six parts from the followings:- 6 × 2 = 12
- (i) Can visible light produce interference fringes? Explain.
  - (ii) How would you manage to get more orders of spectra using a diffracting grating?
  - (iii) What is the difference between interference and diffraction of light waves?
  - (iv) One can buy a cheap microscope for use by the children. The image seen in such a microscope has coloured edges. Why is this so?
  - (v) What is repeater? What it is necessary in optical fibre communication system.
  - (vi) A thermos flask containing milk as a system is shaken rapidly. Does the temperature of milk rise?
  - (vii) Does entropy of a system increase or decrease due to friction?
  - (viii) what are isothermal and adiabatic processes? (ix) Define triple point of water, also write down its value.
- Note: Attempt any three questions. Section ----- II (8 × 3 = 24)
5. (a) Define Absolute potential energy and derive a relation for it.
  - (b) The magnitude of dot and cross products of two vectors are  $6\sqrt{3}$  and 6 respectively. Find the angle between the vectors.
  6. (a) What is centripetal force? Work out an expression for centripetal force of an object of mass 'm' moving with constant speed 'v' in a circle of radius 'r'.
  - (b) A football is thrown upwards with an angle of  $30^\circ$  with respect to the horizontal to throw a 40 m pass, What must be the initial speed of the ball?
  7. (a) What is carnot engine. Explain its cycle and derive formula for efficiency.
  - (b) Water flows through a hose whose internal diameter is 1 cm at a speed of  $1 \text{ ms}^{-1}$ . What should be the diameter of the nozzle if the water is to emerge at  $21 \text{ ms}^{-1}$ .
  8. (a) What is simple pendulum? Show that motion of pendulum is S.H.M. Also find relations for its time period and frequency.
  - (b) A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrates in four-segments, at a frequency of 120 Hz. Determine its wave length and the fundamental frequency.
  9. (a) Explain the construction and working of a compound microscope. Drive expression for its magnification.
  - (b) In a double slit experiment the second order maximum occurs at  $\theta = 0.25^\circ$ . The wavelength is 650 nm. Determine the slit separation.