

Time Allowed:- 20 minutes

PAPER CODE 2471

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 term 134.7 can be written in scientific notation as
 (A) 1.347×10^2 (B) 1.347×10^3 (C) 1.347×10^1 (D) 1.347×10^4
- 2) The quantity 0.00467 has significant figures
 (A) 3 (B) 4 (C) 5 (D) 6
- 3) If the two components of a vector are equal in magnitude, the vector making angle with x-axis will be
 (A) 30° (B) 45° (C) 60° (D) 90°
- 4) Two forces of magnitudes 10 N and 20 N act on a body in directions making angle of 30° , The X-component of the resultant force will be
 (A) 25.98 N (B) 30.98 N (C) 20.98 N (D) 17.98 N
- 5) If maximum height of the projectile is equal to the range then angle of projection of projectile will be
 (A) 30° (B) 60° (C) 45° (D) 76°
- 6) If 50 kg crate is pushed through 2 m across the floor with a force of 50 N, the work done will be
 (A) 245 J (B) 150 J (C) 200 J (D) 100 J
- 7) A body rotates with a constant angular velocity of 100 rad/sec about a vertical axis the required torque to sustain this motion will be
 (A) Zero Nm (B) 100 Nm (C) 200 Nm (D) 300 Nm
- 8) Moment of inertia of 100 kg sphere having radius 50 cm will be
 (A) 10 Kg m^2 (B) 5 Kg m^2 (C) 500 Kg m^2 (D) 2.5 Kg m^2
- 9) Laminar flow occurs at
 (A) High speed (B) Low speed (C) Zero speed (D) Very high speed
- 10) High concentration of red blood cells increases the viscosity of blood from
 (A) 2 – 3 times that of water (B) 3 – 5 times that of water (C) 5 – 7 times that of water (D) 7 – 9 times that of water
- 11) Distance covered by a body in one vibration is 20 cm. The amplitude of the vibration will be
 (A) 10 cm (B) 5 cm (C) 15 cm (D) 20 cm
- 12) Speed of sound in Hydrogen is higher than in Oxygen by times
 (A) 4 (B) 6 (C) 8 (D) 16
- 13) Sound waves can not pass through
 (A) Liquid (B) Solids (C) Air (D) Vacuum
- 14) Which of the followings can not produce colours with white light?
 (A) Diffraction (B) Interference (C) Polarization (D) Dispersion
- 15) The image formed by eyepiece of compound microscope is
 (A) Real and magnified (B) Real and diminished (C) Virtual and enlarge (D) Virtual and diminished
- 16) The direction of flow of heat between two bodies in thermal contact is determined by
 (A) Internal energies (B) Kinetic energies (C) Potential energies (D) Atmospheric pressure
- 17) A carnot engine has an efficiency of 50% when its sink temperature is 27°C . The temperature of source is
 (A) 300°C (B) 327°C (C) 373°C (D) 273°C

1187- 1119 -- 23000 (1)

SGD-PI-11-19

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

Maximum Marks: 68

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

 $8 \times 2 = 16$

- (i) Write any two points which should be kept in mind, while using units.
 (ii) How many micro seconds in one year? (iii) Find the angle between $\vec{A} = 2\hat{i} - 2\hat{j}$ and $\vec{B} = 2\hat{i} + 2\hat{j}$
 (iv) Can the magnitude of a vector ever be zero? Explain.
 (v) What are the steps, taken to add vectors by rectangular components?
 (vi) In which case more work is done, when a 50 kg crate is pushed through 10 m across a floor with a force of 30 N or same crate is lifted through 5 m height?
 (vii) Derive work-energy principle. (viii) Explain, how the swing is produced in a fast moving tennis ball?
 (ix) What you know about viscosity and what is its effect on drag force?
 (x) What are the factors on which frequency of a spring-mass system depends?
 (xi) What is the difference between free and driven harmonic oscillators? (xii) Explain phase and initial phase.

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

 $8 \times 2 = 16$

- (i) Can the velocity of an object reverse direction when acceleration is constant? If so give an example.
 (ii) Define impulse and show how it is related to linear momentum?
 (iii) What does the slope of velocity-time graph represent?
 (iv) An object is thrown vertically upward. Discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.
 (v) Define angular velocity. How its direction is determined? (vi) Prove that $1 \text{ radian} = 57.3^\circ$
 (vii) When mud flies off the tyre of a moving bicycle. In what direction does it fly? Explain.
 (viii) Show that angular momentum, $L_o = mvr$ (ix) What is difference between interference and beats
 (x) What is the difference between constructive and destructive interference?
 (xi) Explain why sound travels faster in warm air than in cold air?
 (xii) How should a sound source move with respect to an observer so that the frequency of its sound does not change?

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

 $6 \times 2 = 12$

- (i) Can visible light produce interference fringes? Explain.
 (ii) Why the Polaroid sunglasses are better than ordinary sunglasses?
 (iii) How coherent light beams can be produced? Explain. (iv) How the light signal is transmitted through the optical fibre?
 (v) How can the resolving power of compound microscope be increased?
 (vi) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
 (vii) Is it possible to convert internal energy into mechanical energy? Explain with example.
 (viii) What would be average speed of oxygen molecule in the air at S.T.P.?
 (ix) Differentiate between isothermal and adiabatic process.

Note: Attempt any three questions.

Section ----- II

 $(8 \times 3 = 24)$

5. (a) What is Carnot engine? Discuss Carnot cycle, also derive expression of its efficiency.
 (b) Suppose, we are told that the acceleration of a particle moving in a circle of radius r with uniform speed is proportional to some power of r , say r^n and some power of v , say v^m , determine the powers of r and v ?
6. (a) What is isolated system? Also state and explain the law of conservation of linear momentum.
 (b) Two particles are located at $\vec{r}_1 = 3\hat{i} + 7\hat{j}$ and $\vec{r}_2 = -2\hat{i} + 3\hat{j}$ respectively. Find both the magnitude of vector $(\vec{r}_2 - \vec{r}_1)$ and its orientation with respect to x-axis.
7. (a) Define Doppler effect. Discuss the case when source moves towards the stationary observer and when observer moves towards the stationary source.
 (b) A brick of mass 2 kg is dropped from a rest position 5 m above the ground. What is its velocity at height of 3 m above the ground.
8. (a) What is meant by gravity free system. How gravity like earth is produced in a space ship? Explain.
 (b) A simple pendulum is 80 cm long what will be its period and frequency at a place where $g = 9.8 \text{ ms}^{-2}$
9. (a) What is magnifying glass? How is it used as a microscope? Derive the relation for its magnifying power?
 (b) In a double slit experiment, the second order maximum occurs at $\theta = 0.25^\circ$, The wavelength is 700 nm. Determine its slit separation?

1188-- 1119 -- 23000

SGD-11-G1-19

Time Allowed:- 20 minutes

PAPER CODE 2472

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) Absolute uncertainty in a measuring instrument is equal to
 (A) Least count (B) Accuracy (C) Fractional uncertainty (D) Percentage uncertainty
- 2) Dimension of moment arm is
 (A) [M] (B) [T] (C) [LT] (D) [L]
- 3) The force of 15 N makes an angle of 90° with x-axis, its y- component is
 (A) 15 N (B) Zero N (C) 30 N (D) 45 N
- 4) The position vector \vec{r} in xz- plane is
 (A) $y\hat{i} + z\hat{k}$ (B) $x\hat{i} + y\hat{k}$ (C) $x\hat{i} + z\hat{k}$ (D) $x\hat{i} + y\hat{j} + z\hat{k}$
- 5) Area between the velocity time graph is equal to
 (A) Time (B) Velocity (C) Distance (D) Mass
- 6) When the finite force is parallel to the direction of motion of the body, the work done is
 (A) Minimum (B) Maximum (C) Infinity (D) Varies
- 7) A body of mass 10 kg in free falling lift has weight
 (A) 10 N (B) 9.8 N (C) Zero N (D) 980 N
- 8) 20 N centripetal Force revolving a body along a circular path of radius 1m, the work done by the centripetal Force is
 (A) 20 Joule (B) 40 Joule (C) 10 Joule (D) Zero Joule
- 9) Stoke's Law hold for bodies when they have
 (A) Spherical shape (B) Curved shape (C) Rectangular shape (D) Oblong shape
- 10) One Torr is equal to
 (A) 120 Pascals (B) 100 Pascals (C) 133.3 Pascals (D) 80 Pascals
- 11) A simple pendulum is completing 20 vibration in 5 seconds, its frequency is,
 (A) 4 Hz (B) 20 Hz (C) 200 Hz (D) 40 Hz
- 12) The Product of frequency and Time Period is
 (A) 2 (B) 3 (C) 1 (D) 1 Hertz
- 13) Two tuning forks of frequencies 261 Hz and 258 Hz are sounded together, the number of beats per second are
 (A) 3 (B) 2 (C) 261 (D) 258
- 14) Which of the following waves can not be polarized
 (A) X-Rays (B) Light waves (C) Sound waves (D) Infrared rays
- 15) If a convex Lens of focal length "f" is cut into two identical halves along the Lens diameter, the focal length of each half is
 (A) $\frac{3}{2}f$ (B) $2f$ (C) $\frac{f}{2}$ (D) f
- 16) Solid ice, Liquid water and water vapours consist in thermal equilibrium at a Temperature
 (A) 273 K (B) 273.16 K (C) 273°C (D) 100°C
- 17) The Sum of all the energies of molecules is known as
 (A) Elastic potential energy (B) Kinetic energy (C) Internal energy (D) Gravitational potential energy

1189- 1119 -- 14000 (1)

SGD-P11-671-19

Time Allowed: 2.40 hours

Section ----- I

(Inter Part - I) Maximum Marks: 68

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

 $8 \times 2 = 16$

- (i) Write two differences between base and derived quantities?
- (ii) Name several repetitive phenomena occurring in nature which could serve as reasonable time standard?
- (iii) Under what circumstances would a vector have components that are equal in magnitude?
- (iv) Define component of a vector? What are rectangular components?
- (v) If all the components of a vector \vec{A}_1 and \vec{A}_2 were reversed, how would this alter $\vec{A}_1 \times \vec{A}_2$?
- (vi) Define conservative field. Give example. (vii) What is Venturi Relation? Explain briefly.
- (viii) What is drag force? On what factors does it depend?
- (ix) Show that $1\text{ kWh} = 3.6\text{ MJ}$ (x) Derive the relation $\omega = \sqrt{\frac{k}{m}}$ (xi) What is resonance? Example must be given?
- (xii) Does the acceleration of a simple harmonic oscillator ever remain constant? Explain.

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

 $8 \times 2 = 16$

- (i) Can the velocity of an object reverse direction when acceleration is constant? If so, give an example.
- (ii) Define impulse and show that how it is related to linear momentum?
- (iii) Show that the range of projectile is maximum when projectile is thrown at an angle of 45° with horizontal.
- (iv) Differentiate between Ballistic and non-ballistic projectiles.
- (v) What is meant by moment of inertia? Explain its significance.
- (vi) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- (vii) Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission?
- (viii) Define the terms (a) Gravitation, and (b) Geodesics
- (ix) What features do longitudinal waves have in common with transverse waves?
- (x) As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.
- (xi) Why does sound travel faster in solids than in gases? (xii) Differentiate between "Red Shift" and "Blue Shift"

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

 $6 \times 2 = 12$

- (i) What is meant by a wavefront? (ii) Can visible light produce interference fringes? Explain.
- (iii) The centre of Newton's rings is dark. Why? (iv) What are the two conditions for total internal reflection to take place?
- (v) How the light signal is transmitted through optical fibre?
- (vi) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
- (vii) Is it possible to construct a heat engine that will not expel heat into the atmosphere?
- (viii) Explain why adiabatic is steeper than an isotherm?
- (ix) Can the mechanical energy be converted completely into heat energy? If so give an example.

Note: Attempt any three questions.

Section ----- II

 $(8 \times 3 = 24)$

5. (a) What is the main difference between petrol engine and diesel engine? Also describe petrol engine elaborating its four strokes.
- (b) The diameter and length of a metal cylinder measured with the help of vernier callipers of least count 0.01 cm are 1.22 cm and 5.35 cm . Calculate the volume of cylinder and uncertainty in it.
6. (a) Derive expressions for the magnitude and direction of resultant of two vectors, added by rectangular component method.
- (b) A football is thrown upward with an angle of 30° with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball?
7. (a) Define the conservative field. Prove that the work done in the earth's gravitational field is independent of the path followed.
- (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 wavelength and fundamental frequency?
8. (a) Derive an expression for the radius of orbit of a geo-stationary satellite.
- (b) A block of mass 4 kg is dropped from a height of 0.8 m on to a spring of spring constant $K = 1960 \frac{\text{N}}{\text{m}}$. Find the maximum distance through which spring will be compressed.
9. (a) Explain compound microscope using suitable diagram. Derive formula for its angular magnification.
- (b) Sodium light ($\lambda = 589\text{ nm}$) is incident normally on a grating having 3000 lines per centimetre. What is the highest order of the spectrum obtained with this grating?

ISC D - 11 - G2 - 19