PHYSICS

GROUP : FIRST

OBJECTIVE

TIME: 20 MINUTES

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.

QUESTION NO. 1

1	Acceleration of a pendulum of length $\ell = 1$ m and displacement of 5 cm having S.H.M is (A) 0.29 m/s^2 (B) 0.19 m/s^2 (C) 0.69 m/s^2 (D) 0.49 m/s^2
2	If radius of droplet becomes half then its terminal velocity will be (A) One fourth (B) Four times (C) Half (D) Double
3	When both ends of organ pipe are open then the frequency of stationary waves of nth harmonic is given by (A) $f_n = \frac{nv}{4\ell}$ (B) $f_n = \frac{v}{2n\ell}$ (C) $f_n = \frac{nv}{2\ell}$ (D) $f_n = \frac{2v}{n\ell}$
4	The value of constant γ for the mono-atomic gas is (A) 1.67 (B) 1.40 (C) 1.29 (D) 2.45
5	In youngs double slit experiment the position of bright fringe is given by (A) $y = \frac{m\lambda d}{L}$ (B) $y = \frac{mLd}{\lambda}$ (C) $y = \frac{m\lambda}{Ld}$ (D) $y = \frac{m\lambda L}{d}$
6	In Michelson method time taken by the rotational mirror to rotate through an angle $\frac{2\pi}{8}$ (If f is the frequency of rotation) is (A) $\frac{1}{4f}$ (B) $\frac{1}{2f}$ (C) $\frac{1}{8f}$ (D) $\frac{1}{6f}$
7	Sadi Carnot described an ideal engine in (A) 1640 (B) 1740 (C) 1940 (D) 1840
8	A system does 600 J of work and at the same time internal energy increases by 320 J , The heat supplied is (A) 200 J (B) 600 J (C) 280 J (D) 920 J
9	The dimensions of volume flow rate of a fluid are (A) $[LT^{-1}]$ (B) $[L^2T^{-2}]$ (C) $[L^3T^{-1}]$ (D) $[L^3T^{-2}]$
10	Time taken by light to travel from sun to earth is (A) 8 min 20 s (B) 1 min 20 s (C) 5 h 20 s (D) 4 h 20 s
11	At what angle Dot product and Cross product have the same magnitude (A) 0° (B) 45° (C) 30° (D) 60°
12	Magnitude of cross product of two perpendicular vectors is (A) $\vec{A}\vec{B}$ (B) $AB\,\hat{n}$ (C) 0 (D) AB
13	A 1500 kg has its velocity reduced from 20 ms^{-1} to 15 ms^{-1} in 3.0 sec. How large was the retarding force ? (A) 500 N (B) 2500 N (C) 1500 N (D) 1000 N
14	When a massive body of mass m_1 collides with lighter stationary body of mass m_2 , the velocity of massive body after collision will be (A) $V_1' = 2V_1$ (B) $V_2' = V_1$ (C) $V_1' = V_1$ (D) $V_2' = 2V_2$
15	Which one of the following is conservative force (A) Electric force (B) Air resistance (C) Frictional force (D) Tension in string
16	A hoop is rolled down on an inclined plane having height of 10 m. Its velocity at the bottom will be (A) 4.91 m/sec (B) 9.89 m/sec (C) 28.31 m/sec (D) 31.31 m/sec
17	Apparent weight of an object in a lift moving down with acceleration a = g is (A) T = w + ma (B) T = 0 (C) T = w (D) T = Infinity

QUESTION NO. 2 Write short answers of any Eight (8) parts of the following 16

(1) Show that the expression Vf = Vi + at is dimensionally correct. Where Vi is the velocity at t = 0, a is acceleration and Vf is the velocity at time t

(2) What are the rules for assessment of uncertainty in case of a power factor ?

(3) Three students measured the length of a needle with a scale on which minimum divisions is 1 mm and recorded as (i) 0.2145 (ii) 0.21 m (iii) 0.214 m. which record is correct and why ?

(4) Write the dimensions of (i) Force (ii) Velocity

(5) The vector sum of three vectors give a zero resultant. What can be the orientation of the vectors ?

(6) Define torque. Write its unit (7) What is the unit vector in the direction of the vector $\vec{A} = 4\hat{i} + 3\hat{j}$

(8) Does a moving object have impulse ? (9) Explain the difference between elastic and inelastic collision.

(10) What is the effect on the speed of a fighter plane chasing another when it open fire ? What happen to the speed of pursued plane when it returns the fire ?

(11) Define an Isolated system. Give example

(12) Two row boats moving parallel in the same direction are pulled towards each other. Explain

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following 16

(1) Explain what do you understand the work done by Gravitational field ?

(2) An object has one joule of potential energy. Explain what does its mean ?

(3) When a rocket re-enters the atmosphere, its nose cone become very hot. Where does heat energy come from ?

(4) Define the terms (a) Rotational Kinetic Energy (b) Orbital velocity

(5) State the direction of the following vectors in simple situation ; angular velocity and angular momentum

(6) Why does a diver change his body positions before and after diving in the pool ?

(7) What should be the length of a simple pendulum whose period is 1.0 second at a place where g = 9.8 ms^{-2} ?

(8) Under what conditions does the addition of two simple harmonic motions produce a result, which is also simple harmonic ?

(9) Describe two common phenomena in which resonance plays important role

(10) What features do transverse periodic waves have common with longitudinal periodic waves ?

(11) What is the effect of density on the speed of sound ? Explain

(12) What happen when a jet plane like Concorde flies faster than the speed of sound ?

QUESTION NO. 4 Write short answers of any Six (6) parts of the following 12

(1) Can visible light produce interference fringes ? Explain

(2) Explain whether the Young's experiment is an experiment for studying interference or diffraction effect of light

(3) Why the centre of the Newton's ring is dark ?

(4) How convex lens is used as a magnifier ? What limits the magnification of an optical instrument ?

(5) If a person was looking through a telescope at the full moon, how would the appearance of the moon be changed by covering half of the objective lens ?

(6) Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why ?

(7) What is meant by irreversible process ? Give its example

(8) Calculate the work done during isothermal process ?

(9) Draw PV-diagram which show four steps of Carnot engine

SECTION-II

Note: Attempt any Three questions from this section 8 x 3 = 24

Q.5 (A) What is projectile motion ? Derive expressions for its height and range ? 5

(B) Find the projection of $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of the vector $\vec{B} = 3\hat{i} - 4\hat{j} - 12\hat{k}$ 3

Q.6 (A) What is the effect of temperature on speed of sound ? Show that $v_t = v_o + 0.61 t$ 5

(B) How large a force is required to accelerate an electron (m = 9.1 × 10^{-31} kg) from rest to a speed of 2×10^7 ms^{-1} through a distance of 10 cm. 3

Q.7 (A) Derive Bernoulli's equation for a non-viscous, incompressible fluid which flows in a steady state manner 5

(B) A 1000 kg car traveling with a speed of 144 km h^{-1} rounds a curve of radius 100 m. Find the necessary centripetal force 3

Q.8 (A) Prove Law of Conservation of energy in SHM in mass spring system 5

(B) Estimate the average speed of Nitrogen molecules in air under standard conditions of pressure and temperature. 3

Q.9 (A) Define diffraction of light. Describe it through a diffraction grating to derive diffraction equation to determine wavelength of light. 5

(B) An astronomical telescope having magnifying power 5.0 consists of two thin lenses 24 cm apart. Find focal lengths of the lenses 3