

Section-A (Marks 17)

Q. 1 Circle the correct option i.e. A / B / C / D. Each part carries one mark.

- (i) In colour printing, the entire range of colours can be obtained by mixing _____
A. Seven colours
B. Six colours
C. Five colours
D. Four colours
- (ii) Which of the following pairs has the same dimension?
A. Power, Speed
B. Force, Momentum
C. Work, Torque
D. Velocity, Acceleration
- (iii) If $A_x = -1$ and $A_y = -1$ then the resultant vector lies with the x -axis at _____
A. 45°
B. 180°
C. 90°
D. 225°
- (iv) Slope of the tangent at a point on velocity – time graph gives _____
A. Displacement
B. Velocity
C. Acceleration
D. Momentum
- (v) Kilowatt – hour is the unit of _____
A. Power
B. Work
C. Force
D. Momentum
- (vi) On a clear day at noon the intensity of solar energy reaching the earth's surface is about _____
A. $1.4 kW m^{-2}$
B. $1 kW m^{-2}$
C. $1.2 kW m^{-2}$
D. $1.6 kW m^{-2}$
- (vii) How many satellites form the Global positioning system?
A. 3
B. 9
C. 12
D. 24
- (viii) $1 \text{ torr} = \text{_____ } N / m^2$.
A. 760
B. 76
C. 133.3
D. 780

- (ix) S.I unit of coefficient of viscosity is _____
- A. $\frac{N \cdot \text{Sec}^{-1}}{m^2}$ B. $N \cdot m^{-2} \cdot \text{Sec}^{-1}$
- C. $\frac{N \cdot \text{Sec}}{m^2}$ D. None of these
- (x) The length of second pendulum will be _____
- A. 2 m B. 1.5 m
- C. 1 m D. 0.5 m
- (xi) The length of a pipe is 10 cm (where one end is closed and other is open). The maximum wavelength which can be produced is _____
- A. 5 cm B. 10 cm
- C. 20 cm D. 40 cm
- (xii) For interference of light sources should be _____
- A. Monochromatic B. Coherent
- C. Close to each other D. All of these
- (xiii) For normal adjustment, length of Galilean Telescope is _____
- A. $f_o + f_e$ B. $f_o - f_e$
- C. $f_o f_e$ D. $\frac{f_o}{f_e}$
- (xiv) Human metabolism provides an example of _____
- A. Mass conservation B. Energy conservation
- C. Momentum conservation D. All of these
- (xv) An adiabatic change is the one in which _____
- A. No heat is added to or taken out of a system
- B. No change of temperature takes place
- C. Boyle's law is applicable
- D. Pressure and volume remain constant
- (xvi) The normal human ear is most sensitive in the frequency range is _____
- A. 200 – 20000 Hz B. 2000 – 4000 Hz
- C. 1000 – 3000 Hz D. 3000 – 5000 Hz
- (xvii) When light enters glass from air its speed decreases. It is due to the change in its _____
- A. Wavelength B. Frequency
- C. Both A and B D. Intensity

SECTION – B (Marks 42)

2. Attempt any FOURTEEN parts. The answer to each part should not exceed 3 to 4 lines. (14 x 3 = 42)

- (i) Under what circumstances would a vector have components that are equal in magnitude?
- (ii) Show that the expression $v_f = v_i + at$ is dimensionally correct.
- (iii) Explain the circumstances in which the velocity v and acceleration a of a car are:
 - a. Parallel
 - b. Anti-parallel
 - c. Perpendicular to one another
- (iv) What is Rotational K.E.? Find the rotational K.E. of sphere.
- (v) Explain how the swing is produced in a fast moving cricket ball.
- (vi) At what distance from the mean position of simple harmonic oscillator its K.E. will become half of its max-value?
- (vii) Would you keep the amplitude of simple pendulum small or large? Why?
- (viii) What are the conditions for constructive and destructive interference of sound waves?
- (ix) What is thin film? Upon what factors does the interference in thin film depend?
- (x) 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.
- (xi) Why the adiabatic curve is more steeper than isothermal curve?
- (xii) The frequency of the note emitted by a stretched string is 300 Hz . What will be the frequency of this note when the length of wave is reduced by one-third without changing the tension?
- (xiii) A block of mass 4 kg is dropped from a height of 0.80 m onto a spring of spring constant $k = 1960\text{ N/m}$. Find the maximum distance through which the spring will be compressed.

- (xiv) Water flows through a hose, whose internal diameter is 1 cm , at a speed of 1 m/sec . What should be the diameter of nozzle if the water is to emerge at 21 m/sec ?
- (xv) How large a force is required to accelerate an electron ($m = 9.1 \times 10^{-31}\text{ kg}$) from rest to a speed of $2 \times 10^7\text{ m/sec}$ through a distance of 5 cm ?
- (xvi) Find the angle of projection of a projectile for which its maximum height and horizontal range are equal.
- (xvii) Describe why the sound produced by explosions going on in the sun can not be heard on the earth.
- (xviii) Why does the flow of water from a tap decrease when someone opens another tap in the same building?
- (xix) A ball of mass ' m ' attached to string is whirled in a vertical circle. At what point on the circle the string are likely to break? Why?

SECTION – C (Marks 26)

Note:- Attempt any TWO questions. (2 x 13 = 26)

- Q. 3 a. Define and explain the Vector product. Give its four characteristics. 07
- b. The line of action of force $F = \hat{i} - 2\hat{j}$ passes through a point whose position vector is $(-\hat{j} + \hat{k})$. Find the moment of \vec{F} about the point of which the position vector is $\hat{i} + \hat{k}$. 04
- c. Can a body rotate about its centre of gravity under the action of its weight? 02
- Q. 4 a. What is meant by Geostationary orbit? Derive its orbital radius. 07
- b. Calculate the angular momentum of a star of mass $2 \times 10^{30}\text{ kg}$ and radius $7 \times 10^5\text{ km}$. If it makes one complete rotation about its axis once in 20 days. 04
- c. What is meant by moment of inertia? Explain its significance. 02
- Q. 5 a. Describe the construction, working and magnifying power of compound microscope. 07
- b. An astronomical telescope having magnifying power of 5 consists of two thin lenses 24 cm apart. Find the focal length of the lenses. 04
- c. How is the power lost in optical fiber through dispersion? Explain. 02