

SECTION – I

2. Write short answers to any EIGHT (8) questions :

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- (i) Write down dimensions of : (a) Pressure. (b) Density.
- (ii) Does a dimensional analysis give any information on constant of proportionality that may appear in an algebraic expression?
- (iii) Name two major types of errors.
- (iv) Write down factors of prefixes atto and tera.
- (v) Can magnitude of a vector have a negative value?
- (vi) If $\vec{A} - \vec{B} = \vec{O}$, what can you say about the components of the two vectors?
- (vii) Can you add zero to a null vector?
- (viii) Motion with constant velocity is a special case of motion with constant acceleration. Is this statement true? Discuss.
- (ix) An object is thrown vertically upward. Discuss sign of acceleration due to gravity relative to velocity, while the object is in air.
- (x) How impulse is equal to change in momentum?
- (xi) An object has 1J of potential energy. Explain what does it mean?
- (xii) Prove that $P = \vec{F} \cdot \vec{v}$ where P, $\vec{F}$ and $\vec{v}$ are power, force and velocity.

3. Write short answers to any EIGHT (8) questions :

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- (i) A wheel covers 200 m distance between two points. If its radius is 0.2 m, find the number of revolution completed by the wheel.
- (ii) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.
- (iii) State the direction of the following vectors in simple situations, angular momentum and angular velocity.
- (iv) When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.
- (v) A person is standing near a fast moving train. Is there any danger that he will fall towards it?
- (vi) Explain the working of a carburetor of a motorcar using Bernoulli's principle.
- (vii) Time period of a simple pendulum is 2.0 s and amplitude 20 cm, find its maximum speed.
- (viii) What are the conditions of constructive and destructive interference of two sound waves from coherent sources?
- (ix) Can we realize an ideal simple pendulum?
- (x) What is the total distance travelled by an object moving with SHM in a time equal, to its period, if its amplitude is A?
- (xi) Explain the terms : (i) crest. (ii) antinode.
- (xii) Why does sound travel faster in solids than in gases?

(Turn Over)

4. Write short answers to any SIX (6) questions :

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- (i) Which principle is helpful to determine the shape and location of new wavefront? Explain briefly.
- (ii) Explain whether the Young's experiment is an experiment for studying interference or diffraction effects of light.
- (iii) What are different methods to get polarized light?
- (iv) What is multimode step index fibre? Explain in short.
- (v) Draw the ray diagram of compound microscope.
- (vi) Describe in short the construction and working of collimator.
- (vii) What will be efficiency of an engine if it performs 100 J of work and rejects 400 J of heat energy to the cold reservoir?
- (viii) Why the efficiency of real heat engine is always less than one?
- (ix) Give an example of a process in which no heat is transferred to or from the system but temperature of system changes.

SECTION – II

Note : Attempt any THREE questions.

- 5. (a) Find resultant of $\vec{A}$ and $\vec{B}$ using addition of vectors by rectangular components. 5
- (b) A football is thrown upward at an angle of 30° with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball? 3
- 6. (a) How would you describe the analytical approach of formula of absolute P.E., also derive the formula with diagrammatic explanation. 5
- (b) The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the tension is increased by one third without changing the length of the wire? 3
- 7. (a) Define angular momentum and explain orbital and spin angular momentum. 5
- (b) A block of mass 4.0 kg is dropped from height of 0.80 m on to a spring of spring constant $k = 1960 \text{ Nm}^{-1}$. Find the maximum distance through which the spring will be compressed? 3
- 8. (a) Define pressure of gas. Prove that pressure exerted by the gas is directly proportional to the average translational kinetic energy of the gas molecules. 5
- (b) How large must a heating duct be if air moving along it can replenish the air in a room of 300 m^3 volume every 15 min.? Assume the air's density remains constant. 3
- 9. (a) Explain Young's Double slit experiment to study the phenomenon of interference of light. 5
- (b) An astronomical telescope having magnifying power of 5 consist of two thin lenses 24 cm apart. Find the focal lengths of the lenses. 3