SECTION – I

2. Write short answers to any EIGHT (8) questions : **16**

(i) What are two major types of errors, explain them with examples?

(ii) Give any two rules for significant figures.

(iii) Find the dimensions of gravitational constant G in the formula $F = G\frac{m_1 m_2}{r^2}$

(iv) Find the uncertainty in a timing experiment of 30 vibrations completed in 54.6 sec. and the timing device has the least count 0.1 sec.

(v) Under what circumstances would a vector have components that are equal in magnitude?

(vi) How would you prove equilibrium of coplanar forces?

(vii) Analyse the net increase in the value of vector product when angle between two vectors are changed from 0^o to 60^o.

(viii) Why do we wear seat belts? Use an equation to support your answer.

(ix) Mention the points in the path of a projectile for minimum and maximum speed.

(x) An object is thrown vertically upward, discuss the sign of acceleration due to gravity, relative to velocity, while the object is in air.

(xi) How pollution can be reduced? Use mass transportation and energy methods to support your answer.

(xii) A girl drops a cup from a certain height, which breaks into pieces. What energy changes are involved?

3. Write short answers to any EIGHT (8) questions : **16**

(i) Why mud flies off the tyre of a moving bicycle, in what direction does it fly?

(ii) What are the artificial satellites?

(iii) Show that orbital angular momentum $L_o = mvr$

(iv) Differentiate between tangential and angular velocity, how both are related to each other?

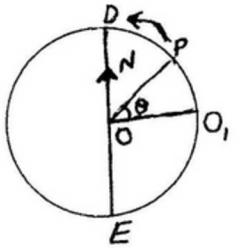
(v) What do you understand about the term viscosity?

(vi) How do you describe the behaviour of an ideal fluid flow?

(vii) On what factors does frequency of a simple pendulum depends?

(viii) If a mass-spring system vibrates, during vibration if potential energy increases what do you conclude about total energy?

(ix) Locate the position of pointer 'P' along with vibrating point 'N' at different instant of time period.



(x) Why does sound travel faster in solids than in gases?

(xi) Describe the phenomenon of sound speed regardless of temperature in air.

(xii) If stationary waves are set up in an organ pipe with both open ends, how does frequency varies with length of pipe?

4. Write short answers to any SIX (6) questions : 12

(i) Give two applications of Bragg's equation.

(ii) Under what conditions two or more sources of light behave as coherent sources?

(iii) Can visible light produce interference fringes? Explain.

(iv) Use Snell's law to calculate critical angle for glass air boundary. Make a diagram to support your answer.

(v) Make the ray diagrams of compound microscope and astronomical telescope.

(vi) Define resolving power and give its at least two formulae.

(vii) Give the interpretation of temperature by using pressure of gas equation.

(viii) How do you describe the all processes of strokes for petrol engine?

(ix) Give an example of a natural process that involves an increase in entropy.

SECTION – II

Note : Attempt any THREE questions.

5. (a) Define projectile motion. Derive relation for :
(i) Time of flight (ii) Range (iii) Maximum height 5

(b) Find the angle between two forces of equal magnitude when the magnitude of their resultant is also equal to the magnitude of either of these forces. 3

6. (a) Discuss stationary waves in an air column. Also discuss different modes of vibrations in an open organ pipe. 5

(b) How large a force is required to accelerate an electron ($m = 9.11 \times 10^{-31} kg$) from rest to speed of $2 \times 10^{7} ms^{-1}$ through a distance of 5 cm? 3

7. (a) What is artificial gravity? Derive an expression for frequency of space-ship to provide the artificial gravity. 5

(b) A simple pendulum is 50.0 cm long. What will be its frequency of vibration at a place where $g = 9.8 ms^{-2}$? 3

8. (a) How does the efficiency of a carnot engine is calculated? 5

(b) What gauge pressure is required in the city mains for a stream from a fire hose connected to the mains to reach a vertical height of 15.0 m? 3

9. (a) What is meant by diffraction of light? Also discuss the diffraction of light through a narrow slit? 5

(b) A simple astronomical telescope in normal adjustment has an objective of focal length 100 cm and an eye piece of focal length 5.0 cm. 3
(i) Where is the final image formed? (ii) Calculate the angular magnification.