

Bachelor of Construction Engineering Supplementary Examination 2018
(1st year, 1st Semester)

Subject - Physics 1B

Time -3Hrs

Full marks -100

Answer any *five* questions

1. (a) What is streamline flow of a liquid through a capillary tube? Show that the velocity profile of the advancing liquid is a parabola.

(b) Deduce Poiseuille's equation. Find the expression of axial velocity of the liquid.

(c) A liquid of density 1.45 g/c.c flows along a horizontal tube of which the cross-section is not constant. Calculate the change in pressure when the velocity of flow changes from 10 cm/s to 20 cm/s ? 8+8+4

2. (a) Discuss the formation of Lissajous figures by the superposition of two simple harmonic motion of nearly same frequency.

(b) Construct the differential equation of forced vibration. What do you mean by amplitude resonance? Define phase and group velocities of sound waves and establish a relation between them.

(c) A particle executing SHM has displacement x_1 and x_2 when its velocities are v_1 and v_2 . Find its Time period. 8+8+4

3. (a) What is meant by 'degrees of freedom'? State the law of equipartition of energies applicable for gas molecules. Derive an expression for the ratio of the specific heats for gas in terms of degrees of freedom?

(b) What is entropy? What is its relation with thermodynamic probability. Discuss about its physical significance.

(c) Find the energy in Joule of thermal motion of 20 gm of oxygen at 10^0 C . 8+8+4

4. (a) Define conservative force field and show that total energy is conserved here. Find the force $F = (3z+5y)\mathbf{i} + (5x+2z)\mathbf{j} + (2y+3x+4z)\mathbf{k}$ is conservative or not. 10

(b) Derive the general differential equation of an central orbit. Show that all central forces are conservative. 10

5. (a) State and prove parallel and perpendicular axis theorem of moment of inertia of rigid body. 10

(b) What is radius of gyration? Find the moment of inertia and radius of gyration of a solid sphere about a diameter as axis. 10

6. (a) Explain the phenomena of beats with mathematical details. 10

(b) Establish the relation between group velocity and phase velocity of sound waves. 10

7. Write short notes (any two) 10x2

- (a) Bernoulli's theorem
- (b) Entropy and its importance
- (c) Lissajous figures
- (d) Gradient and Divergence of a vector