

Bachelor of Construction Engineering Supplementary Examination 2017  
(1st year, 1st Semester)

Subject - Physics 1B

Time -3Hrs

Full marks -100

Answer any *five* questions

- 1.(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
- 2 (a) Show that in a streamline flow of a liquid through a capillary tube, the velocity profile of the advancing liquid is a parabola. Find the expression of axial velocity of the liquid. 10+4
- (b) Liquid of density 1.5gm/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 15cm/s to 25 cm/s? 6
3. (a) State and prove parallel 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
4. (a) Find the velocity and acceleration of a particle in plane polar coordinate system. 10
- (b) Define cylindrical co-ordinate system and show its unit vectors are perpendicular to each other. 10
5. (a) Construct the differential equation of forced vibration subject to a damping force and obtain the steady state solution. 10
- (b) What do you mean by amplitude resonance? Derive the condition of it. 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) Law of equipartition of energy.