Bachelor of Construction Engineering Examination 2018
(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 in a conservative field.. Find the force $F=(3z+5y)i+(5x+2z)j+(2y+3x+4z)k$ is conservative or not.   2+4+4

(b) Derive the general differential equation of a central orbit. Show that all central forces are conservative.   5+5

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 and perpendicular axis theorem of moment of inertia of rigid body.   5+5

(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 so its unit vectors are perpendicular to each other.   5+5

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.   5

(c) A weighted glass tube is floating in a liquid with 20 cm length immersed. It pushed down a certain distance and released. Compute the time period of its vibration.   5

6. (a) What are Lissajous figures ? Two simple harmonic motions of nearly same frequencyare acting at right angles to each other superpose. Show how resulting patterns changes with time.   10

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

7. (a) What is entropy? How is it related with thermodynamical probability. Write down and explain Boltzmann formula for entropy.   10

(b) Define microstate and macrostate of a statistical system. Write down the different microstate and macrostate for a system of 3 distincguishable particle in 2 identical compartments.   10

8. Write short notes (any two)   10x2
(a) Bernoulli's theorem
(b) Gradient and divergence of a Vector
(c) Formation of beats.
(d) Law of equipartition of energy.