First Year Examination of the Three Year

Degree Course, 2001

(Faculty of Science)

PHYSICS

Paper I

(Mechanics & Properties of Matters)

Time - Three Hours

Maximum Marks - 50

Attempt **Five** question in all,

selecting **ONE** question from each unit.

All questions carry equal marks.

UNIT I

1. (a) What do you understand by the motion of a system of variable mass? Explain it with suitable example.   3+3

   (b) Locate the centre of mass of three particles of 2 kg. 3 kg and 4 kg placed at the three corners of an equilateral triangle of one meter side.   4

OR

2. Define moment of inertia and derive its unit and dimension. Calculate the moment of ineritia of a diatomic molecule.   2+2+6

UNIT II

3. What do you understand by a damped harmonic oscillator?   2+4+4

OR

4. State and explain Fourier's theorem. Apply this theorem to analyse the output wave of a half wave rectifier when the input wave is of the form $E=E_0 \sin wt$.

2+4+4

UNIT III

5. (a) State and prove Gauss's divergence theorem.   5

   (b) For the position vector $r = ix + jy + kz$ prove that :   2.5+2.5

   (i)   div R = 3 and

   (ii)   div (r/r^3) = 0.

OR

6.   Explain inertial and non-inertial frames of references. Show that a frame of reference having uniform translatory motion relative to an inertial frame is also inertial.   4+6

UNIT IV

7.   Write short notew on the following :-   5+5
   (a)   Michelson-Morley experiment.
   (b)   Group and phase velocity.

OR

8.   Derive differential equationof a wave motion.   4+6
        Prove that :
        $V = \sqrt{Y/p}$
        Where the symbols have their usual meaning.

UNIT-V

9.   (a)   Define bending moment and derive its expression.   2+3
        (b)   What is Cantilever? Determine Young's modulus (Y) for the material of a Cantilever.   2+3

OR

10.   (a)   Define viscosity and write down its unit and dimension.   2+1
        (a)   Derive an expression for the liquid flow through a narrow capillary tube and discuss the limitations and corrections for the derived formula.   5+1+1