6. (a) Define :

   i) Centre of gravity

   ii) Moment of inertia

   iii) Radius of gyration. (6 Marks)

   (b) Locate the centroid of a semi circle with respect to horizontal diameter by the method of integration. (6 Marks)

   (c) Locate the centroid of shaded area shown in fig.4. (8 Marks)

7. (a) State and prove parallel axis theorem. (5 Marks)

   (b) State and prove perpendicular axis theorem. (5 Marks)

   (c) Find the moment of inertia of a pre-stressed concrete beam section shown in fig.5 about horizontal and vertical axes passing through the centroid. (10 Marks)

8. (a) State the laws of dry friction. (4 Marks)

   (b) Define :

   i) Coefficient of friction

   ii) Angle of friction

   iii) Cone of friction. (6 Marks)

   (c) A small block of weight 1000N is placed on a 30^0 incline with a coefficience of friction at 0.25 on shown in fig.6. Determine the horizontal force to be applied for

   i) the impending motion down the plane, and

   ii) the impending motion up the plane. (10 Marks)

Contd.... 3