Th4(a) - Engineering Mechanics

Full Marks: 80   Time- 3 Hrs

Answer any five Questions including Q No.1& 2

Figures in the right hand margin indicates marks

1.   Answer **All** questions   2 x 10

   a.   State the Law of Conservation of Linear momentum.

   b.   What is fundamental unit and derived units with examples?

   c.   What is coefficient of friction?

   d.   Write down the expression for Velocity Ratio of a Simple wheel and Axle.

   e.   What is Coplanar Concurrent Forces?

   f.   State Newton's 1st law of motion.

   g.   What is Self Locking machine?

   h.   What is the distance of centroid of a semi circular area from the base?

   i.   Define Force and its unit in S.I system.

   j.   Define Couple and its unit.

2.   Answer **Any Six** Questions   6 x 5

   a.   Derive the relation between Mechanical Advantage, Velocity Ratio and Efficiency of a Lifting machine.

   b.   In a lifting machine, an effort of 15N can lift a load of 300N and an effort of 20N can lift a load of 500N. Find the law of machine. Also find the effort required to lift a load of 880N.

   c.   What is Gear Train .Derive its velocity ratio of a Simple Gear Train.

   d.   State and Proof the Polygon Law of Forces.

   e.   Find the angle between two equal forces p, when their resultant is equal to (i) p and (ii) p/2

   f.   State and prove Lami's theorem.

   g   The following forces act at a point

      (i)   20N inclined at 30^0 towards North to East.

      (ii)   25N towards North

      (iii)   30N towards North west, and

      (iv)   35N inclined at 40^0 towards south of west.

   Find the magnitude and direction of the resultant force.

| 3 | State Triangle Law of force and proof Parallelogram Law of Force. | 10 |

| 4 | Define Centroid. | 10 |

An I- section has the following dimensions in mm units.
Bottom flange= 300x100
Top flange= 150x50
Web= 300x50
Determine mathematically the position of centre of gravity of the section.

| 5 | Define Angle of repose. | 10 |

A body of weight 500N is pulled up an inclined plane, by a force of 350N. The inclination of the plane is 30^0 to the horizontal and the force is applied parallel to the plane.
Determine the co-efficient of friction.

| 6 | A body of weight 70KN is suspended by two strings whose lengths are 6cm and 8cm from two points in the same horizontal level. The horizontal distance between the two points is 10cm. Determine the tensions of the strings. | 10 |

| 7 | Define Coefficient of Restitution. What are various types of Impacts? Discuss any one of them. | 10 |