2015

STRUCTURE-1

Paper : ENG-1·5

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. Write short notes on :   5×4=20

    (a) System of Forces

    (b) Parallelogram law of forces

    (c) Resolution of a force

    (d) Principle of Resolution

    (e) Triangle law of forces.

2. (a) What is limiting friction ?   5+15=20

   (b) A body ; resting on a rough horizontal plane, required a pull of $180N$ inclined at $30°$ to the plane just to move it. It was found that a push of $220N$ inclined at $30°$ to the plane just moved the body. Determine the weight of the body and co-efficient of friction.

3. (a) Differenciate centroid and centre of gravity.   5+15

   (b) Determine the moment of inertia of the section shown in the figure about an axis passing through the controid and parallel to the top most fibre of the section. Also determine moment of inertia about the axis of symmetry. Hence find out radii of gyration.
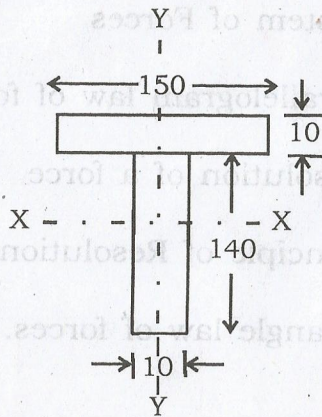

4. Determine the forces in all members of the truss shown in the figure and indicate the magnitude and nature of forces on the diagram of the truss. All inclined members are $60°$ to the horizontal and length of each member is $2m$.   20
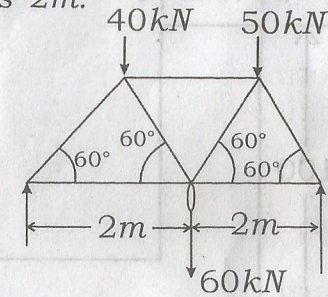
5. A light string ABCDE whose extremity A is fixed, has weights W_1 and W_2 attached to it at B and C. It passes round a small smooth peg at D, carrying a weight $300N$ at the free end E, as shown in the figure.

   If in the equilibrium position, BC is horizontal and AB and CD make $150°$ and $120°$ with BC. Find (i) Tensions in the portion AB, BC and CD of the string and (ii) Magnitude of W_1 and W_2.   20
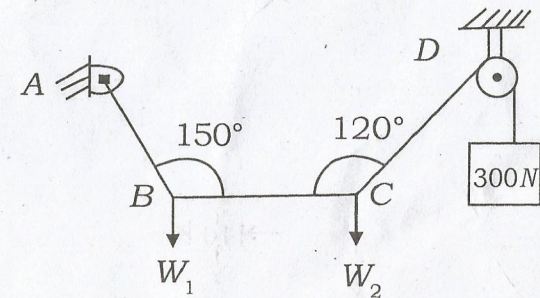
6. Find the moment of inertia about the centroidal *X-X* and *Y-Y* axes of the angle section shown in the figure. 20