T63/A01022/EE/20160711

**Time : 3 Hours**   **Marks : 80**

Instruction :

1. All Questions are Compulsory.
2. Each Sub-question carry 5 marks.
3. Each Sub-question should be answered between 75 to 100 words. Write every questions answer on separate page.
4. Question paper of 80 Marks, it will be converted in to your programme structure marks.

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1. Solve any **four** sub-questions.

   a) Write short note on :   5
      i) Parallel axis theorem
      ii) Moment of Inertia

   b) Find the centre of gravity of a T-section 15cm × 15cm × 2cm.   5

   c) Find the Moment of Inertia of a T-section for the above problem (Q. 1 (b)) about an axis passing through its centre of gravity and parallel to X-X axis.   5

   d) Three concurrent forces are acting on a body which is in equilibrium, then the resultant of the two forces should be equal and opposite to the third force. Prove this statement.   5

   e) A cantilever 3m long carries a uniformly distributed load of 2 t/m over a length of 2m from the fixed end. Draw S.F.D. for cantilever.   5

2. Solve any **four** sub-questions.

   a) State and explain the law of parallelogram of forces.   5

   b) A hemisphere of 80mm diameter is placed on the top of a cylinder having 80mm diameter. Find the common centre of gravity of the two from the base of the cylinder if its height is 100mm.   5

   c) Find the moment of Inertia for the above problem about common centre of gravity (Q. 2(b)).   5

   d) The four coplanar forces are acting at a point as shown in figure. Determine the resultant in magnitude and direction graphically.   5
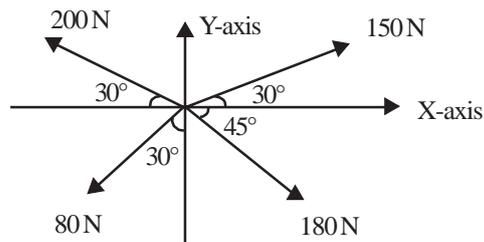
e)   Define the following terms 5
     i)   Axis of symmetry
     ii)   Moment of Inertia
     iii) Bending moment
     iv)   Radius of gyration
     v)   Shear force

3.   Solve any **four** sub-questions.
     a)   What do you understand by moment of resistance and section modulus? 5
     b)   Find the forces in the members of the truss loaded and supported as shown in figure.
          5
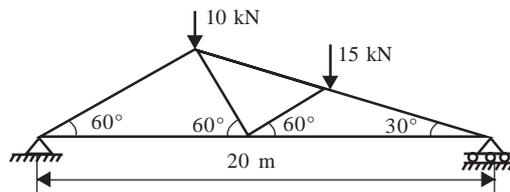
     c)   Explain with neat sketches, the different types of supports and their characteristics. 5
     d)   A simply supported beam of length 5m carries a uniformly increasing load of 800N/m
          at one end to 1600 N/m at the other end and a point load of 100N at its center. Calculate
          the reactions at both the ends. 5
     e)   Determine the moment of Inertia of a rectangular section by integration having
          width = b and depth = d, along x and y axes. 5

4.   Solve any **four** sub-questions.
     a)   What are the types of force system? Explain each in details. 5
     b)   Three like parallel forces 100N, 200N and 300N are acting at a point A, B and C
          respectively on a straight line ABC as shown in figure. The distances are AB = 30cm
          and BC = 40cm. Find the resultant and also the distance of the resultant from point A
          on line ABC. 5
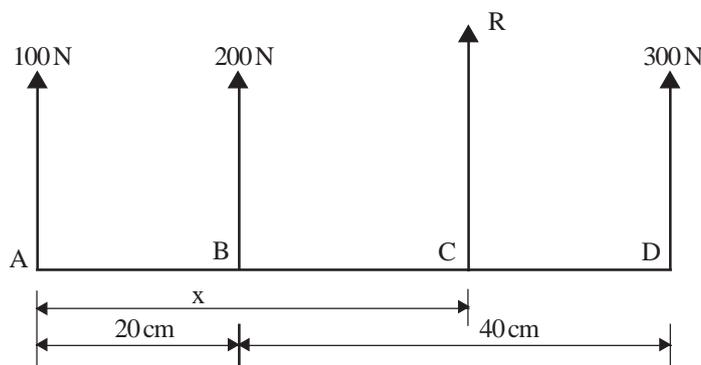
     c)   Write a short note on the types of trusses, their uses, suitability and limitations. 5

d)   Calculate the beam reactions for the following figure.   5
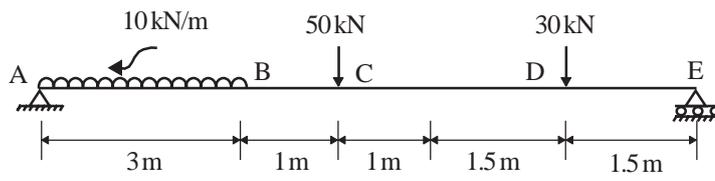
e)   State and explain the Perpendicular axis theorem.   5

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