b) Give the position of centroid of the following standard sections :
   i) Rectangle
   ii) Triangle
   iii) Uniform rod and
   iv) Semicircle

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Roll No ....

CE - 110

B.E. (All Branches)/ B.Arch. I Year I Semester

Examination, December 2015

Choice Based Credit System (CBCS)

Engineering Mechanics

Time : Three Hours

Maximum Marks : 60

Note: i)   Attempt any five questions.

ii) All questions carry equal marks.

iii) Assume suitable data or dimensions, if necessary, clearly mentioned it.

1. a) What is Engineering mechanics? Classify the Engineering mechanics and briefly explain them.

   b) The resultant of the two forces, when they act an angle of $60°$ is 14N. If the same forces are acting at right angles, their resultant is 12N. Determine the magnitude of two forces.

2. a) State the law of parallelogram of forces and show that the resultant, $R = \sqrt{P^2 + Q^2}$ when the two forces P and Q are acting at right angles to each other. Find the value of R if the angle between the forces is zero.

b) The four forces F_1, F_2, F_3 and F_4 of magnitudes 18N, 20N, 15N and 30N and directions 0°, 45°, 90°, 210° (counter clock wise from horizontal) respectively acting at a point on a body. Determine the magnitude and direction of the force for equilibrium condition of the body.

3. a) Define and explain the terms principal of equilibrium, forces law of equilibrium and moment law of equilibrium.

b) A lamp weighing 10N is suspended from the ceiling by a chain. It is pulled a side by a horizontal cord until the chain makes an angle of 60° with the ceiling. Find the tension in the chain and the cord by applying Lami's theorem.

4. a) Explain the various types of beams. What are the different types of support and loading on a beam explain in brief ?

b) A beam of 6 m long is simply supported at the ends and carries a uniformly distributed load of 1.5 kN/m and three concentrated loads 1kN, 2kN and 3kN acting respectively at a distance of 1.5m, 3m and 4.5m from the left end. Determine the reaction at both ends.

5. a) Derive an expression for the moment of inertia of a triangular section about an axis passing through the C.G. of the section and parallel to the base.

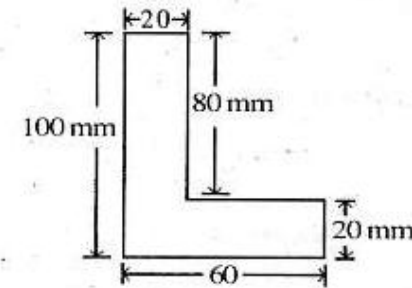b) Determine the Centre of gravity of the L-section shown in figure-1.

Figure-1

6. a) State the Newton's law of motion and Gravitation, also explain the various terms used in dynamics.

b) Determine the forces in members BD, CD and CE of the truss shown in Figure - 2.
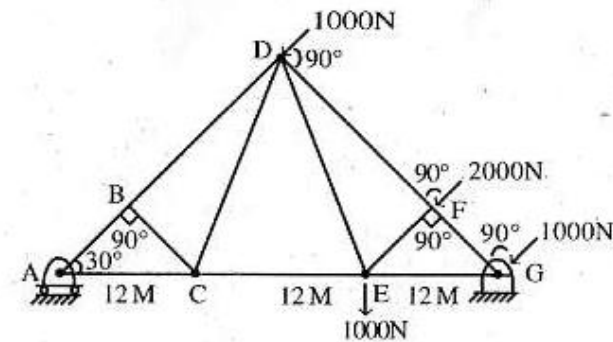

Figure - 2

7. a) Explain and define the term free body diagram. Draw the free body diagram of a ball of weight W placed on a horizontal surface.