

Roll No .....

**CE-110**

**B.E. (All Branches) First Semester**

Examination, December 2016

**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? Give the classification of Engineering mechanics.  
b) Determine the magnitude and direction of the resultant of the two forces of magnitude of 12N and 15N acting at a point, if the angle between the two forces is 60°.
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) Three collinear horizontal forces of magnitude 75N, 135N and 185N are acting on a rigid body. Determine the resultant of the forces analytically and graphically when forces 75N and 135N are acting in the same direction and force 185N acts in the opposite direction.
3. a) State and prove the Varignon's theorem.  
b) Three forces  $F_1$ ,  $F_2$  and  $F_3$  are acting on a body in such a way that the direction  $0^\circ$ ,  $120^\circ$  and  $240^\circ$  (counter clock wise from horizontal) respectively and the body is in the equilibrium condition. If the magnitude of the force  $F_3$  is 200N, find the magnitudes of force  $F_1$  and  $F_2$ .
4. a) What are the important types of loading on a beam? Differentiate between uniformly distributed load and uniformly varying load on a beam.  
b) A simply supported beam of length 5m carries a uniformly increasing load of 500N/m at one end to 1500N/m at the other end. Calculate the reactions at both ends.
5. a) State and prove the parallel axes theorem on moment of inertia for a plane area.  
b) Determine moment of inertia of the I-section shown in figure 1, with respect to X and Y axes.

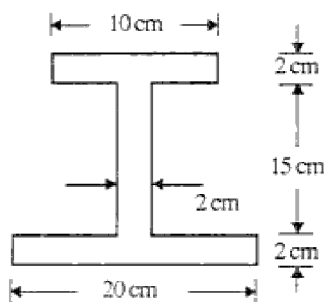


Figure 1

6. a) State and explain the Newton's law of gravitation.  
b) 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.
7. a) Explain with simple sketches the terms method of sections and method of joints, as applied to trusses.  
b) Find the reactions and forces in the all members of the truss shown in figure 2.

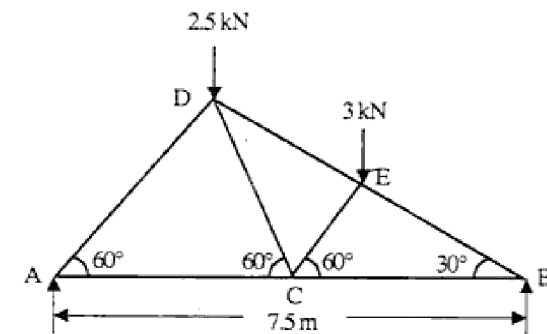


Figure 2

8. Write short notes on following (Any four)
  - a) Free body diagram
  - b) Lami's theorem
  - c) Coplanar non concurrent forces
  - d) Over hanging beams
  - e) Newton's law of motion
  - f) Radius of gyration

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