Code No: R21011 **R10** SET - 1

II B. Tech I Semester Supplementary Examinations, Dec - 2015
MECHANICS OF MATERIALS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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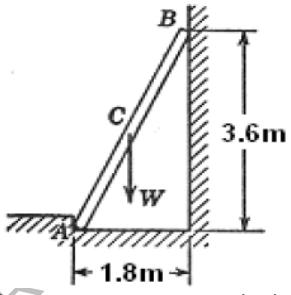
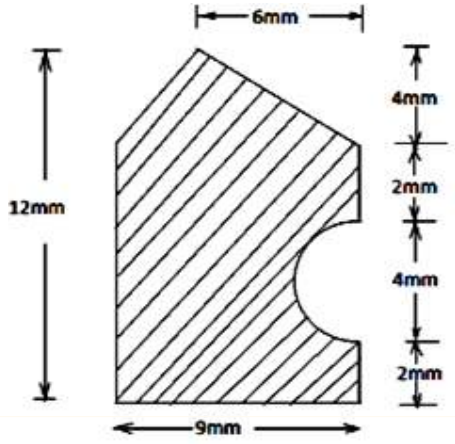
1. a) Explain various force systems with neat sketches (5M)
   b) Three forces of magnitude 40KN, 15 KN, and 20KN are acting at a point O. The angles made by 40KN, 15KN and 20KN forces with X axis are 60^0, 120^0 and 240^0 respectively. Determine the magnitude and direction of the resultant force (10M)

2. a) Explain various laws of Engineering Mechanics (6M)
   b) A 675 N man stands on the middle rung of a 225 N ladder, as shown in below figure. Assuming a smooth wall at B and a stop at A to prevent slipping, find the reactions at A and B. (9M)



3. a) Derive the condition for maximum power transmission in a belt drive. (5M)
   b) A pulley is driven by a flat belt running at a speed of 500m/min. The coefficient of friction between the pulley and the belt is 0.35 and the angle of lap is 150 degrees. If the maximum tension in the belt is 700N, find the power transmitted by a belt. (10M)

4. a) Differentiate centroid, centre of gravity and mass centre. (5M)
   b) Find the coordinates of centroid of shaded area as shown in below figure (10M)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5. a) Derive the relation between Young's modulus, shear modulus and bulk modulus (8M)
   b) Define the following (7M)
   i) Factor of safety ii) Poisson's ratio ii) Hooks law

6. a) Define point of contra flexure. (2M)
   b) Draw the Shear force and bending moment diagram for the loaded beam as shown in Figure 3. (13M)

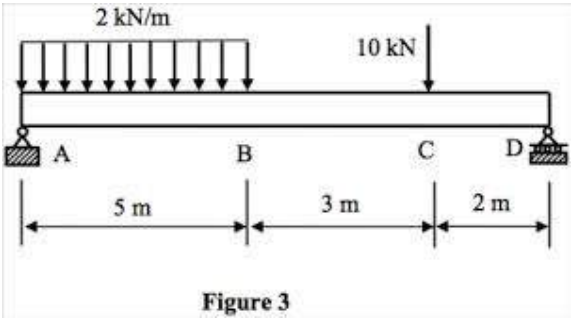

Figure 3

7. a) Derive flexure equation (8M)
   b) A rectangular beam 200mm deep and 300mm wide is simply supported over a span of 8m. What uniformly distributed load per meter the beam may carry, if the bending stress is not to exceed 120 N/mm^2. (7M)

8. The shear force acting on a section of a beam is 50kN. The section of the beam is T shaped of dimensions 100x100x20mm. The moment of inertia about the horizontal neutral axis is 314.221x10^4 mm^4. Calculate the shear stress at the neutral axis and at the junction of the web and flange. Draw the distribution of shear stress across the depth of the section (15M)