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**University Examinations 2015/2016**

SECOND YEAR FIRST SEMESTER EXAMINATION

FOR DIPLOMA IN

CIVIL ENGINEERING

**ECV 2152: THEORY OF STRUCTURES I**

**DATE: APRIL 2016 TIME: 1 ½ HOURS**

**INSTRUCTIONS:** *Answer question* ***one*** *and any other* ***two*** *questions*

**QUESTION ONE (30 MARKS)**

1. State and describe three properties of materials. (6 marks)
2. Draw a stress-strain diagram for mild steel and briefly explain the salient points on it.

(6 marks)

1. Find the centre of gravity of the L section showing in figure 1. (5 marks)
2. Using sketches, describe any three types of beams. (6 marks)
3. Using sketches, describe three types of loads that act on beams. (6 marks)
4. Define the term ‘centroid’ and ‘radius of gyration’ (1 mark)

**QUESTION TWO (15 MARKS)**

1. A concrete column 300mm x 300 mm Is reinforced with eight steel bars each 20mm diameter, the column carries a load of 360kN, calculate the stress in concrete and steel.

 and  (7 marks)

1. A cantilever beam 2m long carries a point load 1 KN at its free and 2KN at 1m from the free end. Draw S.F and B.M diagrams for the cantilever (8 marks)

**QUESTION THREE (15 MARKS)**

1. A concrete cylinder of diameter 150mm and length 300 mm when subjected to an axial compressive load of 240kN increases in diameter by 0.127 mm and decreases in length by 0.28mm. Compute the poisson’s ratio and Young’s modulus. (6 marks)
2. A steel prop is used to stabilize a building as shown in figure 2, if the compressive stress in the bar at 200c is 30 mpa, what will be the stress in the prop if the temperature is raised to 350c, at what temperature the prop will cease to be effective?

 and  (9 marks)

**QUESTION FOUR (15 MARKS)**

1. A simply supported beam 8m long carries a point load of 4 kN and 6kN at a distance 2m and 4m from the left end. Draw S.F and B.M diagrams for the beam. (6 marks)
2. The following observations were made during a tensile test on mild steel specimen 40mm diameter and 200mm long.

Elongation with 40kN within lactic limit = 0.0304mm

Yield load = 161kN

Maximum load = 242 kN

Length of specimen at fracture = 249mm

Determine young’s modulus, yield point stress, ultimate stress and percentage elongation (9 marks)