DU – 003

III Semester B.E. (Civil) Degree Examination, Dec. 2017/Jan. 2018
(2K11 Scheme)
CE 301 : THEORY OF STRUCTURES – I

Time : 3 Hours Max. Marks : 100

***Note** : Answer **five full** questions select atleast **two** questions from **each** Part.*

PART – A

1. a) State and derive the Bending equation, mention the assumptions made. **10**
   b) A simply supported beam of span 5 m has a cross section 150 mm × 250 mm. If the permissible stress is 10 N/mm^2 find the maximum intensity of UDL. **10**

2. a) Explain the uniform strength of beams. **6**
   b) Determine the slope and deflection at B and C, for figure (1) shown. Take E = 200 kN/mm^2 and I = 12×10^8 mm^4. **14**

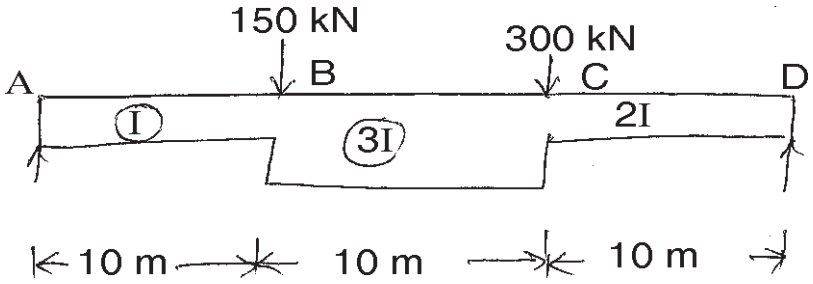

Fig. (1)

3. a) Define Mohr's circle and explain the construction procedure. **8**
   b) At a point in a strained material there is tensile stress of 80 N/mm^2 upon a horizontal plane and a compressive stress of 40 N/mm^2 upon a vertical plane. There is also a shear stress of 48 N/mm^2 upon each of these planes. Determine the planes of maximum shear stress at the point. Determine also the resultant stress on the planes of maximum shear stress. **12**

4. a) State and explain Castigliano's first theorem. **6**
   b) Calculate the central deflection and slope at ends of a simply supported beam carrying a UDL W/m run over the entire span. **14**

P.T.O.

PART – B

5. A symmetrical three hinged parabolic arch of span 40 m and rise 8 m carries an UDL of 30 kN/m over the left half of the span. Calculate the reactions at the supports, bending moment, radial shear and normal thrust at a distance of 10m from the left support and draw BMD. **20**

6. a) Mention the components of suspension bridge with neat sketch. **8**
   b) A cable of horizontal span 21 m is to be used to support six equal loads of 40 kN each at 3 m spacing. The central dip of the cable is limited to 2.0 m. Find the length of the cable required and also its sectional area if the safe tensile stress is 750 N/mm^2. **12**

7. Draw the ILD for shear force and bending moment for a section at 5 m from the left hand support of a simply supported beam, 20 m long. Hence calculate the maximum bending moment and shear force at the section, due to an un uniformly distributed rolling load of length 8 m and intensity 10 kN/m run. **20**

8. A single rolling load of 100 kN moves on a girder of span 20 m.
   a) Construct the influence lines for, shear force and bending moment.
   b) Construct the influence lines for points at which the, maximum shears and bending moment. **20**

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