Hall Ticket No | | | | | | | | | | | Question Paper Code: ACE004

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular) - May, 2018

Regulation: IARE – R16

Strength of Materials - II

Time: 3 Hours **(CE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) Determine the slope and deflection at free end for a cantilever of length 'L', carrying a uniformly distributed load 'w' per unit run over the whole length using double integration method. **[7M]**

   (b) A beam of span 6m and of uniform flexural rigidity EI= 40000m kNm^2 is subjected to a uniformly distributed load of 13 kN/m at a distance of 4m from the left end. Find the deflection using moment area method. **[7M]**

2. (a) A cantilever beam AB is fixed at end A and free at 'B'. Find the reaction and slope at the free end, if beam carries UDL 'W' over its entire length using conjugate beam method. **[7M]**

   (b) Find slope and deflection for a cantilever beam with point load acting at its free end using Mohr's theorem. **[7M]**

UNIT – II

3. (a) Derive the expression for strain energy due to axial load of prismatic bar when load 'P' is applied gradually. **[7M]**

   (b) A cantilever beam of length 'L' is subjected to concentrated load 'W' as shown in Figure 1. Determine strain energy of beam. Find slope and deflection of beam using unit load method. **[7M]**

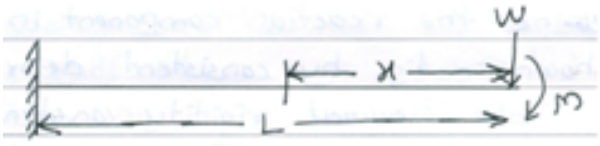

Figure 1

4. (a) Derive the expression for total strain energy stored in the beam (U), due to bending. **[7M]**

   (b) Find out strain energy and deflection of free end for a cantilever beam of length 'L' subjected to point load 'W' at its free end. **[7M]**

UNIT – III

5. (a) Derive the expression for circumferential stress and longitudinal stress for thin cylindrical shell, which carries an internal fluid pressure 'p'. **[7M]**

   (b) A cylindrical shell 2m long and 90cm internal diameter and 12mm metal thickness is subjected to internal pressure of 1.6 N/mm2. Determine **[7M]**

   i. Maximum intensity of shear stress

   ii. Change in dimension of shell, Take E= 2 x 10^5 N/mm^2 1/m = 0.3

6. (a) Find the thickness of metal necessary for a steel cylindrical shell of internal diameter 200mm to withstand an internal fluid pressure of 50 N/mm^2. The maximum hoop stress in the section is not to exceed 150 N/mm^2. **[7M]**

   (b) A thick spherical shell of 150mm internal diameter is subjected to an internal fluid pressure of 20 N/mm^2. If the permissible tensile stress is 100 N/mm^2, find the thickness of the shell. **[7M]**

UNIT – IV

7. (a) A propped cantilever beam is subjected to a concentrated load of 60kN at 3m from end 'A' as shown in Figure 2. Draw BMD and SFD by method of consistent deformation method. Assume that flexural rigidity of beam is constant throughout its length. **[7M]**

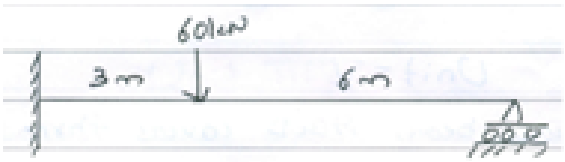

Figure 2

   (b) A propped cantilever beam AB is subjected to a uniformly distributed load of 12 kN/m throughout the length of 8 m. Draw bending moment diagram and shear force diagram by consistent deformation method. Assume that flexural rigidity of beam is constant throughout its length. **[7M]**

8. A fixed beam of 8m span carries a UDL of 40 kN/m run over 4m length starting from left hand and a concentrated load of 80 kN at a distance of 6m from the left hand end. Find **[7M]**

   (a) Moments at the supports

   (b) Deflection at centre of the beam. Take EI= 15000 kNm^2. **[7M]**

UNIT – V

9. (a) Analyze a continuous beam as shown in Figure 3. using Clapeyorn's equation of three moment. **[7M]**

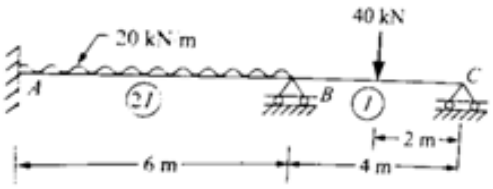

Figure 3

(b) Analyze the continuous beam as shown in Figure 4 using Clapeyorn's equation of three moment and draw bending momeent diagram.

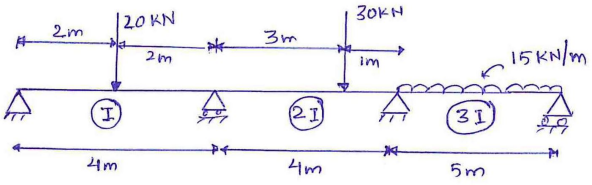

Figure 4

10. (a) Derive the Clapeyorn's equation of three moment for a continuous beam with a neat sketch and bending moment diagram. Flexural rigidity of the beam is constant(EI) and carries a uniformly distributed load of w per unit length. **[7M]**

(b) Analyze the continuous beam shown in Figure 5, if the support B sinks by 10mm by using three moment equations. Draw the SFD and BMD. Take E= 15 X10^6 kN/m^2 and I = 4 X 10^9 mm^4. **[7M]**

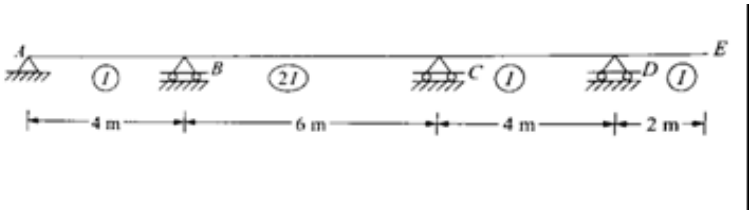

Figure 5

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