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

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular / Supplementary) - May 2019

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) Define Macaulay's method for deflection of beam and write its uses. **[7M]**

   (b) A beam of uniform rectangular section 200mm wide and 300mm deep is simply supported at its ends. It carries a uniformly distributed load of 9kN/m run over the entire span of 5m.If the value of E for the beam material is 1 x 10^4N/mm^2, find the slope at the supports and maximum deflection. **[7M]**

2. (a) State Mohr's theorem for beams. Where moment area method is conveniently used? What do you understand by moment area method? **[7M]**

   (b) A beam is 6m long, simply supported at its ends, carrying a point load of 50kN at its center. Take I = 78 x 10^6N/mm^4 and E = 2.1 x 10^5 N/mm^2. Calculate deflection at the center of the beam and slope at the supports. **[7M]**

UNIT – II

3. (a) Explain the term gradually applied load and suddenly applied load. Explain in detail about Betti's law. **[7M]**

   (b) A member of length 1.5m and 30mm diameter is subjected to a suddenly applied load of 25KN. Find the maximum instantaneous stress induced in the member and elongation of the member. Take E = 2 X 10^5 N/mm^2. **[7M]**

4. (a) Prove that the stress induced in a member under suddenly applied load is twice that of the gradual loading. **[7M]**

   (b) An unknown weight falls from a 10mm height on a collar rigidly attached to the lower end of a vertical rod of 500cm length and 600mm^2 area. If the maximum instantaneous extension of the bar is 2mm , find the unknown weight. Take E = 2X 10^5 N/mm^2. **[7M]**

UNIT – III

5. (a) Explain in detail about stresses in compound thick cylinders. **[7M]**

   (b) A cylindrical thin drum 80cm in diameter and 3m long has a shell thickness of 1cm. If the drum is subjected to an internal pressure of 2.5N/mm^2, determine the change in diameter, change in length and change in volume. Take E = 2 x 10^5 N/mm^2, Poisson's ratio=0.25. **[7M]**

6. (a) Determine the maximum and minimum hoop stress across the section of a pipe of 400mm internal diameter and 100mm thick, when the pipe contains fluid at a pressure of 8 N/mm^2. **[7M]**

(b) A vessel in the shape of a spherical shell of 1.4m internal diameter and 4.5mm thickness is subjected to a pressure of 1.8 N/mm^2. Determine the stress induced in the material of the vessel. **[7M]**

UNIT – IV

7. (a) Differentiate between cantilever beam and propped cantilever beam. **[7M]**

(b) A cantilever ABC is fixed at A and rigidly propped at C and is loaded with uniform distributed load of 1 KN/m up to point B for the length of 4m out of total length 6m. Assume the end point C . Determine the reaction at the propped end. **[7M]**

8. (a) Explain the term moment of inertia. What are the various loading conditions in case of a beam? **[7M]**

(b) Determine the reaction components in the propped cantilever shown in Figure 1. EI is constant throughout. **[7M]**

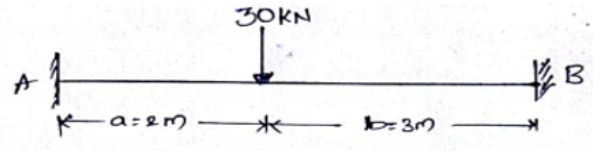

Figure 1

UNIT – V

9. (a) What is the expression for bending moment for continuous beam under udl? Write the application of three moments equations. **[7M]**

(b) Analyse the continuous beam ABCD shown in Figure 2. If support C settles down by 5mm. Take E=15kN/mm^2. Moment of inertia is constant throughout and is equal to 5 x 10^9 mm^4. **[7M]**

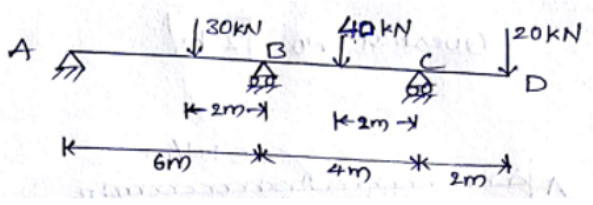

Figure 2

10. (a) Explain in detail clapeyron's theorem of three moments for continuous beam. **[7M]**

(b) A continuous beam ABC of uniform section with span AB and BC as 4m each is fixed at A and simply supported at B and C. The beam is carrying a uniformly distributed load of 6kN/m run throughout its length. Find the support moments and the reactions. Also Draw the bending moment and shear force diagrams. **[7M]**