Code No. : 21015

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (Civil Engg.) II Year I-Semester (Main & Backlog) Examinations, Nov./Dec.-2016
## Strength of Materials-I

Time: **3** hours

Max. Marks: **70**

Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

1. Differentiate between Ductile and Brittle materials.

2. What causes temperature stresses and how are they computed?

3. Explain with example, point of contraflexure.

4. Draw bending moment diagram for a cantilever beam of span '*l*' and subjected to a clockwise couple 'M' at its free end.

5. Sketch shear stress distributions for I and T sections.

6. State the assumptions made in pure bending theory.

7. State and explain the middle third rule.

8. Discuss in brief, ellipse of stress.

9. Write down the Lame's equations for finding stresses in a thick cylinder.

10. Differentiate between thick and thin cylinders.

Part-B (5 × 10 = 50 Marks)

11. a) Derive the relation between bulk modulus and young's modulus. [3]

   b) Three vertical rods, equal in length, each 12mm in diameter are equispaced in a vertical plane and together support a load of 10kN, the rods being so adjusted as to share the load equally. If an additional load of 10kN be added determine the stress in each rod. The middle rod is of copper and other rods are of steel. Take Es = 2×10^5 MPa, Ec = 1×10^5 MPa. [7]

12. a) Draw the shear force and bending moment diagrams for the beam shown in fig. [7]
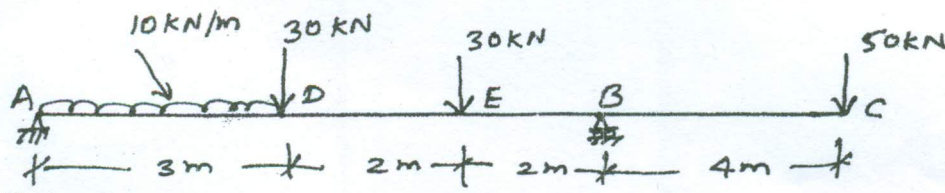
   b) Where does the maximum bending moment occur in the above beam and what is its magnitude? [3]

13. a) A beam has T-shaped cross section. The dimension of Flange is 400 mm × 40 mm and web is 500 mm × 50 mm. At a section the B.M is 100 kNm and S.F is 80kN. Evaluate the maximum stresses due to B.M and S.F at that section. [6]

   b) Sketch bending stress and shear stress variation at that section with all important values. [4]

14. a) A short hollow column having outer sides (2 m x×2 m) and inner sides (1.5 m×1.5 m) [6]
   supports a vertical load of 100 kN on the inner diagonal, at a distance of 0.5 m from
   the vertical axis of the column passing through centre. Find the stresses developed at
   the 4 corners of column top face.

   b) Sketch Mohr's circle of stress for a state of stress where the principal stresses are [4]
   70N/mm^2 (tensile) and 40 N/mm^2 (tensile).

15. a) A C.I Pipe has 2000mm internal diameter and 50mm metal thickness, and carries water [7]
   under a pressure of 5MPa. Calculate the maximum and minimum intensities of
   circumferential stress. Sketch the variation of circumferential and radial pressure across
   the thickness of pipe.

   b) Discuss the concept behind wire wound thin cylinders. [3]

16. a) Derive the relationship between three elastic constants. [5]

   b) A simply supported beam of 8m span is loaded with a UDL of 10kN/m over the left half [5]
   of the span and a point load of 20kN at 2m from left support. Draw SFD and BMD.

17. Answer any *two* of the following:

   a) Derive the bending equation. [5]

   b) Calculate the increase in volume of a thin cylindrical shell 2 m long, internal diameter [5]
   1.2 m and 15 mm thick if it is subjected to an internal pressure of 8 N/mm^2. Take
   E = 2 × 10^5 N/mm^2 and μ = 0.3.

   c) Derive an expression for the distribution of shear stress across a circular section. Also [5]
   draw a sketch of the stress distribution.

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