

FACULTY OF ENGINEERING
B.E. 2/4 (MP/AE) I - Semester (Backlog) Examination, May / June 2018

Subject : Mechanics of Materials

Time : 3 Hours

Max. Marks: 75

Note: Answer all questions from Part-A & answer any five questions from Part-B.

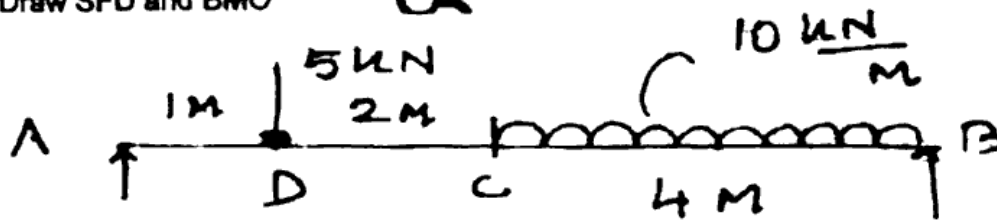
PART - A (25 Marks)

- 1 Explain Bulk modulus. (2)
- 2 Define point of inflexion. (2)
- 3 What is the ratio of max shear stress to average shear stress in a solid circular section of diameter 'd'? (2)
- 4 What is meant by equivalent torque? (2)
- 5 Define resilience of a beam. (2)
- 6 Explain importance of spring index. (3)
- 7 Write down this assumption made in the theory of thin cylinders. (3)
- 8 Write demerits of Macaulay's method. (3)
- 9 State middle third rule. (3)
- 10 What is the meaning of Equivalent length of column? Write the importance. (3)

PART - B (50 Marks)

- 11 Derive the relation between shear modulus 'C', Poisson's ratio, $1/m$ and modulus of elasticity E from the fundamentals.

- 12 Draw SFD and BMO



- 13 Derive pure bending equation $\frac{M}{I} = \frac{\sigma}{Y} = \frac{E}{R}$

- 14 A simply supported beam of span 16m carries two point loads of 20 kN and 30 kN at 2m and 4m from left end respectively. Find max. deflection in terms EI.

- 15 A solid circular shaft is used to transmit a power 500 H.p at 300 rpm. The max shear stress should not exceed 80 MPa and angle of twist in 2m length of the shaft should not exceed 4° . Take $C = 0.85 \times 10^5$ MPa. Determine its diameter.

- 16 Draw shear stress distribution across the circular section and its variation along the depth.

- 17 A cast Iron pipe of 400mm internal diameter 100mm thick carries water under a pressure of 10 MPa. Determine Maximum and Minimum intensities of Hoop stress across the section.

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- 15 A hollow alloy tube 5M long with external and internal diameter 30 mm and 25 mm was found to extend by 4.3 mm, under a tensile load of 40 kN. Find the critical load for the tube when used as a column with one end fixed and other end free. Also find the safe load for the tube with a factor of safety of 4.
- 16 (a) Sketch the stress and strain curve for Brittle material. Explain all the salient points on it.
- (b) In a tension test on a circular rod 60 mm diameter and 200 mm gauge Length. The elongation recorded was 0.6mm. The decrease in diameter was found to be 0.22mm. Calculate the three elastic Constants.
- 17 Write short notes on the following:
- Direct and bending stress
 - Theory of pure bending
 - Second and Perry's formula

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