**Course Code:** 1930113 **Roll No:** **MLRS- R19**

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## INSTITUTE OF TECHNOLOGY AND MANAGEMENT
**(AN AUTONOMOUS INSTITUTION)**
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Supplementary Examination, February-2022

**Strength of Materials – I**

(CIVIL)

**Time: 3 Hours.** **Max. Marks: 70**

Note: 1. Answer any FIVE questions.
2. Each question carries 14 marks and may have a, b as sub questions.

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|---|---|---|---|---|---|
| 1 | a) | Derive the relationship Modulus of elasticity and Modulus of rigidity | 6M | CO1 | BL6 |
| | b) | Find the maximum stress and total elongation of a bar subjected to loads shown in fig. 1. The bar has a diameter 30mm and E for the bar 105GPa | 8M | CO1 | BL3 |

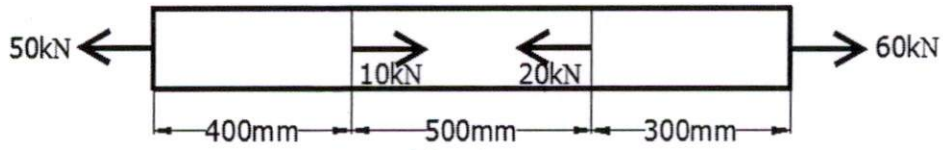

Fig. 1

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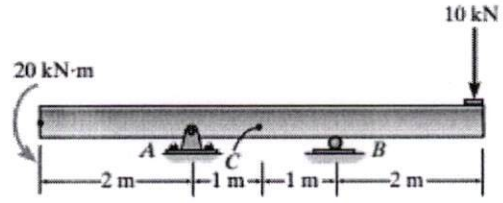
| 2 | a) | Discuss the detailed classification of stresses and strains. | 6M | CO1 | BL2 |
| | b) | A bar of steel is 60x60 mm in section and 180 mm long. It is subjected to a tensile load of 300 kN along the longitudinal axis and tensile loads of 750 kN and 600 kN on the lateral forces. Find the change in the dimensions of the bar and change in volume. Take E = 200 GPa and $\mu = 0.3$. | 8M | CO1 | BL3 |
| 3 | a) | Describe the point of contraflexure? What is the significance of it. | 4M | CO2 | BL2 |
| | b) | Draw the shear force and bending moment diagrams for a beam shown in fig.2. | 10M | CO2 | BL2 |

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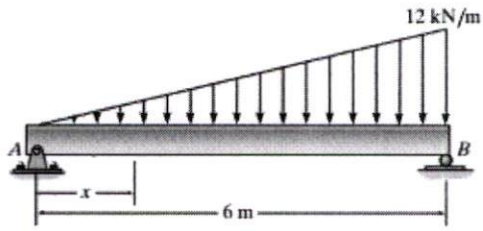
| 4 | | Determine the reactions at the supports and Draw the Shear force & Bending moment diagram for a beam shown in fig.3 | 14M | CO2 | B3 |

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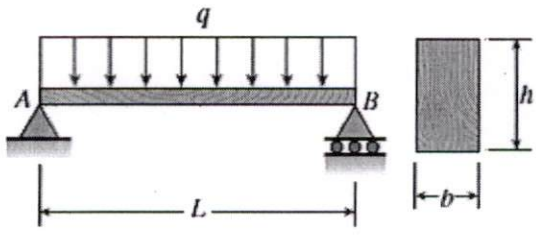
| 5 | a) | Explain the significance of the section modulus? Give the section modulus for the following.<br>i) Hollow and solid Circular sections ii) Symmetric I-section | 7M | CO3 | BL4 |
| | b) | A simply supported wood beam AB with span length L = 4 m carries a uniform load of intensity q = 5.8 kN/m shown in fig.4. Calculate the maximum bending stress due to the load q if the beam has a rectangular cross section with width b = 140 mm and height h = 240 mm. 7M | 7M | CO3 | BL3 |

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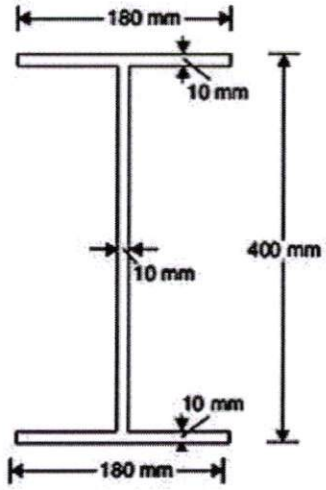
| 6 | | Draw the shear stress variation diagram for the I-section shown in Fig.5, if it is subjected to a shear force of 100 kN.<br>10M | 14M | CO3 | BL2 |

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| 7 | | A simply supported beam of span 7m carries a point load of 10kN at a distance of 4m from the left end. Determine the slope at the either ends and deflection under the load using Macaulays method. | 14M | CO4 | BL1 |
| 8 | | At a point in a strained material, there are normal stresses of 60Mpa(Compressive) and 40Mpa( Tensile) at right angles to each other with a shear stress 20MPa( negative). Determine the principal stresses, maximum shear stress and plane on which they act. Show them on the sketches of properly oriented elements. | 14M | CO5 | BL2 |

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