



P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Seventh Semester, B.E. - Civil Engineering

Semester End Examination; Dec. - 2019

Design of Steel Structures

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit

ii) IS-800 table is allowed

UNIT - I

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| 1 a. | Explain briefly the necessity of partial safety factors and codes in structural design. | 10 |
| | b. Explain the advantages and disadvantages of steel structures. | 10 |
| 2 a. | Write a note on HSFG bolt. | 6 |
| | b. Two plates of size 150 mm × 6 mm are connected by a double bolted lap joint using 4 numbers of 16 mm dia bolt. Determine the efficiency of the joint. Use steel of grade Fe410 and $f_y = 250 \text{ N/mm}^2$. | 14 |

UNIT - II

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|------|---|----|
| 3 a. | Design a suitable bolted bracket connection of a ISHT75 section attached to the flange of ISHB300 at 577 N/m, to carry a vertical factored load of 600 kN at an eccentricity distance of 300 mm. Use M ₂₄ bolt of grade 4.6. | 20 |
| 4 a. | Explain defects of welded connections with appropriate figure. | 8 |
| | b. Design a welded connection for an angle (80×80×6) mm connected to 6 mm thick gusset plate subjected to a force of 210 kN. Provide welding on three sides. | 12 |

UNIT - III

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| 5 a. | Design a tie member consisting of a single angle section to carry a working load of 150 kN. Use bolted connection with M18 bolts of property clause 5.6. If the length of the member is 2 m check for slenderness ratio. | 20 |
| 6 a. | Explain the various modes of failure of compression members. | 6 |
| | b. A column consisting of ISHB400 @759.3 N/m bar a length of 4.5 m. It is hinged at both ends. Determine the axial load carried by column, if $f_y = 250 \text{ MPa}$, $E = 2 \times 10^5 \text{ MPa}$. | 14 |

UNIT - IV

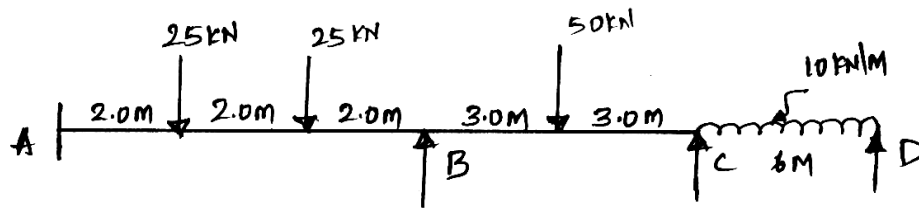
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|------|--|----|
| 7 a. | Design a battened column with two channels back-to-back of length 8 m to carry an axial factored load of 1000 kN. The column is hinged at both ends. | 20 |
| 8 a. | Write the design steps of column splicing of columns of different sections. | 6 |
| | b. Design a slab base for a column ISHB300 @58.8 kg/m subjected to a service load of 1500 kN. The grade of concrete for pedestal of M20 and SBC of the soil is 180 kN/m ² . | 14 |

UNIT - V

9 a. Explain plastic analysis of continuous Beams.

6

b. Determine the plastic moment for a continuous beam of uniform cross section as shown below. The load factor is 1.70.



14

10. A roof hall measuring $6\text{ m} \times 13.7\text{ m}$ consists of 120 mm thick RCC slab supporting on a steel I-section spaced @3.5 m C/C. The hall is having wall of 30 cm thick all around. The finishing load on the roof is 1 kN/m^2 and LL is 2 kN/m^2 . Design steel beam and apply all necessary check for the design. Assume width of bearing as 75 mm.

20

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