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INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Regular) - May, 2019

Regulation: IARE-R18

ADVANCED STEEL DESIGN

Time: 3 Hours

(STE)

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) What are the load combinations for the design purposes? [7M]
 (b) Write short notes on stability against overturning and sway. [7M]
2. (a) Can structural elements fail in a brittle manner? Give example. [7M]
 (b) There are three design philosophies for designing steel structures – The working stress, the ultimate method, and the limit state. In what sense limit state method of design is more rational. [7M]

UNIT – II

3. (a) Explain in detail about plastic hinge [7M]
 (b) Explain the methods of plastic analysis [7M]
4. (a) Explain about web buckling . [7M]
 (b) An I-section beam is fabricated with plates of following dimensions.
 Flange : 380 x 20 mm, Web : 1600 x 15 mm.
 Classify flanges, web and the section. Also determine the plastic moment capacity of the beam about its strong axis, if the grade of steel is Fe 410. [7M]

UNIT – III

5. (a) Write short notes on column splices. [7M]
 (b) Design a steel column using single rolled I-section to carry an axial load of 850 kN. Both of the columns are restrained against translation and rotation. The actual length of column between intersections is 6 m. The yield stress of steel is 250 MPa [7M]
6. (a) Write short notes on Bracing connections. [7M]
 (b) Design a laced column with two channels back to back of length 08 m to carry an axial factored load of 1200 kN. The column may be assumed to have restrained in position but not in direction at both ends. [7M]

UNIT – IV

7. (a) How first-order plastic analysis does differ from the second-order inelastic analysis? Why are restraints required in members designed by plastic method. [7M]
- (b) Design a stanchion 3 m long, in a building, subjected to a factored load of 500 kN. Both ends of the stanchion are effectively restrained in direction and position. Use steel of grade Fe 410. [7M]
8. (a) Define (i) Design life (ii) Fabrication tolerance [7M]
- (b) A steel column is of 4 m height with both of its ends restrained against translation and rotation, it is built up of an ISHB 400 @ 822 N/m with two cover plates of 420 x 20 mm size one on each flange connected by fillet welds along the length of flanges. The yield stress of steel is 340 MPa. Determine the design strength of the column assuming gross area of section is effective insisting compression. [7M]

UNIT – V

9. (a) Write short notes on biaxial bending. [7M]
- (b) Design a slab base for a column ISHB300 @ 630 N/m to carry an axial factored load of 1100 kN. Assume Fe410 grade steel and M20 grade concrete is used provide welded connection between column and base plate. [7M]
10. (a) Write short notes on steel beams in flexure [7M]
- (b) Design a gusset base for a column ISHB350 @ 710 N/m with two plates 430 x 20 mm carrying a factored load of 3400 kN. The column is to be supported on concrete pedestal built with M20 concrete. [7M]

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