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Question Paper Code: 42692

M.E.DEGREE EXAMINATION, NOV 2016

Elective

Structural Engineering

14PSE512 - DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES

(Regulation 2014)

Duration: Threehours

Maximum: 100 Marks

Answer ALL Questions

(Use of relevant IS codes and Deign aids are permitted)

PART A - (5 x 1 = 5 Marks)

1. The tendency of the concrete slab to separate from the steel section is called
(a) shear (b) uplift (c) slip (d)torsion
2. Plastic composite sections are used in
(a) Columns (b) Beams (c) Truss (d) Continuous bridge girder
3. The reduction factor due to column buckling is a function of
(a) nondimensional slenderness (b) axial load
(c) moment (d) shear force
4. A composite box girder section has high
(a) Flexural stiffness (b) Torsional stiffness
(c) Compression (d) None of these
5. A composite box girder section has high
(a) torsional stiffness (b) flexural stiffness
(c) bending stiffness (d)compression

PART - B (5 x 3 = 15 Marks)

6. List the advantages of steel as a structural material.
7. What do you mean by second order effects?

8. Mention the types of shear connections.
9. Sketch typical section of box girders used for composite bridges.
10. What is the response of composite structures to seismic effects?

PART - C (5 x 16 = 80 Marks)

11. (a) Discuss about the determination of ultimate moment capacity of a composite section with profile sheeting. (16)

Or

- (b) Explain the behavior of a composite deck slab and beam construction with neat sketches. (16)
12. (a) Design a mid span section of a simply supported composite beam with 10m span. The beams are spaced 3m c/c to over 18m length of hall. Thickness of slab is 120mm. The floor is to carry an imposed load of 2.5 kN/sq.m and partition load of 1.5 kN/sq.m. Assume floor finish load of 0.4 kN/sq.m. Assume suitable data if necessary. (16)

Or

- (b) The composite column of size 400X400X400 mm under the design axial load of 1200 kN and bending moment about XX axis is of 200 kNm with steel section ISMB 250 is at the center. Steel reinforcement is 4 Nos of 12 mm dia bars. Check the adequacy of the Section for uniaxial bending. Adopt M30 and Fe 415 steel. (16)
13. (a) An ISMB 250 is supporting a slab of thickness 125mm. the steel beam of 5.5m span are spaced at 4m interval. The slab is subjected to a super imposed load of 2 kN/m². Design the suitable connectors between steel beam and RC Slab to ensure full interaction. (16)

Or

- (b) (i) Discuss the load bearing mechanism of the shear connectors. (8)
- (ii) Discuss the behaviour of various types of shear connectors with neat sketches. (8)
14. (a) Explain briefly about the behaviour of box girder bridges. (16)

Or

- (b) Explain the step by step procedure for design of box girder bridge. (16)
15. (a) Brief any one case study on steel concrete composite construction in buildings. (16)

Or

- (b) Explain the seismic behavior of composite beams and columns. (16)