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**Question Paper Code: 42961**

M.E.DEGREE EXAMINATION, MAY 2017

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. Failure of bond between steel element and concrete element is  
(a) Interface failure      (b) Debonding      (c) Shear failure      (d) None
2. The partial safety factor for dead load as per Eurocode is  
(a) 1      (b) 1.15      (c) 1.2      (d) 1.35
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 the above
5. The yield stress for HYSD based on IS:1139-1966 is  
(a) 415 N/mm<sup>2</sup> (b) 425 N/mm<sup>2</sup> (c) 345 N/mm<sup>2</sup> (d) 260 N/mm<sup>2</sup>

PART - B (5 x 3 = 15 Marks)

6. Differentiate composite and non-composite section.
7. How the composite structures behave under static loading?
8. Define shear connection.

9. Mention any two advantages of using box girder bridge.
10. What is the response of composite structures to seismic effects?

PART - C (5 x 16 = 80 Marks)

11. (a) Explain the theory and design principles of composite constructions. (16)

Or

- (b) Discuss the properties of materials used in steel – concrete composite construction. (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 cover 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) A square composite column of size 400mm consists of a steel section ISHB 250 and steel reinforcement in terms of 4 nos. 16mm diameter bars of Fe415 grade. The column carries a design load of 1600 kN. The height of the column is 3m. Check the adequacy of the section. Assume suitable data if necessary. (16)

- 13 (a) With neat sketch explain the types of shear connectors. (16)

Or

- (b) 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/m<sup>2</sup>. Design the suitable connectors between steel beam and RC Slab to ensure full interaction. (16)

14. (a) Explain briefly about the behaviour of box girder bridges. (16)

Or

- (b) State and explain the general design principles of composite box girder bridges. (16)

15. (a) Explain the characteristic strength of shear connectors. (16)

Or

- (b) Explain about any two case studies on steel concrete composite construction in buildings. (16)