C **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 55U12

M.E. DEGREE EXAMINATION, NOV 2019

Elective

Structural Engineering

15PSE512–DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES

(Regulation 2015)

((Use of IS11384, IS 800 and Steel Tables is permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 1= 5 Marks)

1. A composite beam can fail by CO1- R

   (a) Deflection (b) Shear only (c) Flexure only (d) Flexure or shear

2. The partial safety factor for dead load as per Eurocode is CO2 -R

   (a) 1 .15 (b) 1.5 (c) 1 (d) 1.35

3. Studs are examples of CO3- R

   (a) Flexible connector (b) Rigid connector (c) Bond connector (d) All the above

4. Composite box girder bridges have been widely used for spans ranging from CO4 -R

   (a) 20 to 30m (b) 45 to 100m (c) 30 to 50m (d) 25 to 40m

5. Mechanical interlocks are used to prevent _____ CO5- R

   (a) Shear bond failure (b) Buckling (c) Deflection (d) Torsion

PART – B (5 x 3= 15Marks)

6. What is meant by transformed section? CO1-U

7. What do you mean by second order effects? CO2-U

8. What do you mean by push out test? CO3-R

9. Sketch the cross section of a composite box girder bridge. CO4-R

10. Define: Ductility. CO5-U

PART – C (5 x 16= 80Marks)

11.	(a)	Derive the expressions for ultimate moment of resistance of composite beams as per Eurocode 4 provisions.	CO1- U	(16)
		Or		
	(b)	Derive the expression for ultimate moment of resistance of composite beams as per IS 11384 provisions.	CO1- U	(16)
12.	(a)	Design a composite column for an axial load of 350 kN and a bending moment of 35 kNm. Use M25 concrete. Assume suitable data.	CO2- App	(16)
		Or		
	(b)	Design a simple supported composite beam with 12m span spaced at 3m c/c. Thickness of slab = 100mm. The floor has to carry an imposed load of 3 kN/m^2, a construction load of 0.75 kN/m^2 and a floor finish load of 0.5 kN/m^2. Check the adequacy of section at construction stage and composite stage. Calculate deflection and stresses. Use M 25 grade concrete.	CO2- App	(16)
13.	(a)	Define: Strength of shear connectors. With neat diagrams explain the push out test on shear connectors.	CO3-U	(16)
		Or		
	(b)	Discuss the load bearing mechanism of the shear connectors with neat sketches.	CO3-U	(16)
14.	(a)	Explain the structural behavior of box girder bridge and its suitability for the composite constructions.	CO4 -U	(16)
		Or		
	(b)	Explain the process of initial design stage for box girders highlighting the economic and practical considerations.	CO4 -U	(16)
15.	(a)	Explain with neat sketches the seismic behavior of composite beams.	CO5-U	(16)
		Or		
	(b)	lllustrate a case study in steel - concrete composite construction in buildings.	CO5-U	(16)