

B.TECH. SEM -V (CIVIL) 2014 COURSE (CBCS) : WINTER - 2017

SUBJECT : STRUCTURAL DESIGN – I

Day : **Thursday**
Date : **11/01/2018**

W-2017-2121

Time : **02.30 PM TO 06.30 PM**
Max. Marks : **60**

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of IS-800, IS-875, steel table, calculator is **ALLOWED**.
- 4) Use of steel Fe-410 ($f_y = 250$ MPa, $f_u = 410$ MPa) unless specified otherwise.
- 5) Assume suitable data if necessary.

- Q.1** a) Explain limit state of strength and limit state of serviceability. [05]
b) Explain types of steel structures with neat sketches. [05]

OR

Enlist design philosophies used for design of steel structure and explain limit state method of design. [10]

- Q.2** a) Write advantages and disadvantages of welded connections over bolted connections. [05]
b) Explain modes of failure of bolted connections. [05]

OR

An ISA $60 \times 60 \times 6$ connected to 10 mm thick gusset plate to carry factored tensile force 200 kN. Design welded connections. Use 3 mm size of shop weld. [10]

- Q.3** Determine design tensile strength of 2ISA $90 \times 60 \times 6$ connected back to back on opposite side to 12 mm thick gusset plate by 4 nos. of M20 bolts of grade 4.6. [10]

OR

Design a tie member using double angle to carry factored axial tensile force 450 kN. Also design bolted connections by using M20 bolt. [10]

- Q.4** Explain factors affecting on design compressive strength of column. Also explain modes of failure of column. [10]

OR

An 2ISA $90 \times 90 \times 12$ connected back to back on opposite side to 12 mm thick gusset plate by using 4 bolts of M20 bolts. Determine design compressive strength of member. Take effective length of member is 2.1 m. [10]

- Q.5** Determine design compressive strength of column consisting 2ISMC300 back to back spaced by 200 mm connected using single lacing system with bolted connection. Length of column is 7 m with one end fixed and other end hinged. [10]

OR

Design a slab base of an ISMB400 used as a column to carry an axial compression 600 kN. Use M20 grade of concrete. [10]

- Q.6** Explain effect of following on design of beam- [10]
i) Laterally unsupported beam ii) Web buckling and web crippling

OR

An ISMB 400 used as a laterally restrained beam for a simply supported span of 5 m. Determine safe UDL carried by the beam. [10]

* * * *