

Total No. of Questions : 6]

SEAT No. :

P5385

[Total No. of Pages : 2

T.E./Insem.-603
T.E. Civil (Semester-I)
STRUCTURAL; DESIGN -I
(2015 Course)

Time : 1 Hrs. 30 Min.]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
- 2) *Neat sketches must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Take Fe 410 grade of steel.*
- 5) *Take ultimate stress in bolt, $f_{ub} = 400 \text{ N/mm}^2$.*
- 6) *Assume suitable data, if necessary.*
- 7) *Use of electronic pocket calculator IS: 800-2007 and steel table allowed.*
- 8) *Use of cell phone is prohibited in the examination hall.*

- Q1)** a) State and explain application of tension member with its cross section in industrial steel structures. **[4]**
- b) Determine design tensile strength due to yielding and rupture of an ISA $90 \times 90 \times 6$ @ 8.2 kg/m which is connected to the 8 mm thick gusset plate by 3 number of M20 black bolts of 4.6 grades. **[6]**

OR

- Q2)** a) State and explain classification of hot rolled steel section with stress diagram. **[4]**
- b) Design a tie member of length 2.3 m in a truss to carry axial tension 150 kN using single unequal angle section. Assume angle is connected to 8 mm thick gusset plate by 4 numbers of M20 bolts. **[6]**
- Q3)** a) Explain in brief effective length of compression members of truss using angle sections. **[4]**

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- b) Check the adequacy of two-ISA $70 \times 70 \times 6$ @ 6.3 kg/m subjected to factored compressive force 200 kN. Assume angles are connected back to back on opposite side of 8 mm thick gusset plate by fillet weld. Assume length of strut is 2.5 m. [6]

OR

- Q4) a)** A 6 m long column is effectively held in position at both ends and restrained against rotation at one end. If an ISHB 400 @ 77.4 kg/m is used, calculate design compressive strength of the column. [4]

- b) A column 10 m long consist 2-ISM 300 @ 35.8 kg/m spaced 200 mm back to back to carry a factored load of 1100 kN. The column is restrained in position but not in direction at both ends. Design a batten system with bolted connection. [6]

- Q5)** Explain types of column bases and design the size of slab base for a column ISHB 350 @ 67.4 kg/m supporting a factored axial compression of 1200 kN. Consider grade of concrete as M20. [10]

OR

- Q6)** Check the adequacy of ISHB 450 @ 85.4 kg/m to carry a factored compressive load of 750 kN at an eccentricity of 270 mm about major axis. The effective length of column is 3 m. Consider only section strength. [10]

