

Total No. of Questions : 6]

SEAT No. :

P39

Oct./TE/Insem.-153

[Total No. of Pages : 2

T.E. (Civil)

STRUCTURAL DESIGN - I

(2015 Course) (Semester - I)

Time : 1½ Hour]

[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 should 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 a section ISA $90 \times 90 \times 6$ @ 8.2 kg/m which is connected to the 8 mm thick gusset plate by 5 mm fillet weld. **[6]**

OR

Q2) Design a tie member of length 2.5 m in a roof truss to carry an axial force 200 kN using double equal angle section. Assume angle is connected to 8 mm thick gusset plate by 4 numbers of M20 bolts. **[10]**

Q3) a) Differentiate lacing and battening in built up column section. **[4]**

b) 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 section. **[6]**

OR

P.T.O.

Q4) A compression member of 4 m long consists of 2 ISA $100 \times 100 \times 8$ mm @ 12.1 kg/m connected to each side of 12 mm thick gusset plate by fillet weld. Calculate the design strength of the section and design the connection. Also draw the design sketch. [10]

Q5) a) State the type of column bases and differentiate slab base & gusseted base. [4]

b) Design slab base for a column section ISHB 350 @ 67.4 kg/m supporting a factored axial load of 420 kN rest on M20 grade of concrete pedestal. [6]

OR

Q6) Design eccentric column carrying factored force 1000 kN at an eccentricity of 150 mm along the minor axis for section strength. The ends of the column are hinged with an unsupported length of 5 m and compression flanges are laterally unsupported. [10]

