

Total No. of Questions : 6]

SEAT No. :

P5616

[Total No. of Pages : 2

TE/INSEM./OCT.-3

T.E. (Civil)

STRUCTURAL DESIGN - I

(2012Pattern) (Semester - I)

Time : 1½ Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) *Answer Q.No1 or Q.No.2 Q.No.3 or Q.No.4, Q.No.5 or Q.No.6.*
- 2) *Neat diagrams 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 classification of cross section with bending stress distribution. [4]
- b) Design a double angles tension members connected on each side of 10 mm thick gusset plate to carry an axial load of 340 kN. Use shop weld for connection. [6]

OR

- Q2)** a) Explain partial safety factors and characteristic load in limit state design. [4]
- b) A tension member of roof truss consists of 2 ISA 90 × 90 × 12 mm @ 15.8 kg/m placed back to back connect to 12 mm thick gusset plate by 5 bolt of 20 mm diameter. Determine design tensile strength due to yielding and rupture. [6]

- Q3)** a) State and explain the factors affecting design strength of compression members. [4]
- b) Check the adequacy of 2 ISA 80 × 80 × 8 @ 9.6 Kg/m to factored axial compressive load of 180 kN. Two angles are connected on either side of 10 mm thick gusset plate by 4 numbers of M 20 black bolts of 4.6 grades. The effective length of strut is 2.5m. [6]

OR

P.T.O.

Q4) A column consisting of 2 - ISMC 350 @ 42.1 Kg/m Spaced by 220 mm for an effective length 6 m to carry factored axial compressive load of 1800 kN. Design a suitable batten system with bolted connection and draw the design details. **[10]**

Q5) Design a gusseted base for a column ISHB 350 @ 67.4 Kg/m supporting a factored axial compression of 1700 kN. Consider grade of concrete as M20 and gusset angle ISA 150 × 115 × 15mm. **[10]**

OR

Q6) A column section ISHB 300@ 63.0kg/m having effective length of 4 m is subjected to factored axial load of 650 kN and factored moment of 50 kNm about major axis. Determine the section strength. **[10]**

