

Total No. of Questions : 10]

SEAT No. :

**P3466**

**[5560]-103**

[Total No. of Pages : 3

**T.E. (Civil)**

**STRUCTURAL DESIGN-I**

**(2012 Course) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 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.*

**Q1) a)** State and explain classification of hot rolled steel section with stress diagram. Classify the section ISHB 350 @ 67.4 Kg/m and ISA 75×75 ×8 mm @ 8.9 kg/m. **[6]**

b) A column 8 m long consisting 2 ISMC 300 @ 35.8 kg/m spaced at 180 mm back to back. The column is restrained in translation but not in rotation at both ends. Determine design strength of section. **[4]**

OR

**Q2) a)** Determine the design tensile strength due to yielding and rupture of the section ISA 75×75 ×8 mm @ 8.9 kg/m connected by 4 bolts of 16 mm. **[4]**

b) Design double angle continuous strut of 2 m, carries a factored load of 200 kN assuming section placed on either side of gusset plate. **[6]**

**Q3) a)** A 5 m long column is effectively held in position and restrained against rotation at both ends subjected to 650 kN. Design the section using medium weight I section. **[6]**

b) Differentiate slab base and gusseted base. **[4]**

OR

**P.T.O.**

- Q4) a)** State and explain lacing and bracing with suitable example. [4]
- b)** Check the adequacy of ISHB 400 @ 82.2 kg/m to carry a factored axial compressive load of 600 kN at an eccentricity of 200 mm about major axis considering section strength. The effective length of column is 4.5 m. [6]

**Q5)** An ISMB 550 @ 103.7 kg/m has been used as a simply supported beam over 6 m span. Determine the safe uniformly distributed load  $w$  so that the beam can carry safely in flexure. Assuming compression flange is unrestrained throughout the span against lateral buckling. [16]

OR

**Q6)** Design suitable I section for simply supported beam of span 6 m. The beam is subjected to a factor uniformly distributed load 90 kN/m. The beam is laterally supported throughout the span. Also check for serviceability. [16]

- Q7) a)** An ISLB 350 @ 49.5 kg/m transmit an end reaction of 600 kN under factored load to the web of ISWB 500 @ 95.2 @ kg/m. Design bolted framed connection. [12]
- b)** Explain beam to beam and beam to column connection with suitable sketches. [4]

OR

**Q8)** A simply supported welded plate girder of an effective span of 20 m subjected to uniformly distributed load 24 kN/m throughout the whole span excluding the self weight of plate girder and central point load of 500 kN. Assuming compression flange laterally supported throughout the span, design cross section of plate girder, check for shear buckling of web, shear capacity of end panels and deflection. [16]

**Q9)** Determine the design force in members AB, AL and BL for a truss as shown in Fig.9. The design wind pressure is 1500 N/m<sup>2</sup>. The truss is covered with GI sheet and the center to center spacing of truss is 4 m. Also design purlin using angle section. [18]

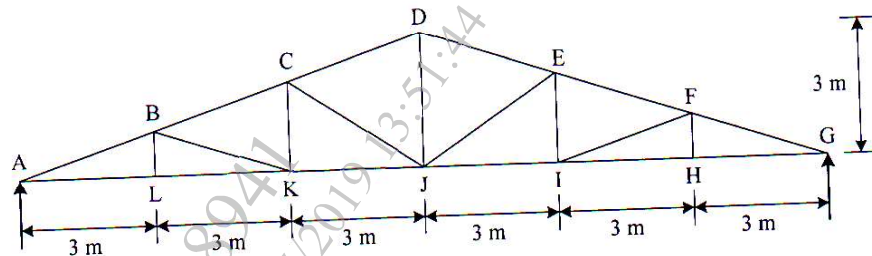


Fig. 9

OR

**Q10)** Design cross section of gantry girder to carry electric overhead traveling cranes with following data. **[18]**

Span of gantry : 6 m, span of crane girder: 16 m, Crane capacity: 250 kN, Self weight of crane girder including trolley: 240 kN, Minimum hook approach: 1.2 m, Center to center distance between wheels: 3.2 m and self weight of rails: 300 N/m.

