Total No. of Questions : 10]

SEAT No. : ____

P3240

[Total No. of Pages : 3

[5353] - 103
T.E. Civil End Sem.
STRUCTURAL DESIGN - I
(2012 Pattern) (Semester - I)

Time :3 hours] ***[Max. Marks :70***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2. Q.3 or Q.4, Q5. 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, fub = 400 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 the advantages and disadvantage of steel as structural material. **[4]**

b) A column 10m long consisting 2 ISMC 300@ 35.8kg/m spaced at 190mm back to back to carry factor load of 1200 kN. The column is restrained in translation but not in rotation at both ends. Design suitable lacing system. **[6]**

OR

Q2) a) Determine the block shear strength of the tension member ISA 75 × 75 × 8 mm @ 8.9 kg/m connected by 2 bolts of 20mm with 10mm thick gusset plate. **[4]**

b) Design double angle discontinuous strut to carry a factored load of 160 kN. The length of the strut is 2.3m considering angles are placed on opposite side of gusset plate. **[6]**

Q3) a) A 6 m long column is effectively held in in position and restrained against rotation at both ends. If an ISHB 350@ 67.4 kg/m is used, calculate design compressive strength of the column. **[4]**

b) Explain types of column bases with suitable sketches **[6]**

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OR

Q4) a) State and explain classification of cross section by bending stress distribution. **[4]**

b) Check the adequacy of ISHB 400 @ 82.2 kg/m to carry a factored axial compressive load of 700 kN at an eccentricity of 150 mm about major axis cindering section strength. The effective length of column is 3m.**[6]**

Q5) a) An ISLB 550 @ 86.3 kg/m has been used as a simply supported beam over 8 m span. Determine the safe uniformly distributed load w so that the beam can carry safely in flexure. Assuming compression flange is restrained throughout the span against lateral buckling. **[12]**

b) Explain web buckling and crippling with suitable sketches. **[4]**

OR

Q6) Design suitable I section for simply supported beam of span. 6m. The beam is subjected to a dead load of 30kN/m and a live load of 40 kN/m. The beam is laterally unsupported throughout the span. Also check for serviceability.**[16]**

Q7) a) An ISLB 350 @ 49.5kg/m transmit an end reaction of 400 kN under factored load to the web of ISWB 500 @95.2kg/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 25 kN/m throughout the whole span excluding the self weight of plate girder. Assume compression flange laterally supported throughout the span. Design cross section of plate girder, check for shear buckling of web and shear capacity of end panels. **[16]**

Q9) Determine the design forces in the members AB,AL and BL of a truss as shown in Fig. 9.The design wind pressure is 900 N/m^2. The truss is covered with AC sheet and the center to center spacing of truss is 6m. **[18]**

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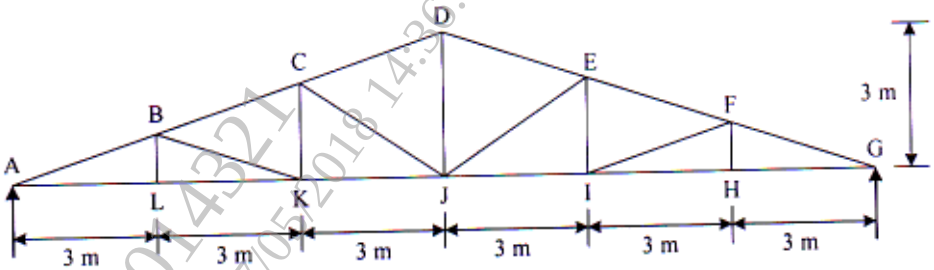

Fig. 9

OR

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

Span of gantry: 4m, Span of crane girder: 15m, Crane capacity:320 kN, self weight of crane girder excluding trolley : 40 kN, Minimum hook approach: 1m, center to center distance between wheels:3.2 m and self weight of rails 300N/m.