Sub Code: RCE701

Paper Id: 100749 Roll No:

B.TECH
(SEM VII) THEORY EXAMINATION 2019-20
DESIGN OF STRUCTURES-III

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
2. Use of IS 800:2007 is permitted.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a.	Determine the minimum pitch and end distance for M 20, 4.6 grade bolts.
b.	List the IS clause for minimum and maximum size of the weld.
c.	Discuss the utility of splices in tension members.
d.	Enlist the formula to calculate various types of strengths in a tension member.
e.	List various modes of failure of compression members in steel structures.
f.	Discuss the utility of gantry girder in brief.
g.	Define prying forces.

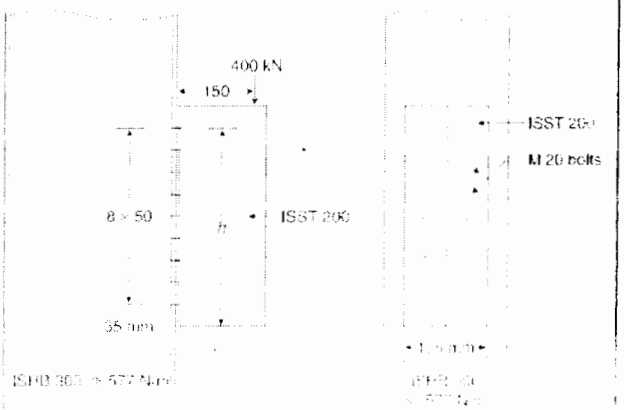
SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a.	Explain the stress- strain curve of mild steel with the help of a labeled diagram. Clearly indicate the extent of every region.
b.	A tie member in a truss girder is 260mm x 16mm in size. It is welded to a 12mm thick gusset plate by a fillet weld. The overlap of the member is 280 mm and the size of the weld is 6mm. Determine the design strength of the joint if the welding is done on 3 sides of the truss girder. State the increase in the strength of the joint if welding is done all around? Assume shop welding.
c.	Explain block shear strength in tension members with the help of a well labeled diagram. Also state the corresponding formulas where symbols have their usual meaning.
d.	Design a column to support a factored load of 1090KN. The column has an effective length 6.9m with respect to z- axis and 5.1m with respect to y axis. Use steel of grade Fe 410.
e.	Explain the phenomenon of web buckling and web crippling in steel beams with the help of a well labeled diagram.

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Design a suitable bolted bracket connection for connecting a ISST-200 section to the flange of a ISHB 300 @ 577 N/m to carry a vertical factored load of 400 kN at an eccentricity of 150 mm. Use M20 bolts of grade 4.6 [Ref. Fig.] 
(b)	Explain various types of loads taken into consideration while designing a steel structure.

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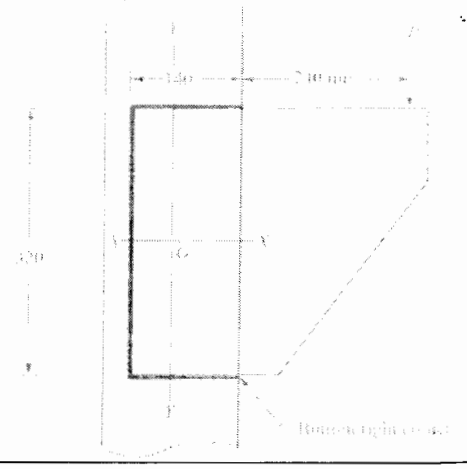
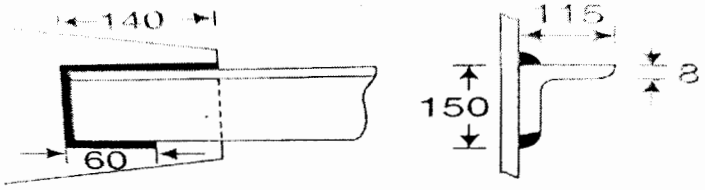
4. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Distinguish between Working stress method and Limit state method of design of steel structures.
(b)	Determine the max load that can be resisted by a bracket shown in fig. fillet weld of size 6mm is provided as shop welding. 

5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	A tension member of a roof truss carries a working axial tension of 286.67 KN. Design the section and the connection using lug angle.
(b)	Compute the tensile strength of an angle section ISA 150 x 115 x 8 mm of Fe 410 grade of steel connected with the gusset plate as shown in Fig below for the following cases: $A_g = 2058\ mm^2$. i). Gross section Yielding ii). Net section Rupture 

6. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Design a built up column 10m long to carry a factored axial load of 1100KN. The column is restrained in position but not in direction at both the ends. Provide single lacing system with bolted connections. Assume the two channel sections are placed back to back.
(b)	Design a single angle discontinuous strut to carry a factored axial compressive load of 70KN. The length of strut is 3m between intersections. It is connected to 12mm thick gusset plate by 20mm diameter 4.6 grade bolts. Use steel of grade Fe 410.

7. Attempt any *one* part of the following: 7 x 1 = 7

(a)	Design a laterally unsupported beam for the following data:	
	Effective span	3.8m
	Maximum bending moment	540 KN-m
	Maximum shear force	210 KN
	Steel of grade	Fe 410
(b)	Design a laterally supported beam for the following data:	
	Effective span	5.5m
	Maximum bending moment	160 KN-m
	Maximum shear force	220 KN
	Steel of grade	Fe 410