

END TERM EXAMINATION

FIFTH SEMESTER [B.TECH] DECEMBER 2015-JANUARY 2016

Paper Code: ETCE-305

Subject: Design of Steel Structure

Time: 3 Hours

Maximum Marks: 75

Note: Attempt any five questions including Q.no.1 which is compulsory.
IS: 800: 2007 allowed. Steel table allowed. Appropriate assumption allowed in design question.

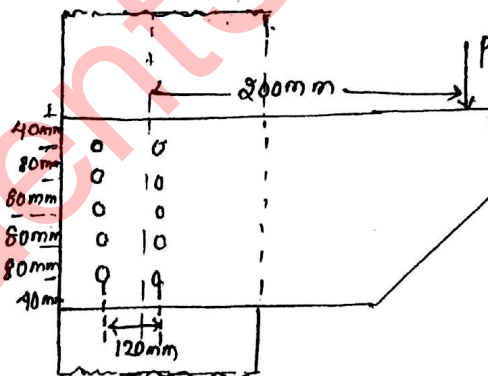
Q1 Answer all: (5x5=25)

- A 20 mm thick plate is joined to a 18 mm plate by 200 mm long (effective) butt weld. Determine the strength of joint if a single -V butt weld is used.
- Design the axial load capacity of the column ISHB300@577 N/m if the length of column is 3 m and its both ends are pinned.
- (i) When plate girder is preferred over rolled section? With neat sketch show various component of plate girder.
(ii) Write a short note on web crippling.
- Determine the collapse load of fixed beam with udl (length = L, unit weight = w, Total weight = W) using static and kinematic method.
- Derive the expression for shape factor of hollow circular section.

Q2 Design a double angle section to carry a tension of 300 KN. The end connection is to be made using M 20 bolts of product grade C and property class 5.6. Assume that angle are provided on both sides of gusset. The yield and ultimate strength of steel are 250 MPa and 410 MPa, respectively. (12.5)

OR

Q3 Determine the safe load P that can be carried by the joint shown in figure given below. The bolts used are 20 mm diameter of grade 4.6. The thickness of the flange of I-section is 9.1 mm and that of bracket plate 10 mm. (12.5)



Q4 Design a battened column with two channel back to back of length 10 m to carry an axial factored load of 1400 KN. The column may be assumed to be restrained in position but not in the direction at both ends. (12.5)

OR

Q5 Design a single angle discontinuous strut to carry a factored axial compressive load of 65 kN. The length of strut is 3 m between intersections. It is connected to 12 mm thick gusset plate by 20 mm diameter 4.6 grade bolts. Use steel of grade Fe410. (12.5)

P.T.O.

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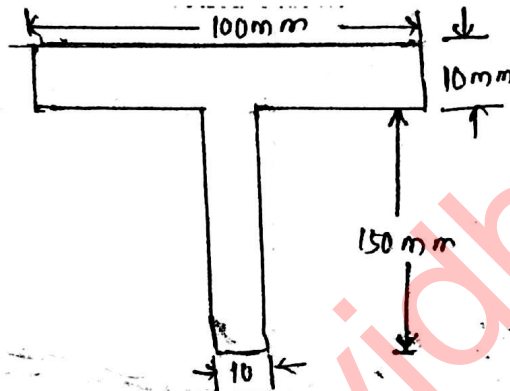
P_{1/2}

- Q6 Design a steel beam section for supporting roof of a big hall for the following data and apply the usual checks. Assume steel grade Fe410. (12.5)
- (a) Clear span = 6 m
 - (b) End bearing = 150 mm
 - (c) c/c spacing of beam = 3 m
 - (d) Imposed load on the beam = 10 kN/m²
 - (e) Dead Load (including self weight) = 4 kN/m².
 - (f) Restriction on beam depth = 375 mm
- The compression flange of beam is laterally supported throughout.

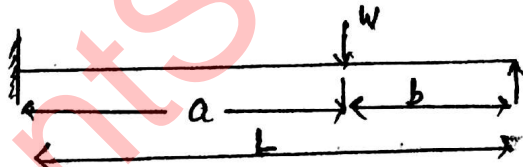
OR

- Q7 Design a welded plate girder of span 24 m to carry superimposed load of 35 kN/m. Avoid use bearing and intermediate stiffeners. Use Fe415 (E250) steel. (12.5)

- Q8 (a) Find the shape factor of T - section below. (8)

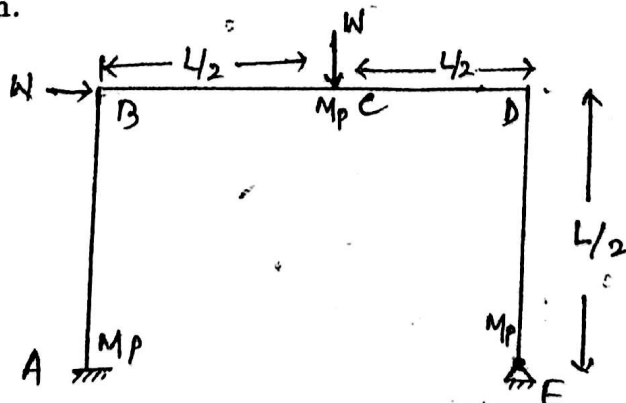


- (b) Find the collapse load 'W' in the figure given below using static and dynamic method. (4.5)



OR

- Q9 Find out collapse load 'W' for a portal frame shown in figure given below. The beam and column are of same cross section. Also draw the plastic moment diagram. (12.5)



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