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M.TECH
(SEM II) THEORY EXAMINATION 2017-18
ADVANCE STEEL STRUCTURES

Time: 3 Hours ***Total Marks: 70***

Note: Attempt all Sections. If require any missing data; then choose suitably.
IS 800- 2007 original copy allowed

SECTION A

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

a. What is Prying Action?
b. State advantages & disadvantages of tubular sections in steel structure
c. State Airy's Theory.
d. Distinguish between Factor of safety and partial factor for loads
e. What are the various types of Connections commonly adopted in steel structures?
f. State the characteristics of HSFG bolts.
g. Write the elements of a Plate Girder.

SECTION B

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

a. Define Sway Bracing of truss girder bridges in brief.
b. Design a lap joint between the two plates each of width 120 mm and of thickness 12mm using bearing type of bolts. The joint has to carry a design load of 150 KN. Use Fe410 grade of steel and M16 bolts of grade 4.6 also draw the cross section and the top view.
c. Discuss the design strength of a tension member as per IS 800: 2007 when one leg of angle is connected to gusset plate with bolt.
d. Discuss the various types of roof trusses for industrial building and classify them.
e. A bridge truss carries an axial pull of 600 KN. It is to be a gusset plate 30mm thick by a double cover butt joint with 22mm diameter power driven rivets. Design an economical joint. Determine the efficiency of the joint.

SECTION C

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

(a) A beam ISMB 400 @ 61.6 kg/m transmits an end shear of 150 KN to the flange of a stanchion ISHB 300 @ 58.8 kg/m. Design an un-stiffened welded seat connection using shop welds.
(b) A member of a truss consists of two angles ISA 80 mm x 80 mm x 6 mm placed back to back. It carries an ultimate tensile load of 175 KN and is connected to a gusset plate 8mm thick placed in between the two connected legs. Determine the number of 16 mm diameter 4.6 grade ordinary bolts required for the joint. Assume f_u of plate as 410 MPa.

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

(a) Explain the tearing failure of plates in a bolted Connection.

(b) A factored load of 150 KN is applied to a bracket at an eccentricity of 350 mm from the axis of a column. This load is transmitted to the flanges of the column with two rows of 20 mm diameter bolts for each bracket plate. The rows are 120 mm apart and the pitch of bolts is 75 mm. Investigate the safety of the design

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

(a) An angle section ISA 100 75X8 mm is used as a tension member with its longer leg connected by 20 mm diameter black bolt. Calculate the net cross-sectional area.

(b) What are the factor affecting the selection of the type of roof trusses.

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

(a) Calculate the design compressive load for a stanchion 350 @710.2 N/m, 3.5 m high. The column is restrained in direction and position at both the ends. It is to be used as an uncased column in a single storey building. Use steel of grade Fe 410.

(b) If ISMB 400@604 N/m is used as a beam, Find out the class of section to which it belongs

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

(a) Write short notes on the following (i) Block Shear failure (ii) Web crippling of a beam

(b) Design a laterally beam to carry a UDL of 60 KN/m . The beam is unsupported for a length of 1.5 mtr and is simply placed on longitudinal beam at its ends.