

Paper Id: **100701**

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B.TECH
(SEM VII) THEORY EXAMINATION 2019-20
DESIGN OF STEEL STRUCTURE

Time: 3 Hours

Total Marks: 100

Note: Attempt Sections in any order as per convenience. No marks will be deducted for any irregularity in the answer sheet.
IS 800: 2007 will be allowed.

SECTION A

1. Attempt questions brief.

2 x 10 = 20

a.	Discuss stress strain behavior of mild steel?
b.	What is the return period used in the wind code?
c.	Define expansion joint.
d.	Why butt joint is superior to lap joint?
e.	What do you mean by strut?
f.	Define lug angle.
g.	Why any rolled I-section widely used as a beam member?
h.	What do you meant by web buckling?
i.	What is the purpose of anchor bolts in a base plate?
j.	What are the load combinations that are usually considered for truss analysis?

SECTION B

2. Attempt any three of the following:

10x3=30

a.	Two plates 10 mm and 18 mm thick are to be joined by double cover butt joint. Design the joint for the following data : Factored design load = 750 kN Bolt = M 20, 4.6 grade Cover plates = 8 mm thick each.
b.	What is the importance of wind load? How it is being calculated for design?
c.	Select a suitable angle section to carry a factored tensile force of 290 kN. Assuming a single row of M 24 bolts and design strength $f_y = 250 \text{ N/mm}^2$
d.	Design a double angle discontinuous strut to carry a load of 250 kN. The length of the strut between c/c of intersections is 3.85 m.
e.	State the difference between purlin and grit. Describe the design of purlin with their load combinations.

SECTION C

3. Attempt any one part of the following:

10x1=10

a.	Distinguish between the working stress method, ultimate strength design and limit state design.
b.	An industrial building of 15 m height is being built at Ajmer near a hillock. The height of the hill is 160 m and the slope is 1 in 4. The building is proposed on the slope at a horizontal distance of 140 m from the base of the hill. Find the design wind pressure.

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4. Attempt any *one* part of the following:

10x1=10

a.	Two plates 10 mm and 14 mm thick are to be jointed by double cover butt joint. Assuming cover plates of 8 mm thickness, design the joint to transmit factored load of 300 kN. Assume Fe 410 plate and 16 mm diameter grade 4.6 bolt.
b.	A tie member consists of two ISMC 250 @ 298.22N/m. The channels are connected on either side of a 12 mm thick gusset plate . Design the welded joint to develop the full strength of the tie. However the overlap is to be limited to 400mm.The channel section is to be welded at site.

5. Attempt any *one* part of the following:

10x1=10

a.	Design a base plate for an ISHB 350 column to carry a factored load of 1200 kN. Assuming Fe 410 grade of steel and M 25 concrete.
b.	Explain with the neat sketch and nomenclature the different types of roof trusses and various load combinations. What are the requirements that are considered while fixing the upper chord slope of trusses.

6. Attempt any *one* part of the following:

10x1=10

a.	Calculate the maximum value of a mid-span concentrated load 'W' that can be safely applied on a laterally unsupported beam of length 3m. The beam is simply supported at either end and is free to rotate in plane but restrained torsionally at their ends. The beam section is ISMB 250 and the load is applied at the top flange at mid span, F_y of steel is 250 MPa.
b.	Design a suitable angle section to carry tensile force of 250 kN. Use welded connection.

7. Attempt any *one* part of the following:

10x1=10

a.	Design the purlins of a truss. It is given that the length of the purlin is 5 m. The dead load, live load and wind load are 301.7 N/m, 620 N/m and ,18373 N/m respectively.
b.	Design a built up tension member to carry a factored force of 340 kN. Use 20 mm diameter black bolts and gusset plate of 8 mm thick.