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B.TECH.
(SEM VII) THEORY EXAMINATION 2021-22
DESIGN OF STEEL STRUCTURES

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

2. IS 800 : 2007 & Steel Table allowed

SECTION A**1. Attempt all questions in brief.**

Q no.	Question	Marks	CO
a.	Write the advantages of steel structure.	2	1
b.	What are the seismic forces ?	2	1
c.	How you classified the connections provided in steel structures?	2	2
d.	Draw the neat sketch of slot and plug welds.	2	2
e.	What do you understand by block shear failure?	2	3
f.	Define shear leg.	2	3
g.	What are the compression members?	2	4
h.	Define Squashing.	2	4
i.	What are the Spandrel beam?	2	5
j.	What are the two important assumptions have to be made to achieve the ideal beam behavior?	2	5

SECTION B**2. Attempt any three of the following:**

Q no.	Question	Marks	CO
a.	A tension bar 100mm X 100 mm is to carry a load of 150 kN. A specimen of the same quality steel of cross section are 800 mm ² was tested in workshop. The maximum load carried by the specimen was 400 kN. Find the ultimate tensile strength, factor of safety in the design and gauge length.	10	1
b.	With neat sketch explain how force transfer of HSBG bolts.	10	2
c.	Design a suitable angle section to carry a factored tensile force of 210 kN assuming a single row of M20 bolts. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa , respectively . The length of the member is 3 m.	10	3
d.	Determine the design axial load on the column section ISMB @ 710.3 N/m, height of column is 4 m and is pin-ended . Assume That $f_y = 250$ N/mm ² , $E=2 \times 10^5$ N/mm ² .	10	4
e.	Write the design procedure of I- section Purlins.	10	5

SECTION C**3. Attempt any one part of the following:**

Q no.	Question	Marks	CO
a.	Explain Cold formed light gauge sections and what are the problem associated with light gauge sections?	10	1
b.	A steel chimney 2.5 m diameter is situated in a region where the intensity of wind pressure is 1000 N/m ² . Assuming the wind pressure to be uniform, calculate the shear force due to wind load at a level 10 m below the top of chimney.	10	1

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4. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	A tie member consist of 2 ISMC 250 . 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 400 mm.	10	2
b.	How you will be Design of bearing bolts subjected to eccentric loading in the plane perpendicular to the groups of bolts.	10	2

5. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Define lateral-torsional buckling with neat sketch and also write the assumptions.	10	3
b.	A double angle section back – to –back 2 ISA 90x90x10 is riveted with 24 mm rivets to a 20 mm gusset plate on one side . Determine the section capacity in tension and also the number of rivets required for develop the 85% tension capacity.	10	3

6. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Design a built-up column consisting of two channels placed toe-to-toe. The column carries an axial factored load of 1500 kn. The effective height of the column is 10 m. Design the lacing also. Assume Fe 415 grade steel.	10	4
b.	With neat sketches describe failure modes of an axially loaded columns.	10	4

7. Attempt any one part of the following:

Q no.	Question	Marks	CO
a.	Design a simply supported beam of span 3.5 m subjected to a factored bending moment of 300 kNm and factored shear of 140 kN. The beam is laterally unsupported . Steel grade of Fe410.	10	5
b.	A simply supported beam of span 4.5 m consist of rolled steel section ISLB 450 @ 640 N/m. The compressive flange is laterally unsupported . Determine the design bending strength of the beam.	10	5