CBCS SCHEME

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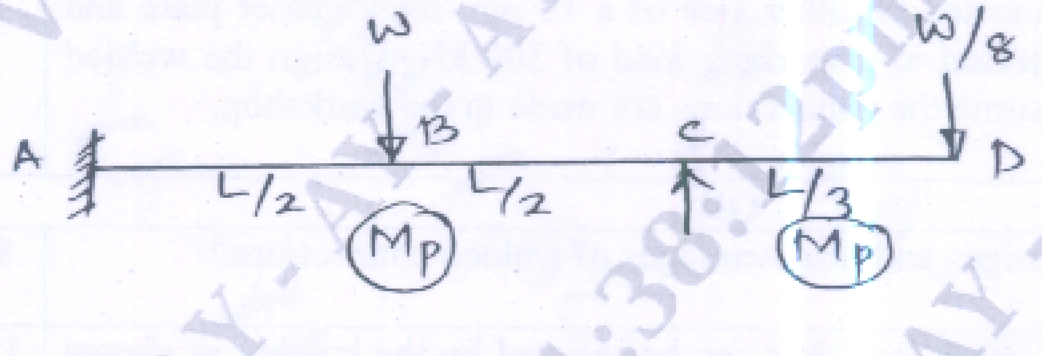
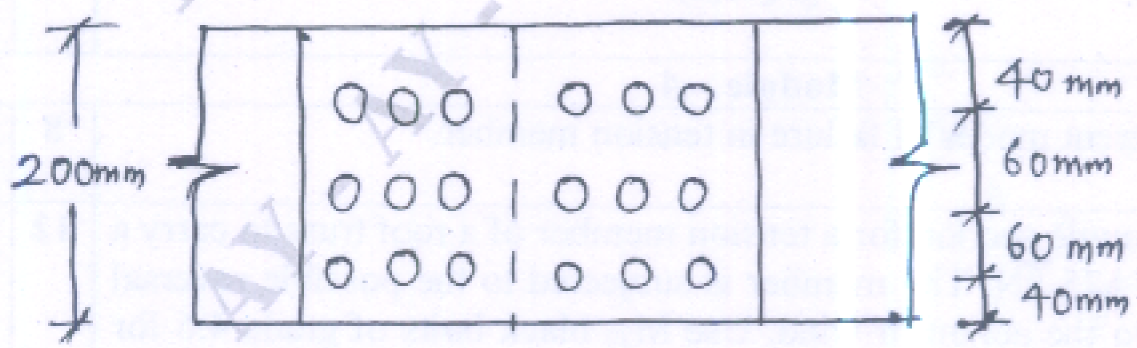
BCV701

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Design of Steel Structures

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of IS-800-2007 code and steel table is permitted.
4. Assume any missing data suitably.

		Module – 1	M	L	C
Q.1	a.	List out the advantages and disadvantages of steel structures.	10	L2	CO1
	b.	Explain the principles of limit state of design in steel structures.	10	L2	CO1
		OR			
Q.2	a.	State upper bound, lower bound and uniqueness theorems.	10	L2	CO1
	b.	A propped cantilever ABCD is loaded as shown in Fig.Q.2(b). Find the collapse load if the beam is of uniform cross section.  Fig.Q.2(b)	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the different failure modes of a bolted joint with neat sketches.	8	L2	CO2
	b.	A double cover butt joint is used to connect two flats of 200 ISF10 with 8 mm cover plates. The two plates are connected by 9 bolts in chain bolting at a pitch of 60 mm and edge distance of 40 mm. The bolts are arranged in 3 rows with 3 bolts in each row as shown in Fig.Q.3(b). Determine the strength and efficiency of the joint. The diameter of the bolts used is 20 mm. Assume property class of bolt as 4.6.  Fig.Q.3(b)	12	L3	CO2

		OR			
Q.4	a.	List out the advantages and disadvantages of bolted connections.	8	L2	CO2
	b.	Find the efficiency of a lap joint as shown in Fig.Q.4(b). Assume M_{20} bolts of grade 4.6 and Fe-410 grade of steel plate.	12	L3	CO2

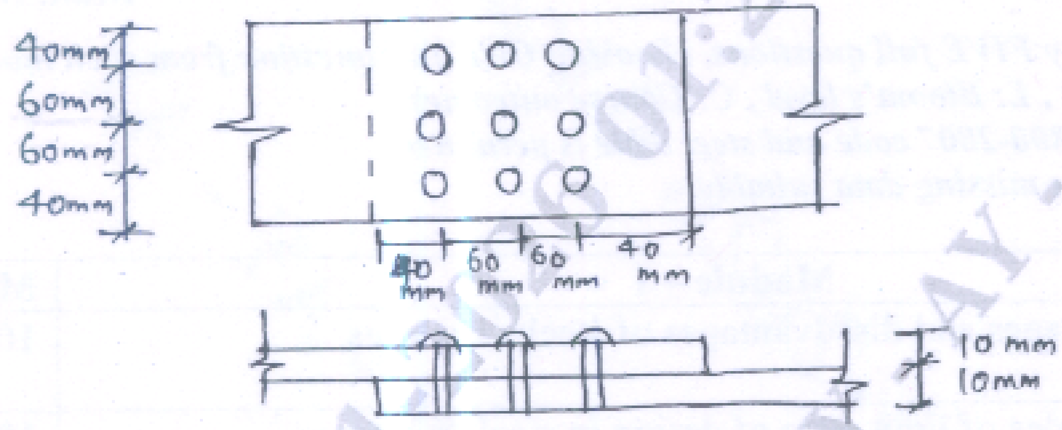


Fig.Q.4(b)

		Module – 3			
Q.5	a.	With neat sketches, explain types and properties of welds.	6	L2	CO2
	b.	A tie member of a roof truss consists of 2ISA (100 × 75 × 8) mm angles. The angles are connected to either side of a 10 mm thick gusset plate and the member is subjected to a working load of 300 kN. Design the welded connections and assume the connections are made in the workshop.	14	L3	CO2
		OR			
Q.6	a.	What are the advantages and disadvantages of welded connections?	8	L2	CO2
	b.	Determine the maximum load that can be resisted by the bracket as shown in Fig.Q.6(b) by fillet weld of size 6 mm.	12	L3	CO2

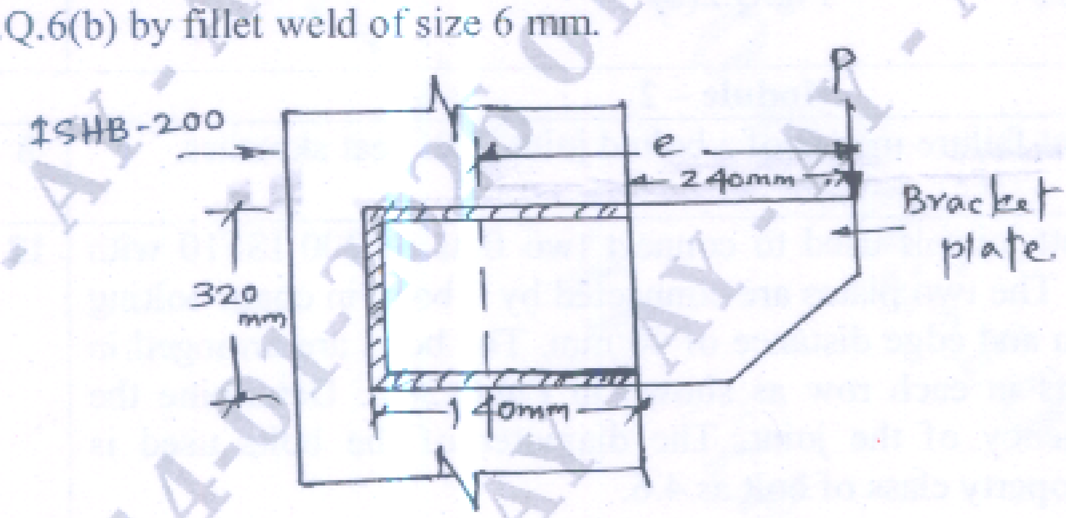


Fig.Q.6(b)

		Module – 4			
Q.7	a.	Explain the different modes of failure in tension member.	8	L2	CO4
	b.	Design a single angle section for a tension member of a roof truss to carry a factored load of 175 kN. The member is subjected to the possible reversal of stresses due to the action of wind. Use M_{20} black bolts of grade 4.6 for the connection and Fe410 grade steel. Draw the connection details.	12	L4	CO4

		OR			
Q.8	**a.**	With neat sketches explain the different types of column bases.	**6**	**L2**	**CO4**
	b.	Design a suitable slab base for a column carrying an axial factored load of 1000 kN. The column section is of ISHB-250 @ 537 N/m. Use M_{20} grade concrete pedestal and 6 mm size of the weld. Also design concrete foundation using safe bearing capacity of soil as 200 kN/m^2.	**14**	**L4**	**CO4**
		Module – 5			
Q.9	**a.**	Determine the design axial load capacity of a column ISHB 300 @ 577 N/m, if the length of column is 3 m and its both ends are pinned.	**8**	**L3**	**CO5**
	b.	Design a single angle strut connected to the gusset plate to carry an axial factored load of 180 kN. The length of the strut between centre to centre intersection is 3 m.	**12**	**L4**	**CO5**
		OR			
Q.10		Design a built up column consisting of two channels placed back to back of length 10 m to carry an axial factored load of 1400 kN. The column may be assumed to have restrained in position but not in direction at both the ends.	**20**	**L4**	**CO5**

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