5th Sem Structural Design-II

1.	2 Marks questions.
	(a) Write down the different types of steel structures.
	(b) Define hardness.
	(c) Define pitch of the bolt.
	(d) Write down the types of welded joints.
	(e) Define slenderness ratio.
	(f) A steel plate 25 cm wide & 12 cm thick, if the diameter of the bolt hole is 20mm, calculate net sectional area of the plate.
	(g) What is the maximum deflection in the beam as per IS:800?
	(h) What is the function of column base?
	(i) What are knots in timber?
	(j) Define Buttress walls.
Q.2	**5 Marks questions**
	(a) Write down advantages and disadvantages of steel structure.
	(b) A tie member consists 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 to 400 mm.
	(c) Explain different modes of failure of tension member.
	(d) Determine the axial load capacity of the column ISHB 300 @ 577 N/m if the length of column is 3m & it's both end pinned.
	(e) Design a slab base for a column ISHB 300 @ 577 N/m carrying an axial factor load of 1000 KN. M20 concrete is used for the foundation. Provide welded connection between column & base plate.
	(f) Determine the load carrying capacity of a strut made with 2 ISA 75× 75, 6mm, back to back if the length member is 3m & welded to a 12 mm gusset plate.
	(g) Discuss about long term deformation in timber.
	10 Marks Questions
Q.3	Design a single bolted double cover butt joint to connect boiler plates of thickness 12 mm for maximum efficiency. Use M16 bolts of grade 4.6. Boiler plates are Fe 410 grade. Find the efficiency of the joint.
Q.4	A column 4m long has to support a factored load of 6000 KN. The column is effectively held at both ends & restrained in direction at one of the ends. Design the column using beam section and plates.
Q.5	Design a simply supported beam of effective span 1.5 m carrying a factored load concentrated load of 360 KN at mid span.
Q.6	Calculate the moment carrying capacity of laterally unstrained beam mode of ISMB 400 & length of member is equal to 4m. Assume necessary suitable data.
Q.7	Write short notes on
	(a) Web crippling & web buckling
	(b) Block shear.

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2 Marks questions

a. Define crinkling in tubular Steel compression member.

b. Define structural Steel.

c. Define gauge distance

d. What do you mean by slot weld and plug weld?

e. Differentiate between web buckling and web crippling of beams.

f. What is effective length of a column?

g. Define net sectional area of a tension member.

h. What is slenderness ratio of a masonry wall?

i. For what type of structure is the tubular Steel sections are suitable?

j. What do you mean by mortar and what are the types of mortars?

5Marks Questions

a. Write down the advantages and disadvantages of steel structure.

b. Explain block shear failure in tension members.

c. Explain different types of butt welds with neat sketch.

d. A ground floor masonary wall is 4m clear height up to bottom of roof slab. Height of plinth above foundation footing is equal to 0.8 metre. If the wall thickness is 30 cm, calculate effective height and slenderness ratio for partial restraint on both ends condition.

e. Determine the tensile strength of a roof Truss 100×75× 10 mm connected to the gusset plate with 100 mm leg by 5 mm fillet weld with length of weld equal to 200 mm. Take fy=250N/mm2.

f. Determine the plastic moment capacity of unsymmetrical I section. Given specifications are:

Top flange- 100 mm × 20 mm
Bottom flange- 200 mm × 20 mm
Web- 200 mm × 20 mm

g   What do you mean by slip critical connection? Explain the principle of high strength friction grip bolts.

10 Marks Questions

3   Find the maximum force that can be transmitted through a double bolted chain lap joint consisting of 6 bolts in two rows at pitch and gauge distances of 40mm. Given that M16 bolts are of grade 4.6 and plates of fe410 are used. The thickness of the plates connected are 10mm and 12 mm. Take end distance and edge distance as 30mm.

4   A laterally supported beam ISMB 600 @1226 N/m is placed between two supports. Determine the safe uniformly distributed load the beam can carry for an effective span of 8 m. Take fy=250N/mm2. Neglect web buckling and web crippling.

5   Design a column section to carry a working axial load of 400 KN. The column is 4 metre long and effectively held in position and restrained against rotation at both ends. Consider fy=250N/mm2.

6   Write the codal provisions of design consideration for masonry walls under eccentric loading.

7   A tie member of a roof Truss consists of two ISA 100 75,8 mm. The angles are connected to either side of a 10mm gusset plate and the member is subjected to a working pull of 300 KN. Design the welded connection, assuming connections are made in workshop.