Question Bank

STRUCTURAL DESIGN-2 (Th-2)

FOR DIPLOMA IN CIVIL ENGINEERING

3rd SEMESTER AS PER SCTE&VT SYLLABUS

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CHAPTER :- 1 Introduction

2MARKS

1) What do you mean by partial safety factor in the limit state method of design?
2) What are the types of structural steel?
3) Define pitch
4) Define bolt value.
5) How are the connections classified?
6) Define staggered pitch.

5MARKS

1) Define the following terms with diagram:
   (i) Pitch of the bolts
   (ii) Gauge distance
   (iii) Edge distance
   (iv) Staggered pitch.
2) Explain special considerations in steel design.

Chapter 2 Structural Steel Fasteners and Connections.

2 MARKS

1) For bolts of property class 4.6, what do the number 4 and 6 indicate.
2) Two plates of 8 mm and 18 mm thickness are to be jointed using longitudinal fillet weld. Suggest a suitable size of weld.
3) Explain different types of butt welds with sketch. Answer any three.
4) Sketch the basic sections and symbols for single V-butt weld.
5) What is the recommended throat thickness for incomplete penetration butt welds welded from one side only?
6) Sketch the basic sections and symbols for single V-butt?

5 MARKS

1) . What do you mean by slip critical connections? Explain the principle of high strength friction grip bolts
2) List the assumptions made in the design of bearing Bolts along with their limitations.
3) Explain different types of butt welds with sketch. Answer any three.
4) State the types of bolts used in structure
5) Write down the advantages of welded connections over bolted connections.

10 MARKS

1) Find the maximum force that can be transmitted through a double bolted chain lap joint consisting of 6 bolts in two rows. Given that M16 bolts are grade 4.6 and plates of Fe 410 are used. The thickness of the plates connected are 10 mm and 12 mm.
2) Design a lap joint to connect two plates 300 mm wide and 16 mm thick using 20 mm diameter bolts of grade 4.6. The applied service load is 375 kN
3) Design a lap joint for two plates of size 120mm × 10 mm and 120 mm × 12 mm for maximum efficiency. Assume shop welding and Fe410 steel?

CHAPTER: - 3 Design of Steel tension Members

2 MARKS

1) Explain block shear failure with sketches for the case of bolted connections.
2) Define net section area of a tension member.

5 MARKS

1) Design a single angle section for a tension number of a roof truss to carry a factored tensile force of 225 kN. The member is subjected to the possible reversal of stress due to the action of wind. The
2) Explain the concept of block shear in the design of tension member.

3) length of the member is 3m. Use 20 mm shop bolts of grade 4.6 for the connection.
4) A be member of a roof truss consists of 2 ISA 90608 man. The angles are connected on the ester side of 10 mm guest plates and the member is subject to a factored pull of 360 kN. Design the welded connection. Assume welding is to be made in the field.

5) Calculate the maximum tensile load that can be taken by an ISA 125 n\times7 mm x 10 m connected through longer leg by fillet welding.

10 MARKS

1) A tension member consists of a flat 100 mm 16 man which is connected to a gusset plate 10 m thick by 2 nos, of 16 mm dia bolts. If steed of grade Fe, and bearing bolts of property class 46 are used in the workshop, determine the strength of the flat against yielding, rupture and block shear .Also determine the maximum load the joint can carry safely.

CHAPTER: -4 Design of Steel Compression members.

2 MARKS

1) Define radius of gyration.

2) What is the value of maximum slenderness ratio for a member carrying compressive loads resulting from dead load and superimposed loads?
3) What is limit of slenderness ratio for a short and solid rectangular column?
4) What is the value of effective length of compression member in case of effectively held in position at both ends restrained against rotation at one end?
5) Mention the types of buckling in a compression member.
6) Define and state the significance of slenderness ratio.

5 MARKS

1) Explain buckling class of cross-sections in compression member.
2) A double angle discontinuous strut consists of two angles ISA 80 80,6 mm and connected by both sides of gusset plate 10 mm thick by two bolts. The length of the strut between Centre intersections is 2.8 m and is Calculate the compressive load. of the strut for steel of grade f-250 N/mm
3) Design a column section to carry a working axial load of 400 kN. The column is 40 m long and effectively held in positions and restrained. against solution at both end. Consider f, -250 N/mm²
4) Write short notes on:
   (i) Crinkling in tubular steel compression members.

10 MARKS

1) Calculate factored axial load on the column section. ISHB 400 @ 806.38 N/M. The height of the column is 3.5m 2nd it is pin-ended. Use steel of Fe_ {410} grade.
2) Design a column section to carry a working axial load of 400 kN. The column is 40 m long and effectively held in positions and restrained against solution at both end. Consider f,-250 N/mm²
3) Determine the design axial load on the column section ISMB 400, given that the height of column is 3.0 m and that is pin-ended. Also assume the following: f = 250 N/mm², f = 410 N/mm² and E= 2 × 105 N/mm².

CHAPTER: -5 Design of Steel beams:

2 MARKS

1) Why retaining walls are provided in will roads?
2) Define retaining wall and breast wall.

5 MARKS

1) Determine the plastic section modulus of a T- section having flange width 200 mm flange thickness 15 mm, depth of web 180 nun and width of web 20 mm.
2) What are the factors that determine the buckling class of structural elements? Determine the buckling class of ISHB 400 @ 806.4 N/m
3) Explain both Web buckling and web crippling.

10 MARKS

1) Design a simply supported beam of effective span 2.5 m carrying a factored concentrated load of 300 kN at mid span point assuming is to be laterally supported (restrained) throughout.

CHAPTER: -6 Design of Tubular Steel Structures:

2 MARKS

1) For what type of structures, the tubular steel sections are suitable?
2) Why tubular steel section is preferred as compression member in place of rolled steel section?

5 MARKS

1) A tubular column consisting of IS: 1161 grade of St. 35 steel is hinged at both the ends. The outside
2)
3) diameter of the tube is 219.1 mm and the weight per unit length is 310 N/m. If the length of column is 4.5 m, determine its safe load carrying capacity
4) What are the necessity of road drainage work, cross drainage works?
5) Explain briefly sub-surface drainage system in highway with sketch.

10 MARKS

1) The principal rafter in a round tubular trues carries a maximum force of 84 kN. A tension member meeting at right angle to the principal

rafter carries a force of 20 kN. Design the member using IS: 1161 grade St. 35 steel for the tube. The panel length along the principal rafter is 1.80 m.

2) A tubular column consists of IS-1161 grade St. 35 steel the column is hinged at both the ends. The outside diameter of tube is 219.1 mm. The weight of 1.5m length of the tube is 330N. The length of column is 4 meter. Determine the safe load carrying capacity of the column.

CHAPTER: -7 Design of Masonry Structures::

2 MARKS

1) What is slenderness ratio of a masonry wall?
2) What is the minimum depth of foundation for a sil with sb.c. of 150 kN/m, unit weight of 20 N'm
3) State the shape of the footing adopted if the width of the foundation for two equal columns is restricted.
4) What type of shape of the footing adopted if the width of the foundation for two equal columns is restricted?
5) Where will be the location of critical section of bending moment for RC wall?

5 MARKS

1) Write short notes on:
   (i) Design consideration for masonry wall footings.

10 MARKS

1) Design the RCC footing for a masonry wall 300 cm thick subjected to a load of 80 kN/m including self-weight. The SBC of soil is 150kN/m^ {2}