Roll No. | | | | | | | | | | | | | **Total No. of Pages : 03**

Total No. of Questions : 08

M.Tech. (Structural Design) (2016 & Onwards) (Sem.–2)

ADVANCE STEEL DESIGN

Subject Code : MTSD-203

M.Code : 74292

Time : 3 Hrs. **Max. Marks : 100**

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT questions.**
2. **Each question carries TWENTY marks.**
3. **Missing data if any can be suitable assumed, clearly stating the same.**
4. **Wherever possible support the answer with suitable sketches.**
5. **Symbols and terms are to be read in context of the subject.**
6. **Use of relevant codes is allowed. (IS 875, IS800, IS 3370, steel tables etc.)**

1. Find out D.L.,L.L and WL on the roof truss of an industrial building having span of 18 m provided of spacing of 3.2 m c/c which is required to be constructed in Delhi.

   Consider G.I sheets as a roof covering. Eaves height is 8 m above ground level. Also design the purlin. (20)

2. Design a welded plate girder for an effective span of 30 m and carrying a uniformly distributed load of 25 kN/m with two concentrated loads 150 kN each at 10 m from either ends.

   Assume that the top compression flange is restrained laterally. Use Fe415 grade steel. Design the cross section of plate girder only and check shear buckling strength of web using simple post critical method. (20)

3. Design side walls and hopper of rectangular steel bunker of 10 m length and 5 m width supported on eight columns (four along each long side) to store coal of bulk density 8 KN/m^3 and angle of internal friction 35°, height of vertical portion 3.8 m , height of hopper portion is 3.8 m . Draw the sketch and label the same. (20)

4. An overhead rectangular water tank consists of a container of plan dimensions 7 m * 10 m and height 2.4 m. The tank is supported at two-tier beam system placed on top of four columns. C/C distance between columns along shorter span of container is 6.2 m while longer span of container is 11.3 m. Design : (20)

   a) Bottom plates of container and joint between two plates.

   b) Upper tier and lower tier of beams, Assume adequate spacing and number of beams.

5. a) Fig below shows a portal bracing in a through truss girder bridge subjected to a lateral force of 150 kN. Determine the forces in various members of the portal bracing. (14)

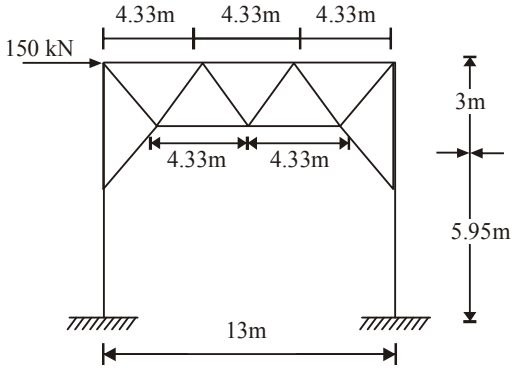

FIG. 1

b) Draw the cross section of a truss bridge and mark all the parts. (3)

c) Differentiate between Deck type and through type truss bridges. Show various parts of truss bridge with the aid of a diagram. Explain the design procedure of stringers. (3)

6. A through type highway steel bridge 48 m span, is supported on two N-girders each consisting of 10 bays of 4.8 m each, the height of girder being 4.8 m. DL of bridge including self weight of two N-girders is 90 kN/m and rolling load on the bridge, to be carried by the two girders is equivalent to 100 kN/m. Design the top & bottom chords at the fifth panel of the bridge and diagonal member in the third bay from left. (20)

7. a) A steel beam has a square cross-section with two semi-circular grooves cut in its sides as shown. Calculate the plastic moment Mp that the beam can develop if σv = 2400 Kg/cm sq (5)

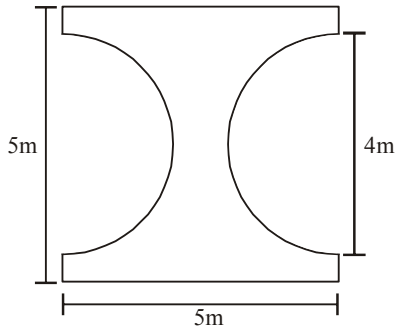

FIG. 2

b) The propped cantilever shown in Fig. 3 is subjected to partial u.d.l. Compute the ultimate load. (15)

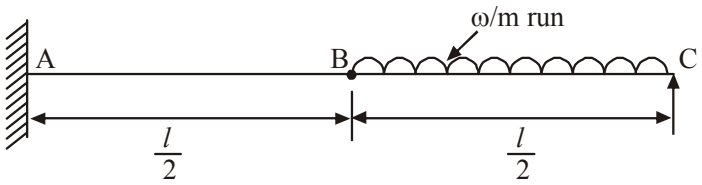

FIG. 3

8. Compute the collapse load of the structure shown in Fig. 4 Draw BMD at collapse.

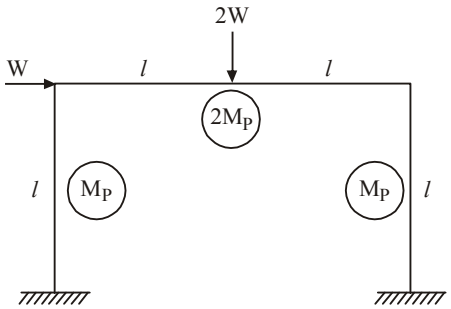

FIG. 4

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.