Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II(New course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 2722007 **Date: 10/12/2015**

Subject Name: Advanced Design of Steel Structures

Time:2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of IS:800, IS:801, IS:811, IS:875, IS:1893 and SP1/Steel Table is permitted.**

Q.1 Roofing system of an industrial shed consists of trusses spaced at 5 m apart. The span of roof truss is 24 m and rise is 6 m. The level of eaves is 8 m above the ground. Assume suitable configuration of truss. Design the purlin only. Choose suitable section for the inclined member no need to show any check. The shade is situated on flat terrain with sparsely populated buildings. The shed has less than 25 % permeability. **14**

Q.2 **(a)** Discuss about various loads to be taken for design of steel structures. Also, discuss various load combination as per codal provisions and their importance. **07**

(b) Explain the cold form steel with its Advantages and Disadvantages. **07**

OR

(b) Determine the safe axial load in compression of the cold formed channel (C) section as shown in **figure 1**. The effective length of the member is 3 m. yield strength of steel is 250 MPa. **07**

Take thickness t= 4 mm, A= 1060 mm^2, r_z=55.8 mm, r_y=18.2 mm, z_0=42.7 mm, J=0.552cm^4, C_w=1750cm^6, x=16.3mm, G= 80 x 10^3 N/mm^2, E= 2 x 10^5 N/mm^2.

Q.3 The Two span Continuous beam is shown in **figure 2** with loading. Select suitable I-section in Fe410 grade steel using (a) Elastic Design and (b) plastic Design and Differentiate Elastic Design and plastic Design **14**

OR

Q.3 Find the Collapse load for the frame of uniform cross section shown in **figure 3** under applied factored loads. Also, find the minimum section required to resist the applied loads. **14**

Q.4 Design a built-up laced column with four angles to support an axial load of 1000 kN. The column is 10 m long. Assume both the ends are held in position and restrained against rotation. Assume Fe 410 grade steel. **14**

OR

Q.4 Design a simply supported beam of 6 m span carrying a reinforced concrete floor to support factored UDL of 350 kN and concentrated factored load of 200 kN. Assuming a stiff end bearing length is 75 mm. **14**

Q.5 Design a simply supported deck-type welded plate girder bridge of effective span 30 m with end panel design only for 25 tones loading-2008 (Broad gauge). Design wind pressure at the bridge is 1.5 kN/m^2. The grade of steel is E250. The EUDL for B. M. =2897.38 kN, EUDL for S. F. = 3188.94 kN, and CDA= 0.372 for 25 tones loading- 2008 (Broad gauge). **14**

OR

Q.5 Design a simply supported deck-type welded plate girder bridge of effective span 30 m with load carrying stiffener only for 25 tones loading-2008 (Broad gauge). Design wind pressure at the bridge is 1.5 kN/m^2. The grade of steel is E250. The EUDL for B. M. =2897.38 kN, EUDL for S. F. = 3188.94 kN, and CDA= 0.372 for 25 tones loading- 2008 (Broad gauge). **14**

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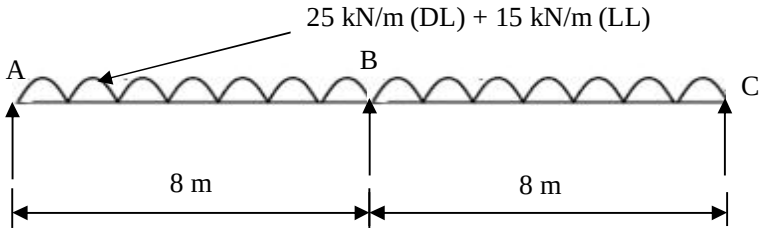

Figure 2

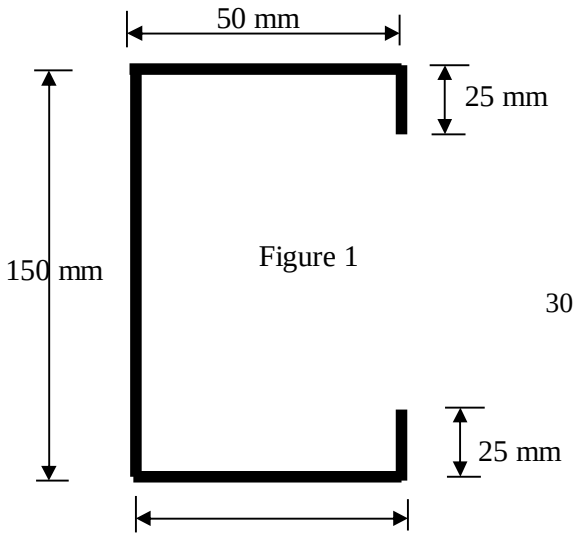

Figure 1

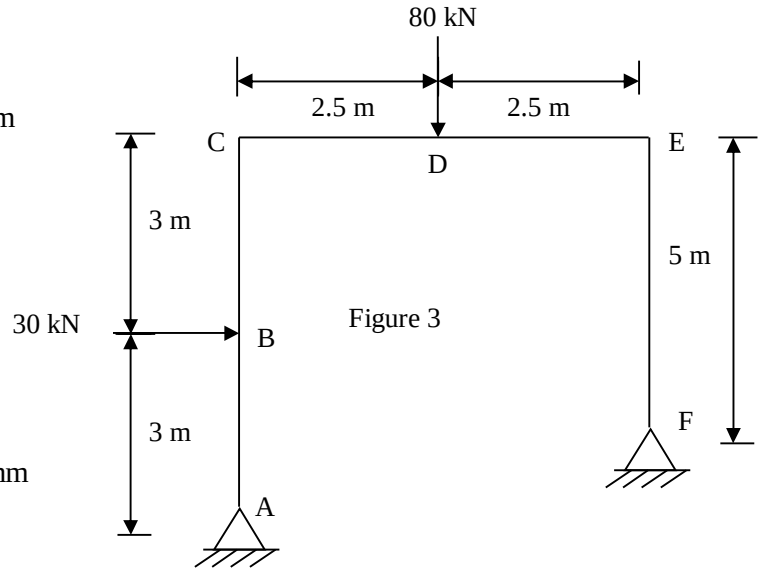

Figure 3