Seat No.: \_\_\_\_\_

Enrolment No.\_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

ME - SEMESTER II (NEW) - • EXAMINATION - SUMMER 2016

## Subject Code: 2722007

Subject Name: Advanced Design of Steel Structures
Time:10:30 am to 01:00 pm

Total Marks: 70

Date: 27/05/2016

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 4.5 m apart. 14 The span of roof truss is 20 m and rise is 5.5 m. The level of eaves is 7.5 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 20 % permeability.
- Q.2 (a) Discuss about various loads to be taken for design of steel structures. Also, 07 discuss various load combination as per codal provisions and their importance.
  - (b) Explain the cold form steel with its Advantages and Disadvantages. 07
    - OR
  - (b) Determine the safe axial load capacity of a column section of the cold formed 07 channel section as shown in figure 1. The effective length of the member is 3 m. yield strength of steel is 250 MPa. Take thickness t=1.6 mm, E= 2 x 10<sup>5</sup> N/mm<sup>2</sup>, outer to outer dimension 100 mm.

Take the constant  $L = 2 \times 10^{-10}$  from the first of t

Q.3 Design a simply supported deck-type welded plate girder bridge of effective 14 span 25 m with load carrying stiffener only for 25 tones loading-2008 (Broad gauge). Design wind pressure at the bridge is 1.25 kN/m<sup>2</sup>. The grade of steel is E250. The EUDL for B. M. =2488.40 kN, EUDL for S. F. = 2730.81 kN, and CDA= 0.408 for 25 tones loading- 2008 (Broad gauge).

## OR

- Q.3 Design a simply supported deck-type welded plate girder bridge of effective 14 span 25 m with end panel design only for 25 tones loading-2008 (Broad gauge). Design wind pressure at the bridge is 1.25 kN/m<sup>2</sup>. The grade of steel is E250. The EUDL for B. M. =2488.40 kN, EUDL for S. F. = 2730.81 kN, and CDA= 0.408 for 25 tones loading- 2008 (Broad gauge).
- Q.4 The Two span Continuous beam is shown in figure 2 with loading. Select 14 suitable I-section in Fe410 grade steel using (a) Elastic Design and (b) plastic Design and Differentiate Elastic Design and plastic Design

OR

Q.4 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.

Q.5 Design a simply supported beam of 7 m span carrying a reinforced concrete floor 14 to support factored UDL of 400 kN and concentrated factored load of 250 kN. Assuming a stiff end bearing length is 75 mm.

## OR

Q.5 Design a built-up laced column with four angles to support an axial load of 1200 14 kN. The column is 8.5 m long. Assume both the ends are held in position and restrained against rotation. Assume Fe 410 grade steel.

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Figure 1