Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2174003 **Date: 26/11/2018**

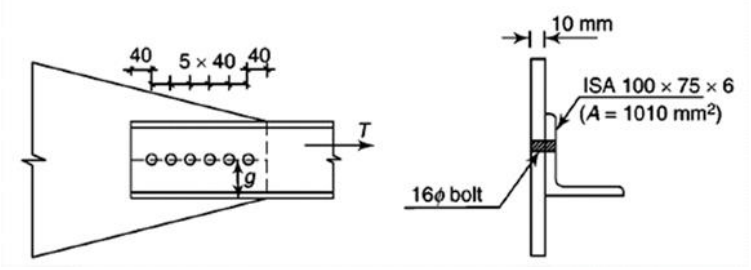
Subject Name: Design of Steel and Masonary Structure

Time: 10:30 AM TO 01:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Draw neat and clean sketches with pencil only.**
5. **Use of IS 800-2007, IS 875-1987, IS 1905 and Steel Table is allowed.**

			MARKS
Q.1	**(a)**	What is limit state? Explain limit state of strength and serviceability according to IS 800 – 2007.	**07**
	(b)	Write a note on: (i) Web cleat angle connection used in beam to beam connection (ii) Clip and seat angle connection – Unstiffened used in beam to column connection.	**07**
Q.2	**(a)**	A roof truss member consist of an angle section of ISA 100 × 100 × 8 mm connected with gusset plate of 10 mm thick, which is subjected to axial tension factorized load of 100 kN. Design the joint using 20 mm Ø of 4.6 grade bolts. The grade of steel Fe 415 for member material.	**07**
	(b)	An angle section 100 mm × 100 mm × 10 mm is to be connected to a gusset plate 12 mm thick. Design the fillet weld to carry load equal to the strength of the member.	**07**
		OR	
	(b)	Write short note on: (i) Beam Splices (ii) Column Splices	**07**
Q.3	**(a)**	A single unequal angle 100 mm × 75 mm × 6 mm is connected to a 10 mm thick gusset plate at the ends with 6 nos. of 16mm diameter bolts to transfer tension as shown in Figure. Determine the design tensile strength of the angle assuming that the yield and the ultimate stress of steel used are 250 MPa and 410 MPa.	**07**



	(b)	Calculate the design compressive strength of a compound column consist of ISHB 400 @ 407 N/m with one cover plate of 500 mm × 20 mm provided on each flange. The length of the column is 4 m effectively held at both ends and restrained in directions at one of the ends. Assuming the yield and ultimate stress of steel are 250 MPa and 410 MPa respectively.	**07**
		OR	
Q.3	**(a)**	Design a tension member to carry a factored load of 300 kN.	**07**

Using single unequal angle with 4 mm fillet weld for the connection to gusset plate. Length of the tension member is 3.0 m. The grade of steel used Fe 415.

(b) A built up column with 2- ISMC 400, back to back at spacing of 200 mm, is carrying an axial load of 800 kN. Length of the column is 8 m. It is held in position at both ends but not restrained in direction. Design a suitable double lacing system. **07**

Q.4 **(a)** Design a slab base foundation for an ISHB 450 column to carry 1500 kN factored axial compressive load. Assume Fe 410 grade of steel and M25 grade of concrete. Take safe bearing capacity of soil 220 kN/m^2. **07**

(b) Design a welded plate girder of span 24 m to carry superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffners. Use Fe 415 steel. (Note: Design of weld connection for flange plate and web plate is not required). **07**

OR

Q.4 **(a)** Design a simply supported beam of span 5 m carrying a factored load of 30 kN/m. Assume that compression flange of the beam is laterally restrained throughout. **07**

(b) Elaborate various steps for design of Gantry Girder. **07**

Q.5 **(a)** Illustrate the effect of different variables in calculating stiffening coefficient in masonry structures. **03**

(b) What are the factors which we should consider while selecting the mortar and masonry unit quality. Prove the importance of lime in masonry structures with suitable example. **04**

(c) Design an interior cross wall having 3 m clear height of a two-storeyed building. The wall is unstiffened and it supports a 2.85 m wide slab. **07**

Consider following data:

Live load on roof = 1.5 kN/m^2

Live load on floor = 2 kN/m^2

Thickness of RCC Slab = 120 mm

Weight of floor finish = 1.0 kN/m^2

OR

(c) Design an interior wall of a two storeyed wall carrying concrete slabs with storey height of 3.2 m. The wall is stiffened by 120 mm thick intersecting walls at 3500 mm c/c. Also, the wall has a door opening of size 900 × 2100 mm at a distance of 250mm from one of the intersecting walls. **07**

Consider following data:

Roof loading = 20 kN/m

Floor loading = 15 kN/m

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