Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEMESTER– 7th EXAMINATION – SUMMER 2015

Subject Code:170603 **Date: 12/05/2015**

Subject Name: Structural Design I

Time: 02.30PM-05.30PM **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. **IS 456:2000, IS 800:2007, SP 16, IS 875 Part I, II and III, steel tables are permitted.**
6. **Adopt M20 grade of concrete, Fe 415 grade of reinforcement for RCC design and Fe 250 grade for steel design until otherwise permitted.**

Q.1		Design a RCC simply supported beam of length of 5 m for flexure and shear. The beam is subjected to UDL of 40 kN/m including self-weight. Perform development length check and deflection check. Draw reinforcement detail, by longitudinal section and cross section.	**14**
Q.2	**(a)**	Write the design steps for the RC combined footing.	**07**
	(b)	Draw neat and clean figures for beam to beam connection and beam to column connection in steel design.	**07**
		OR	
	(b)	Design the bolted connection to transmit an axial force equals to the strength of the plate. Here two plates of size 200 x 12 mm of grade 410 are to be connected by 22 mm diameter bolt by using butt joint.	**07**
Q.3	**(a)**	Find the tensile strength of an angle section ISA 120 x 80 x 8 mm connected by the gusset plate by 5 mm weld at toe and back.	**10**
	(b)	Write in short “Lug angle”.	**04**
		OR	
Q.3	**(a)**	Compute the compressive strength of an angle section ISA 90 x 90 x 8 mm. The angle is loaded by one angle when it is connected by two bolts at each end.	**10**
	(b)	Explain the failure modes of steel section column.	**04**
Q.4		Design double lacing system, when a build up column two ISMB 450 at back-to-back spacing 230 mm subjected to an axial force 1400 kN. Assume the length of column is 8 m and both ends of column are not restrained. Draw necessary sketches.	**14**
		OR	
Q.4		Design a laterally restrained compression flange simply supported beam of span 5 m subjected to working loads. Where DL = 10 kN/m and LL= 7 kN/m.	**14**
Q.5	**(a)**	Explain the needs of drops and column heads in flat slab construction with necessary sketches.	**07**
	(b)	Design a square RCC column subjected to an factored axial force of 1000 kN. Draw necessary sketches.	**07**
		OR	

Q.5	**(a)**	Design a slab of size 3 m x 7 m is resting on wall of 230 mm thick. Assume LL = 3 kN/m2. Perform check for cracking and defection only.	**07**
	(b)	Explain one way shear check and two way shear check for footing design.	**07**

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