Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(OLD) – EXAMINATION – SUMMER 2019

Subject Code:141301 **Date:13/05/2019**

Subject Name: Design Of Environmental Structure

Time:02:30 PM TO 05:00 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 I.S. 456, 800, 875, Part I, II, III and Steel Table are permitted**
5. **For analysis and design of R.C.C. structure use M20 grade of concrete and Fe 415 HYSD and for steel structure use yield stress 250 MPa, unless specified otherwise.**

Q.1	**(a)**	A singly reinforced rectangular beam of size 230 X 500 mm effective depth has to carry a factored moment of 100 kN-m. Calculate area of steel.	**07**
	(b)	A singly reinforced beam is subjected to factored shear force of 200 kN. The effective size of the beam is 320 X 500. The beam is reinforced with 1.0 % of steel. Find spacing of 2 legged 8 # vertical stirrups.	**07**
Q.2	**(a)**	Enlist the basic assumptions made in limit state method for flexure design and calculate the value of Pt lim for M25 & Fe415 Grade.	**07**
	(b)	A singly reinforced beam of section 280 X 450 mm effective is reinforced with 4 # 20. Calculate moment of resistance of section.	**07**
		OR	
	(b)	Design a R.C.C. short square column for axial load of 3000 kN. Assume 1.2% steel.	**07**
Q.3	**(a)**	Design suitable base for column ISHB 300@ 63 kg/m, carrying axial load of 1000kN. The SBC is 180 kN/m^2. Permissible bearing pressure 3.8 N/mm^2.	**07**
	(b)	A discontinues strut 1.80 m effective length consists of 2 equal angle 55 X 55 X 6 mm, it is connected same side gusset plate by two rivets at each angle at both ends. Calculate load which strut can carry.	**07**
		OR	
Q.3	**(a)**	Design column using I section subjected to axial load of 1500 kN. The length of the member 4.2 m. both ends of column are hinged.	**07**
	(b)	Calculate the strength of ISA 50 X 40 X 6 when used as a tension member with longer leg connected to gusset plate (1) 14 mm thick, (2) fillet weld.	**07**
Q.4	**(a)**	Enlist the failure modes that may control the strength of rivet joints and specify the reasons.	**07**
	(b)	Design simply supported beam of span 6m carrying total load of 25 kN/m. provide only check for deflection.	**07**
		OR	
Q.4	**(a)**	An unequal tension member 90 X 70 X 6 has to resist 100 kN load. Design weld connection. Assume permissible stress in weld 108 MPa	**07**
	(b)	Determine load carrying capacity of short braced column of 500 mm diameter reinforced with 8 nos. of 12 mm diameter.	**07**
Q.5	**(a)**	Calculate the moment of resistance of doubly reinforced beam of size 280 X 600 mm over all, is reinforced with 4 # 20 as compression reinforcement and 4# 25 as tensile reinforcement. Take effective cover 50 mm at top & bottom.	**07**
	(b)	Design a square footing for an isolated column 450 X 450 mm size carry axial load 1200 kN. Adopt SBC of soil 180 kN/m^2.	**07**

OR

Q.5 **(a)** Design one way slab for clear span 3 m and thickness of support 300 mm. Take live load 2.5 kN/m^2 and floor finish 1.0 kN/m^2. Design slab for flexure only. **07**

(b) States merits and demerits of R.C.C. and steel structures. **07**

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