Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – IV • EXAMINATION – SUMMER 2015

Subject Code: 141301 **Date: 28/05/2015**

Subject Name: DESIGN OF ENVIRONMENTAL STRUCTURE

Time: 10.30am-01.00pm **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-456, IS-800, IS-875: Part-I, II, III, SP-6, SP-16 and Steel Table is permitted.**
5. **Assume yield stress of steel as 250 MPa and ultimate stress as 410 MPa unless mentioned otherwise for Steel Design.**
6. **Use concrete of grade M25 and steel of grade fe415 unless mentioned otherwise for R. C. C. Design.**
7. **Assume suitable data, if necessary.**

Q.1	**(a)**	Discuss the various philosophies of the design in R. C. C. and steel structures. Also discuss the merits and demerits of each.	**07**
	(b)	A concrete beam has 400 mm width and 680 mm effective depth have span of 6m. Design the beam if it is subjected to a super imposed load of 36.8 KN/m. Use M20 and Fe415.	**07**
Q.2	**(a)**	Find the Moment of Resistance of a singly reinforced concrete beam of 230mm width and 410 mm effective depth, reinforced with 4 bars of 16 mm diameter of Fe 415 and M20 concrete.	**07**
	(b)	Calculate the moment of resistance of a doubly reinforced beam of 350mm X 550mm depth reinforced with 2 bars of 16 mm dia. as compression reinforcement and 4 bars. of 20 mm dia. as tensile reinforcement.	**07**
		OR	
	(b)	State advantages and disadvantages of Welded and bolted connections.	**07**
Q.3	**(a)**	Design a short RCC column square in section, to resist a factored axial load of 3300 KN. Provide all necessary checks and detailed sketch. Use M25 and Fe 500. Assume length of column is 3 m.	**07**
	(b)	Design a one way slab for the simply supported span of 4.0 m resting on 230 mm wide beam which subjected of total factored load of 8kN/m^2. Use M20 and Fe250 grade.	**07**
		OR	
Q.3	**(a)**	Discuss advantages and disadvantages of structural steel?	**04**
	(b)	Describe what you understand by class 4.6 and class 8.8 bolts?	**03**
	(c)	Explain drawing neat sketches the terms: “LACING” and “BATTENING”.	**07**
Q.4	**(a)**	Design a slab base for a steel column ISHB 350 weighing 67.4 kg/m carrying a total factored load of 1050kN. Take the bearing strength of concrete is 15 N/mm^2. Assume bearing capacity of soil is 200kN/m^2.	**07**
	(b)	Explain Bond and development length in R.C.C. structures.	**03**
	(c)	Enumerate the difference between short and slender columns. State the code pecifications for: a) minimum eccentricity for design of columns; b) longitudinal reinforcement; c) lateral ties.	**04**
		OR	

Q.4	**(a)**	Design column using I-section, subjected to an factored axial load of 1500 kN. The length of the member is 4.2 m with both end hinged.	**07**
	(b)	Explain prestressed concrete and state its merit and demerits.	**04**
	(c)	Explain stiffened and stiffened connection.	**03**
Q.5	**(a)**	A simple support beam is laterally supported over the span of 6m and loaded by all inclusive factored udl of 33 kN/m over the entire section. Design the beam using ISMB section.	**07**
	(b)	Design a single angle to carry a design tensile load of 350 kN. Assume that the length of the member is 2.8 m. Assume steel grade Fe 410.	**07**

OR

Q.5	**(a)**	Classify the various loads acting on structures and elaborate any one of them.	**07**
	(b)	Write short notes on Mild steel bars, HYSD bars, TMT bars, Corrosion resistant steel, Coated steel reinforcement.	**07**

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