Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV EXAMINATION – SUMMER 2016

Subject Code:141301 **Date:30/05/2016**

Subject Name:Design Of Environmental Structure

Time:10:30 AM to 01:00 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 IS 456, IS 800, SP 6, SP 16 and IS 875: Part I, II and III are permitted.**
5. **For analysis and design purpose, take concrete grade: M20, steel grade: Fe415 in RCC design and yield stress of steel: fy = 250 MPa in steel design as default.**
6. **Take shear stress in fillet weld as 108 Mpa, wherever necessary.**

Q.1	**(a)**	Explain in short on Mild steel bars, HYSD bars, TMT bars, Corrosion resistant steel, Coated steel reinforcement, live load and erection loads.	**07**
	(b)	Design a singly reinforced rectangular beam for a moment of 100 kNm. The width of the beam is limited to 230mm. Use M20 grade of concrete and Fe415 grade of steel.	**07**
Q.2	**(a)**	Design a double equal angle tie member connected on same side of gusset plate 8 mm thick connected by 22 mmΦ pds rivets. The axial load acting on the member is 400 kN.	**07**
	(b)	Design welded connection for the member subjected by the axial force of 400 kN. Member comprising of 2 ISA 120x120x10 mm connected on both side of gusset plate. Use 20 mmΦ pds rivets.	**07**
		OR	
	(b)	Elaborate pre-stressing. Explain pre-tensioning and post-tensioning. Also, give examples of structural elements where these methods are suitable.	**07**
Q.3	**(a)**	Design an I - section for a column subjected to axial compression of 1500 kN. The unsupported length of column is 6 m with both ends fixed.	**07**
	(b)	Draw neat sketches for beam to column connection and beam to beam framed connection.	**07**
		OR	
Q.3	**(a)**	Design a slab base foundation for the column section ISHB250 subjected to axial force of 1000 kN. Use permissible bearing stress in concrete as 5 N/mm² and safe bearing capacity of soil as 200kN/m².	**07**
	(b)	Design a channel section for a column subjected to axial compression of 1000 kN. The unsupported length of column is 4.5 m with both ends fixed.	**07**
Q.4	**(a)**	A simply supported RCC beam of width 230 mm and effective depth 520 mm is reinforced width 4 bars of 16 mm diameter as tension steel. If the beam is subjected to a factored shear force of 130 kN at the support. Design the shear reinforcement consisting of stirrups.	**07**
	(b)	Design an axially loaded square RCC column of size 450 mm for a service load of 1500 kN. The grades of concrete and steel are M20 and Fe415 respectively.	**07**
		OR	
Q.4	**(a)**	Design a simply supported slab resting on 200 mm thick masonry walls. The clear span is 2.8 m and live load on slab is 3.0 kN/m^2. Check the slab for deflection.	**07**

	(b)	Design an isolated footing for a RCC column carrying a load of 1000 kN. The size of the column is 450 mm X 450 mm. The safe bearing capacity of the soil is 150 kN/m^2.	**07**
Q.5	**(a)**	Elaborate the design steps of battening system and explain codal provisions.	**07**
	(b)	Explain clearly the difference between flexural bond and development bond. What is the development length of a 20 mm ϕ steel grade fe415 bar used in compression for concrete grade M30?	**07**

OR

Q.5	**(a)**	Explain under reinforced and over reinforced design. Why under reinforced design is preferred?	**07**
	(b)	Determine the efficiency of lap joint for 10 mm thick plates joined with 16 mm diameter power driven shop rivets at a pitch of 60 mm c/c.	**07**

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