Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER IV(NEW) EXAMINATION – SUMMER 2017

Subject Code: 2742002 **Date:03/05/2017**

Subject Name: Design of Bridges

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. **IRC 5, 6, 78 and Pigeaud's curve are permitted.**
5. **Adopt M30 grade of concrete and Fe500 grade of steel, until otherwise specified.**
6. **Draw neat and clean figures with pencils only.**

Q.1		Design the intermediate girder only of RCC T beam and deck slab bridge for the following data: Effective span of girders: 16 m and Clear width of road way : 7.5 m Spacing of cross girder and main girder: 4 m and 2.5 m c/c Number of main girder: 3. Thickness of deck slab and wearing coat: 230 mm and 80 mm. Type of loading: IRC AA – Tracked Vehicle Kerb size: 600 x 280 mm. Use 32 mm diameter bar for main reinforcement and 10 mm diameter bar for stirrups. Use impact factor as per IRC, also use Courbon's method for the distribution of live load. Draw typical sketch also with reinforcement detail in girder.	**14**
Q.2	**(a)**	Explain the "Grillage Analogy".	**07**
	(b)	Write short note on "Economical span length of Bridge".	**07**
		OR	
	(b)	Draw different types of substructure option and designate each element of all substructure options.	**07**
Q.3	**(a)**	How the load test on the bridge will be performed? Explain in detail.	**07**
	(b)	Explain in detail "Pigeaud's curve".	**07**
		OR	
Q.3	**(a)**	Explain with neat sketch: Loads acting on sub structure.	**07**
	(b)	Explain the procedure to determine the seismic force on the bridges	**07**
Q.4		Detail and Design a post tensioned prestressed girder only for bridge for the following data: Effective span = 25 m, width of road = 7.5 m, Kerb = 650 mm on both sides, concrete grade = 50 Mpa for girder. Cube strength at transfer = 35 MPa, loss ratio = 0.80, M-40 grade concrete and High strength wires of 1400 MPa strength, Fe-415 for other reinforcement.	**14**
		OR	
Q.4		Design and detail open foundation for a wall type pier for following data. Cross section 1.8 m x 4.0 m, Axial load = 2000 kN, Longitudinal moment = 350 kN.m, Transverse moment = 100 kN. Consider 2.8 m as depth of foundation.	**14**
Q.5	**(a)**	Elaborate the design steps of well foundation.	**07**
	(b)	Elaborate the design steps of balanced cantilever bridge.	**07**
		OR	
Q.5	**(a)**	Enlist the design steps of RC slab culvert.	**07**
	(b)	State and explain the guidelines to control cracking as per IRC.	**07**

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