Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E –IIst SEMESTER–EXAMINATION – JULY- 2012

Subject code: 1721504 **Date: 10/07/2012**

Subject Name: Analysis & Design of Bridges

Time: 10:30 am – 13:00 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 relevant IS, IRC codes and Pigeaud's curves are permitted.**

Q.1 A simply supported two lane T-girder superstructure with footpath on both sides, having center to center pier spacing 25m, is to be designed for national highway. Draw a free hand sketch of a suitable section such that the main bending of deck slab remains along the transverse direction of bridge. Determine bending moment and shear force due to dead load and superimposed dead load at end span, 1/8th span, quarter span, 3/8th span and center of span. **14**

Q.2 **(a)** Design the section assumed in Q.1 for shear force at end span, 1/8th span, quarter span, 3/8th span and center of span. **07**

(b) Design the section assumed in Q.1 for bending moment at end span, 1/8th span, quarter span, 3/8th span and center of span. **07**

OR

(b) Design the top slab of the section assumed in Q.1 for dead load. **07**

Q.3 **(a)** Discuss Courban's method for distribution of load among main girders. **04**

(b) Determine distribution factor for applicable vehicular loads using Courban's method for superstructure assumed in Q.1 considering that Courban's method is applicable in this case. **10**

OR

Q.3 **(a)** How Pigeaud's curves are used in two way slabs of bridge? Explain its outline in brief. **04**

(b) Design a two way slab panel having span 2m X 3.5m for class AA wheeled load vehicle using Pigeaud's curve. **10**

Q.4 Derive design bending moment at quarter span and center of span of superstructure section chosen in Q.1 **14**

OR

Q.4 Derive design shear force at quarter span and end of span of superstructure section chosen in Q.1 **14**

Q.5 **(a)** Draw a free hand sketch of a suitable section of substructure at abutment having founding level 6.5m, HFL 3m and normal ground level 5m below bearing level. Assume open foundation for substructure. **04**

(b) Find out design bending moment and axial force due to dead load and class AA wheeled vehicle at the top of foundation. The soil behind abutment is cohesionless with friction angle 30° and density 1600kg/m^{2}. The superstructure is same as chosen in Q.1. Assume suitable data if missing and clearly state them. **10**

OR

Q.5 **(a)** Draw a free hand sketch of a suitable section of substructure at pier having top of pile cap at 6.5m, HFL 2m and founding level 25m below bearing level. Assume pile foundation with two piles of 1.2m diameter in two rows for substructure. **04**

(b) Find out design bending moment and axial force due to dead load and class AA wheeled vehicle at the top of pier cap. The water velocity at the site is 4m/sec and scour level is 8m below bearing level. The superstructure is same as chosen in Q.1. Assume suitable data if missing and clearly state them. **10**

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