

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-II Examination July 2010****Subject code:721504****Subject: Analysis and Design of Bridges****Date: 07 /07 /2010****Time: 11.00am – 1.30pm****Instructions:****Total Marks: 60**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of all IRCs is permitted.

Q.1 (a) Draw free hand sketches of four different types of superstructural arrangement of bridges and label its parts. **06**

(b) Draw free hand sketches of three different types of substructures and label them. Use different types of piers in each case. **06**

Q.2 (a) Explain various loading pattern with their major applicability clauses as per IRC. **06**

(b) Describe Courban's method of distribution of moments among girders of a T girder bridge. **06**

OR

(b) How the Pigaud's curves are applied to two way slabs of a T girder bridge? Discuss two different loading patterns. **06**

Q.3 Calculate vehicular live load design bending moment (without distribution factor) at L/2 for a national highway two lane bridge having centre to centre span 25.5m and overall slab length 27.5m. Consider Class 70R and class A vehicles only. **12**

OR

Q.3 Draw a suitable cross section for a national highway two lane bridge having 22m centre to centre span and 24m overall span and compute dead load design bending moment (without distribution factor) at L/4. **12**

Q.4 A national highway two lane bridge has 20m centre to centre distance between supports and overall slab length 23m. It consists of three girders with greatest distribution factor 0.4 for central girder. Assume a suitable cross section of central girder near end support and design it for shear. Consider Class AA tracked vehicles as critical load and total dead load of superstructure as 10ton/m length. The end consists of 10 bars of 32mm diameter longitudinal steel. Take concrete grade M30 and steel grade Fe 415. **12**

OR

Q.4 Calculate design moments (longitudinal only) and axial force at the base of pier with following levels corresponding to road formation level 0.0m

Top of bearing pedestal	= - 2.1m	Bottom of pier cap	= - 4.0m	12
Top of pier cap	= - 2.4m	Bottom of pier	= - 12.0m	

Assume suitable cross section of pedestal block, pier cap and pier which carries RCC superstructure of span 24m on both sides. The dead load reaction from each side of superstructure is 160 ton. Account only class AA vehicular load. Neglect water current, earthquake and wind loads.

Q.5 Give detailed steps to analyze and design substructures at pier location consisting of well foundation. **12**

OR

Q.5 Give detailed steps to analyze and design substructures at abutment location consisting of open foundation. **12**
