

GUJARAT TECHNOLOGICAL UNIVERSITY**ME Semester –II Examination Dec. - 2011****Subject code: 1721504****Date: 14/12/2011****Subject Name: Analysis and Design of Bridges****Time: 02.30 pm – 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. Use of all IRCs is permitted.

- Q.1** (a) Draw different types of superstructure layout and designate each element of all superstructure options. **07**
- (b) Draw different types of substructure option and designate each element of all substructure options. **07**

- Q.2** (a) With neat sketches, various types of live loads on bridges. **07**
- (b) Discuss various criteria and guidelines to decide type of bridge. **07**

OR

- (b) What do you understand by economical span of a bridge? Discuss various parameters involved in deciding economical span of a bridge. **07**
- 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 21.5m and overall slab length 23.5m. Consider Class 70R and class A vehicles only. **14**

OR

- Q.3** Draw a suitable cross section for a national highway two lane bridge having 20m centre to centre span and 22m overall span and compute dead load design bending moment (without distribution factor) at $L/4$. **14**
- Q.4** A NH two lane bridge has 22m centre to centre distance between supports and overall slab length 25m. It consists of three girders with greatest distribution factor 0.38 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 100 kN/m length. The end consists of 12 bars of 32mm diameter longitudinal steel. Take concrete grade M30 and steel grade Fe 415. **14**

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 = – 2.2m. Top of pier cap = – 2.5m. Bottom of pier cap = – 4.1m. Bottom of pier = – 12.1m. Assume suitable cross section of pedestal block, pier cap and pier which carries RC superstructure of span 24m on both sides. The dead load reaction from each side of superstructure is 1600 kN. Account only class AA vehicular load. Neglect water current, earthquake and wind loads **14**
- Q.5** Enlist and explain in detail various steps to analyze and design substructures at abutment location consisting of open foundation. **14**

OR

- Q.5** Enlist and explain in detail various steps to analyze and design substructures at pier location consisting of well foundation. **14**