

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD  
M.TECH I SEMESTER EXAMINATIONS APRIL/MAY-2012**

**BRIDGE ENGINEERING  
(HIGHWAY ENGINEERING)**

Time: 3hours

Max.Marks:60

**Answer any five questions  
All questions carry equal marks**

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**Note: Use of I.S, IRC & PSC codes permitted**

1. Design a RC slab culvert for a clear span of 8m and a carriageway of 10m. Kerb on either side is 350mm. Assume uniform slab thickness of 650 mm and a wearing coat of 75mm thick. Kerb details need not be designed. Sketch the reinforcement details in the slab. Consider single train of IRC Class AA tracked vehicle loading.
- 2.a) While designing a girder inclined soffit with varying depth for shear, sketch and show how the net shear force for design of stirrups change due to the inclination of main flexural reinforcements especially at support section.  
b) What are the major risks involved in the bridges in seismic prone areas? Sketch and show measures adopted to prevent such risks quoting examples you know.
- 3.a) Describe how load distribution in Bridge Decks is made for a bridge having 3 longitudinal girders, using Courbons method. List the assumptions and limitations of this method.  
b) List two other methods indicating their advantages over the above method.
- 4.a) List various types of continuous bridges used based on their method of construction.  
b) Enumerate the design steps involved in the design of any one type of continuous bridge.
- 5.a) What is composite action in a composite girder bridge?  
b) Describe the various design requirements of shear connectors.  
c) Sketch and show various parts of a composite girder bridge indicating how it is supported on the pier.
- 6.a) List the various loads that are to be considered for a pier design.  
b) Sketch and show different types of piers used for bridges.  
c) Explain using sketches the different safety checks made for piers of bridges.
7. Design an intermediate T-Beam for the following data- slab need not be designed.
  - i. Road width 8.00m Total width = 10.68m
  - ii. Span 20.00m
  - iii. Number of main girders 4 and cross girders 6
  - iv. Concrete Grade M40
  - v. Thickness of slab 250mm
  - vi. Steel Fe 500
  - vii. Thickness of wearing coat 75mm
  - viii. Loading Class AA tracked.
 Sketch and show main and lateral reinforcements.
8. Write Short Notes on:
  - a) Methods of pre-stressing bridge decks
  - b) Shear design for pre-stressed bridge girder.
  - c) Need for un-tensioned steel in a pre-stressed girder.