R09

Code No: D2008

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
PRINCIPLES OF BRIDGE ENGINEERING
(STRUCTURAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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1. What are the loads to be considered for the design of a bridge as per IRC classification? Describe each one indicating how it is calculated.

2. Design a slab bridge for the following data:
   Span 6.5 m clear
   Road: National Highway-2 Lane
   Loading IRC70 (Tracked Wheel)
   Concrete M30 and steel Fe-415
   Wearing coat 80 mm average
   Foot path 1m wide on either side
   Kerb: 600 mm on either side

3. What forces are considered while designing an Elastomeric bearing? Sketch and show how the horizontal movement is taken care of in such a bearing when compared to steel bearings employed earlier. Indicate the changes in design concept for steel movement bearing and elastomeric bearing especially for lateral movements that occur in a bridge.

4. Describe the use of following methods of load distribution in Bridge decks indicating the assumptions involved in each.
   a) Courbon's Method b) Grillage Analysis Method

5. Verify the stability of the abutment with the following data:
   Top width 1.5m
   Height 4m Back batter 1 in 6
   Front face of the abutment is vertical
   Material RCC
   Unit weight of soil 18 kN/cum
   Angle of repose 30 deg
   Super- structure T beam bridge of 30 m span
   Loading IRC class AA.

   Assume suitable dimensions for the components of the superstructure
   Assume other data if required

6.a) When do we resort to Grillage Analysis?
   b) Describe an example of application of Grillage Analysis for a slab deck with Longitudinal and transverse beams
   c) Describe the issues involved in discretization and modeling the deck and in interpretation of results.

7.a) What are the advantages of Prestressed concrete bridges over conventional RCC tee beam bridges?

b) Why untensioned steel is used in a prestressed concrete bridge?

c) Give a neat sketch of the cross section of a prestressed concrete girder bridge indicating the spacing of prestressing and cover details.

8. Design a composite bridge superstructure and sub structure using the following data:

Span 18m
Number of lanes 2
Live load IRC Class AA
Suitable material for Prestressed concrete and prestressing wires.
Top level of road embankment 1000m
Bed level of stream 992
HFL of stream 994.5m
Top level of stream bund 995
Hard soil foundation available at 900m.

Detailed design not necessary

Draw the following views:

Half sectional elevation and half front elevation
Cross section of the deck.

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