

(Following Paper ID and Roll No. to be filled in your Answer Books)

PAPER ID : MD25

Roll No.

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M. TECH. (Sem.II)

THEORY EXAMINATION 2015-16

BRIDGE ENGINEERING

Time : 3 Hours

Total Marks : 100

- Note :** (1) Attempt questions as per instructions given against them.
(2) Be precise in your answer.
(3) IRC code is allowed.

1. Attempt any two questions : 10×2=20
- (a) What are the functions of the bearings in bridges? Sketch an elastomeric bearing and mark its bridge?
- (b) What are the four standards types of live loads consider in the code? Explain in detail.
- (c) Briefly discuss the importance of bridge engineering in the context of bridge failures. Design the intermediate beam of prestressed concrete bridge f clear span 25m. Assume the roadway width as 7.5 m, loading IRC class 70R tracked vehicle.

2. Attempt any two questions: 10×2=20
- (a) Why is bridge inspection important? Discuss in detail the inspection and maintenance of bridges.
- (b) Discuss in detail the major cause of bridge failures. Indicate how these failures could be avoided.
- (c) Design a prestressed concrete slab for the following data:
- Span(clear) : 4.5 m
- Live load : IRC Class 70R
- Road : National Highway
- Footpath : 1 m on either side
- Materials : M40 concrete and high strength steel
- The compressive stress permissible in concrete during transfer : 16 MPa

3. Attempt any two questions. 10×2=20
- (a) Explain the various components of a bridge and also draw the sketch?
- (b) Explain the function of expansion joints and contraction joints?
- (c) Design the longitudinal girder of a T-beam and slab bridge for the following data. Effective span 18m, carriage way width 7.5m, kerb 600 mm on either side. Provide three longitudinal beams and five cross beams. Loading IRC class AA tracked vehicle. Adopt M25 Fe415 bars. Also provide

the reinforcement details. Use Courbon's method for the calculation of reaction coefficients.

4. Attempt any two questions : 10×2=20
- (a) Explain the relative advantages and disadvantages of pre-stressed concrete bridges and RCC bridges.
 - (b) A reinforced concrete simply supported slab is required for the deck of a road bridge having the following data:-
 - (i) clear span = 5.5 m.
 - (ii) width of carriage way = 7.5 m.
 - (iii) foot path on either side = 1m. wide.
 - (iv) Materials = M20 grade concrete and Fe 415 steel.
 - (v) Type of loading IRC class AA.Design the deck slab. Show the reinforcement details.
 - (c) Explain the factors to be considered while selecting suitable site for a bridge? Also discuss in detail the major cause of bridge failures.
5. Attempt any two questions : 10×2=20
- (a) What are the factors affecting the span of bridges? Why is bridge inspection important?
 - (b) Describe with sketches typical methods of construction of steel bridges. Briefly discuss the economic span for bridges.
 - (c) Design a slab culvert for the following data :

Effective span= 5.0 m

Clear width of carriageway = 8.0 m

Thickness of wearing coat = 70 m

Provide footpath of 800 mm wide on either side loading =
IRC class AA Use M20 concrete and Fe 415 steel. Design
and detail the slab bridge.
