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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; Aug. / Sep. - 2020

Design of Bridges

Time: 3 hrs

Max. Marks: 100

- Note: i) Answer **TWO** full questions, selecting **ONE** full question from **UNIT - I** and **UNIT - II**.
 ii) Answer any **THREE** full questions, choosing from **UNIT - III**, **UNIT - IV** and **UNIT - V**.
 iii) Use of IS codes are permitted.

UNIT - I

- 1 a. Write a neat note on classification of bridges. 10
 b. Determine the economic span of a bridge from the following data :

Span (m)	4	8	12	15	10
Super structure cost in Rs	20,000	32,000	46,000	60,000	
Substructure cost in Rs	32,000	48,500	59,000	78,000	

OR

- 2 a. Reproduce the characteristics of an ideal bridge site. 10
 b. Explain Afflux and Scour phenomenon at a bridge. 10

UNIT - II

- 3 a. Explain with neat dimensional sketches IRC class A and class B type of loading on the bridge. 10
 b. Write a note on Impact and Snow loads. 10

OR

- 4 a. Explain with a neat sketch the features of IRC class AA wheeled loading. 10
 b. Reproduce the various loads to be considered in bridge design. 10

UNIT - III

5. Design slab culvert for a span of 7 m using the following data :
 i) Road width = 7.5 m
 ii) Parapet on either side = 600 mm
 iii) Thickness of kerb = 200 mm
 iv) Thickness of wearing coat = 100 mm
 v) Type of live load-IRC class AA tracked vehicle
 vi) Type of concrete = M20
 vii) Grade of steel = Fe415
 20
6. A slab culvert is to be designed for a span of 6 m, with the following data :
 Road width is 7.5 m, Live load – IRC class A loading, Parapet 400 mm on either side,
 kerb 200 mm, wearing coat = 80 mm, use M20 grade concrete and Fe415 steel.
 Design for flexure only. 20

UNIT - IV

7. Design a Box culvert for an effective span of 4 m with an effective height of vent 4 m using the following data :
- | | | |
|---|--|----|
| i) Road width = 7.5 m | ii) Thickness of parapet = 500 mm | |
| iii) Thickness of kerb = 200mm | iv) Thickness of wearing coat = 100 mm | 20 |
| v) Type of live load = IRC class AA Tracked vehicle | vi) Grade of concrete = M20 | |
| vii) Grade of steel = Fe415 | viii) Angle of repose = 30° | |
| ix) Density of soil = 19 kN/m ³ | | |
8. Design a Box culvert for any effective span of 3.5 m with an effective height of vent 3.5 m using the following data :
- | | | |
|--|---------------------------------------|----|
| i) Road width = 7.5 mm | ii) Thickness of parapet = 400 mm | |
| iii) Thickness of kerb = 200 mm | iv) Thickness of wearing coat = 80 mm | 20 |
| v) Type of live load = IRC class A loading | vi) Grade of concrete = M20 | |
| vii) Grade of steel = Fe415 | viii) Angle of repose = 30° | |
| ix) Density of soil = 18 kN/m ³ | | |

UNIT - V

9. Design an interior panel of a deck slab of a T-beam bridge for flexure only for the following data: Effective span = 14 m, spacing of main girders = 3 m, spacing of cross girders = 3.5 m, live load = IRC class AA tracked vehicle. Detail the designed slab and draw a typical cross section along any one direction. 20
10. A main girder of a T-beam bridge is to be desinged for fluxure only. The details of the bridge is as follows :
- Width of road way = 7.5 m, effective span of the bridge = 16 m, kerb of 0.5 m width and 0.2 m thick. Spacing of main girders is 3 m, spacing of cross girders is 4 m, width of main and cross girder is 0.4 m, thickness of wearing coat = 0.1 m, live load is IRC class AA tracked vehicle. Design the main girder and sketch the reinforcements. 20

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