

CBCS SCHEME

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15CV741

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

Design of Bridges

Time: 3 hrs.

Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. Use of IS-456, IRC-5, IRC-6, IRC-21, IS1343, pigeaud's curves and relevant charts allowed.

Module-1

- 1 a. How are the bridges classified, briefly explain. (10 Marks)
b. List the various loads to be considered in the design of bridges. (06 Marks)

OR

- 2 Briefly explain the following terms:

- i) Linear waterway
ii) Economic span
iii) Afflux
iv) Scour Depth.

(16 Marks)

Module-2

- 3 Design a deck slab for the following details:

Carriage way = Two lane (7.5m wide)

Foot paths = 1m on either side

Clear span = 6m

Wearing coat = 80mm

Width of bearing = 400mm

Materials : M25 grade concrete and Fe415 grade HYSD bars

Loading : IRC class AA tracked vehicle.

(16 Marks)

OR

- 4 Design a SKEW slab culvert to suit the following data:

Clear span = 6m

Width of bearing = 370mm

Width of carriage way = 7.5m

Overall depth of slab = 540mm

Wearing coat = 80mm

Skew angle = 30°

Loading : IRC class AA tracked vehicle

Materials : M20 grade concrete and Fe415 HYSD bars.

(16 Marks)

Module-3

- 5 Design the 'Deck slab only' for the T-beam bridge for the following data:

Effective span = 16m; Live Load – IRC class AA tracked; Materials – M25 grade concrete and Fe415 steel; spacing of the cross girders 4m c/c ; width of carriage way = 7.5m ; thickness of wearing coat = 80mm ; Kerbs on either side = 600mm wide × 300mm deep ; width of main girder = 300mm ; width of cross girder = 300mm ; spacing of main girders = 2.5m c/c ; sketch reinforcement details.

(16 Marks)

OR

- 6 Design T-beam bridge "cross girder" for the data given in Q5 and sketch the reinforcement details. (16 Marks)

Module-4

- 7 Design a Reinforced concrete box culvert having a clear vent way 3m by 3m. The super imposed dead load on the culvert is 12.8 kN/m^2 . The Live Load is estimated as 50 kN/m^2 . Density of soil at site is 18 kN/m^2 . Angle of repose = 30° . Adopt M20 grade concrete and Fe415 steel. Sketch the details of reinforcement. (16 Marks)

OR

- 8 Design a suitable reinforced concrete pipe culvert to suit following data:

Discharge through pipe culvert = $1.57 \text{ m}^3/\text{s}$

Velocity of flow through pipe = 2 m/s

Width of road = 7.5 m

Top width of embankment = $1.5:1$

Bed level of stream = 100.00 m

Top of embankment = 103.00 m

Loading : IRC class AA Wheeled vehicle.

(16 Marks)

Module-5

- 9 Verify the stability of the abutment shown in Fig.Q.9. The other salient details are given below:

Material = Concrete

Density of soil = 18 kN/m^3

Coefficient of friction = 0.6

Angle of repose of soil = $\phi = 30^\circ$

Live Load on bridge = IRC class AA tracked

Span of bridge = 15 m

Angle of friction between the soil and concrete = 18°

The bridge deck consists of three longitudinal girders of 1.4 m depth with a deck slab of 200 mm depth.

(16 Marks)

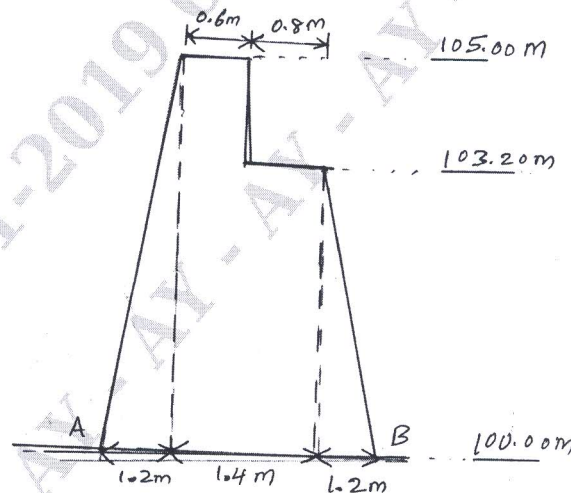


Fig.Q.9

OR

- 10 Write short notes on:
- Bridge bearings
 - Hinges
 - Expansion Joints

(16 Marks)
