CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

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/m². The Live Load is estimated as 50 kN/m². Density of soil at site is 18 kN/m². 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   = 1.57m³/s
   Velocity of flow through pipe   = 2m/s
   Width of road   = 7.5m
   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/m³
   Coefficient of friction   = 0.6
   Angle of repose of soil   = ϕ = 30°
   Live Load on bridge   = IRC class AA tracked
   Span of bridge   = 15m
   Angle of friction between the soil and concrete = 18°

   The bridge deck consists of three longitudinal girders of 1.4m depth with a deck slab of 200mm depth.   (16 Marks)

Fig.Q.9
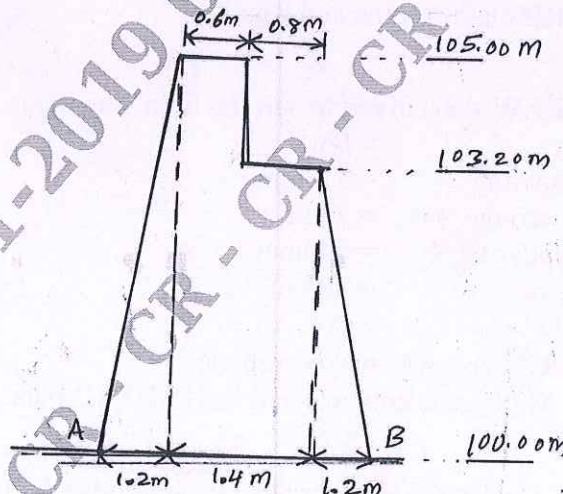
OR

10 Write short notes on:
   a. Bridge bearings
   b. Hinges
   c. Expansion Joints   (16 Marks)

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