CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

18CV821

Eighth Semester B.E. Degree Examination, July/August 2022
Bridges Engineering

Time: 3 hrs.

Max. Marks: 100

Note: **1.** *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Use of IRC codes – IS-456-2000, SP-16, IRC-6, IRC-21, IRC-112 Pigeaud's chart is permitted.*
3. *Use of IS:458 and IS:783 is permitted.*
4. *Any missing data may be suitably assumed.*

Module-1

1 a. Write briefly about the historical development of bridges. **(10 Marks)**
   b. Write a note on classification of bridges. **(10 Marks)**

OR

2 a. Explain the following terms:
   (i)   Linear water way   (ii) Economic span
   (iii) Afflux   (iv) Scour depth **(08 Marks)**
   b. What are the different types of loads and forces acting on a bridge? **(12 Marks)**

Module-2

3 A reinforced concrete slab has a clear span of 5.5 m.
   Carriage way width = 7.5 m
   Footpath on either side = 600 mm
   Thickness of wearing coat = 80 mm
   Live load = Class AA tracked vehicle
   Grade of concrete = M_{25}
   Grade of steel = Fe415
   Design only for flexure with neat sketch. **(20 Marks)**

OR

4 a. What is the difference between straight and skew slab bridge? **(10 Marks)**
   b. Sketch typical reinforcement detailing in skew bridge with skew angle less than 15° and more than 15°. **(10 Marks)**

Module-3

5 Design the deck slab only for T-beam bridge for the following data:
   Effective span = 15 m
   Clear width = 7.5 m
   Width of footpath = 600 mm
   Thickness of wearing coat = 80 mm
   Main girders = 3 nos
   Spaced at 2.5 m s/s
   Cross Beam 5 nos @ 3.75 m c/c
   Live load = class AA tracked
   Use M_{25} and Fe415. **(20 Marks)**

OR

6 For the details in Question Number 5, design the main longitudinal girder and sketch the details of reinforcement. **(20 Marks)**

Module-4

7 Design a box culvert inside (3m × 3m) dimension DL 14 kN/m^2 IRC class AA tracked vehicle unit weight of soil 18 kN/m^2. Angle of repose = 30°, M_{25} and Fe415 steel. With load width = 7.5 m, design top slab only with the reinforcement. **(20 Marks)**

OR

8 Design a suitable R.C.C. pipe culvert to suit the following data:
Discharge through pipe culvert = 1.57 m^3/s
Velocity of flow through pipe = 2 m/s
Width of load (2 lane) = 7.5 m
Top width of embankment = 1.5 : 1
Bed level of stream = 100.00
Top level of embankment = 103.00
Loading – IRC class AA wheeled vehicle with a maximum wheel load of 62.5 kN.
Draw the longitudinal section, plan and end view of the pipe culvert. **(20 Marks)**

Module-5

9 Check the stability analysis of abutment for an abutment having top width 1m, bottom width 2m, height 3m. One of the face is vertical suppose a load of 20 kN SBC = 150 kN/m^2, coefficient of friction = 0.5, check for sliding and over turning, density of soil 18 kN/m^2. **(20 Marks)**

OR

10 Explain:
a. Bearings used in bridges **(10 Marks)**
b. Expansion joints **(05 Marks)**
c. Different types of forces acting on piers. **(05 Marks)**

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