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Code No: H8709/R13

M. Tech. II Semester Regular/ Supplementary Examinations, July-2016

BRIDGE ENGINEERING

(Common to SE and SD)

Use of IS and IRC codes are permitted.

Time: 3 Hours Max. Marks: 60 Answer any FIVE Questions All Questions Carry Equal Marks	
2.	A reinforced concrete simply supported slab is required for the deck of a road bridge having the following data:- Clear span = 5.5 m. Width of carriage way = 7.5 m. Foot path on either side = 1m wide. Materials = M20 grade concrete and Fe 415 steel. Type of loading IRC class AA. Design the deck slab. Show the reinforcement details.
3.	Explain briefly Pigeauds method and Hendry-Jaugar method.
4.	Briefly explain elements of a plate girder and their design.
5.	A prestressed concrete slab, 400 mm thick with parallel post-tensioned cables, is provided fora road bridge of effective span 8 m. The live-load analysis indicates an equivalent live loadof 45 kN/mm2. The force at transfer in each of the cables is 450 kN. If the compressive stresspermissible in concrete at transfer is 18 N/mm2, design the slab as class 1-type member and determine the spacing of the cables and their eccentricity at mid-span. Assume a loss ratio of 0.8.
6.	Design a post-tensioned pre-stressed concrete slab bridge beck for a national highwaycrossing to suit the following data: Clear span 10 m; Width of bearing 400 mm; Clear width of roadway 7.5 m; Footpath 1m on either side; Krebs 600 mm wide; Thickness of wearing coat 80 mm wide; Live load I.R.C. Class AA tracked vehicle; Type of structure Class 1 type; Materials: M45 grade concrete and 7 mm diameter high-tensile wires with anultimate tensile strength of 1600 N/mm ² housed in cables with 12 wires andanchored by Freyssinst anchorages of 150 mm diameter. For supplementary reinforcement, adopt Fe – 415 grade HYSD bars; Compressive strength at transfer; $f_{ci} = 35$ N/mm ² ; Loss ratio = 0.8

1 of 2



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- 7. Verify the adequacy of the dimensions for the pier. The following details are available: 12 Top width of the pier: 1.6 m Height of the pier up to springing level: 10 m c/c of bearings on either side: 1.00 m Side batter: 1 in 12 High flood level: 1m below the bearing level Span of the bridge: 16 m Loading on span: IRC Class AA Road: Two-lane road with 1 m footpath on either side. Superstructure: Consists of three longitudinal girders of 1.4 m depth with a deckslab of 200 mm depth. Rib width of girders = 300 mm Material of the pier: Concrete M20.
- 8. Design a pipe culvert through a road embankment of height 8 m. The width of the road 12 is 7.5 m and the formation width is 10 m. The side slope of the embankment is 1.5:1. Themaximum discharge is 6 m³/s. The safe velocity is 4 m/s. Class AA tracked vehicle is tobe considered as live load. Assume bell-mouthed entry. Given $C_e = 1.5$, $C_s = 0.010$ and the unit weight of the soil = 20 kN/m³.

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