Roll No ....

MVSE - 104

M.E./M. Tech., I Semester

Examination, December 2015

Design of Concrete Structures

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions. All questions carry equal marks.

ii) Use of relevent IS codes, IRC publications and tables are permitted.

iii) Sketch the design details.

iv) Missing data if any may be suitably assumed.

1. A two way simply supported slab, 10m × 8m in size with ribs at 1m intervals is to be designed to support a live load of 4 kN/m². Design a suitable grid floor and sketch the details of reinforcements. 14

2. Determine the thickness and reinforcements for a simply-supported transfer girder of length 5.0m loaded from two columns at 1.75m from each end with 3000 kN. The total depth of the beam is 4.0m and the width of supports is 500mm. 14

3. Using Pigeaud's Curves, compute design bending moments along short and long span of a deck slab for a T-beam bridge considering class AA tracked vehicle for the following data :
   Clear width of roadway = 7.5m; Effective span of beam = 15m
   Centre to centre spacing of cross beams = 3.0m;
   Width of main girders = 300mm
   Centre to Centre spacing of Longitudinal beams = 2.5 m;
   Kerbs = 600mm (wide) × 300mm (deep)
   Thickness of slab = 230mm;
   Thickness of wearing coat = 80mm 14

4. A rectangular water tank 4.5m long 2.25m wide and 2.25m high has its walls rigidly jointed at the vertical edges and pin jointed at their horizontal edges. Design the tank walls and sketch the details. The tank is supported on all sides under the wall. 14

5. A continuous prestressed concrete beam with bonded tendons is shown in figure 1. The cable consists of two linear profiles in the first span AB and parabolic profile in second span BC. Analyze the beam for the effect of prestressing alone, using equivalent load method. Consider a prestress force of 1500 kN at the anchor points and no loss due to friction. 14
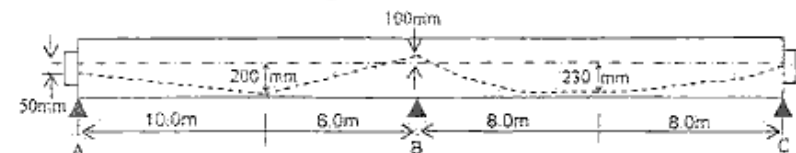

Figure 1

6. A post tensioned prestressed concrete beam has an end block of dimension 500mm × 250mm. Two cables with 400 kN of force in each are anchored at 100mm from top and bottom. The anchor plates have a dimension of 100mm × 100mm. The top cable has a slope of 1/12. Evaluate the anchor zone stresses along the centre line of the beam. Plot the stress pattern variation on along the axis of the beam in the end zone. 14

7. Distinguish between a Bunker and a Silo. Design the side wall of a bunker to store 400kN of coal for the following data .14
   i)   Unit weight of Coal = 8.5 kN/m³
   ii)   Size of bunker = 3.0m × 3.0m with hopper portion of 1.20m high with a central hole of size 0.5m × 0.5m
   iii) Angle of repose = 30°. The stored coal is to be surcharged at its angle of repose

8. Discuss in detail any two of the following: 14
   i)   IS code procedure for estimation of seismic load on buildings
   ii)   Design of staging of overhead tanks
   iii) Design of raft footings
   iv)   Janssen's theory for design of silos

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