B.E. Eighth Semester (Civil Engineering) (C.B.S.)

Elective - III : Advanced Reinforced Cement Concrete Design

P. Pages : 2 **NKT/KS/17/7543**

Time : Three Hours * 0 7 3 3 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Assume suitable data whenever necessary.
7. Use of non programmable calculator is permitted.
8. I.S. 456 (Received) I.S. 3370 (Part - IV) may be consulted.

1. An overhead water tank circular in shape has internal diameter of 6.4 m and height of the wall is 4.5 m. The base slab of tank is supported over its periphery by a circular ring beam of radius 2.88m. The rise of top dome can be assumed as 840 mm. Design the following component of water tank. **20**

i) Top dome ii) Top ring beam
iii) Vertical wall of circular water tank iv) base slab

Assume M20 grade of concrete and Fe415 grade of steel. Draw the reinforcement details.

OR

2. An Intz water tank having capacity 22,50,000 liters and supported by elevated tower consist of 14 nos. column. Use M20 concrete and Fe415 steel. **20**

Design :

i) Top Dome ii) Top ring beam
iii) Cylindrical wall of tank iv) Bottom ring beam.

Sketch the reinforcement details.

3. Design R.C.C. bridge deck slab for following data : **20**

- Carriage way - 6.5 m wide (two lane)
- Clear span - 5.2 m
- Width of Kerb – 650mm
- Wearing coat - 80 mm
- Width of bearing - 450 mm
- Value of K = 2.85
- Loading IRC class AA tracked vehicle.
- Use M20 grade concrete & Fe415 steel.
- Impact factor for 5 m span is 25% and linearly decreasing to 10% for 9m span.

Design deck slab and dram R/F details.

OR

4. a) Explain is details design of RCC bridge deck slab and also explain why average intensity of IRC load is not same for calculating max. B.M. & Max S.F. in the design of bridge deck slab spanning in one direction ? **10**

b) Explain in details with neat sketch various types of IRC loading for design of bridges. **10**

5. A portal frame with end hinged is to be analysed for the following data : **20**

- Spacing of portal frames = 4m
- Height of columns from hinge base to the centre of beam = 5.2 m
- Distance between column centers = 12 m
- Live load on the roof = 1.5 kN/m^2.
- RCC slab is provided over the portal frame

Analyse and design the portal frame and find design moment and shear force at critical section.

OR

6. A multistory building having two boys has continuous beam with AB = 4.3 m, B.C. = 2.5m. The beams are placed equally at an intervals of 4m. The thickness of the floor slab is 150 mm live load = 3 kN/m^2, Floor finish = 0.5 kN/m^2, size of beam = 230 x 400 mm, size of column = 230 x 500 mm, height of floor = 3.5 m, I beam = 2 x I column. Analyse the intermediate frame and design the beam, column and foundation. Assume column having fixed based. Use M20 grade concrete and Fe415 steel, Draw reinforcement details. **20**

7. a) Explain "Beam Theory" in the design of RCC cylindrical shell. Also write it's assumptions and limitations. **10**

b) Explain in detail "Membrane theory for the analysis and design of RCC cylindrical shell. **10**

OR

8. Design an interior panel of a cylindrical shell roof covering plan area of 14 x 32 m using beam theory. The semi central angle 39°. Make suitable assumptions for size of edge beam, thickness of shell and reinforcement in edge beam. Use M20 concrete and Fe415 steel. Sketch the reinforcement details. **20**

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