



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100655

Roll No.

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B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
ADVANCED CONCRETE DESIGN

Time : 3 Hours]

[Total Marks : 100

- Note:
- (i) Attempt ALL questions.
 - (ii) Marks are indicated against each question.
 - (iii) Assume any data suitably, if required.
 - (iv) IS 456: 2000 and IS 3370 is permitted.
 - (v) Draw and show complete structural details in design problems
 - (vi) Use M20 concrete and Fe 415 steel if not given in problem.
1. Attempt any TWO parts of the following : $10 \times 2 = 20$
- (a) Design a section of a vertical wall of a water tank subjected to an axial force of 300KN/m. Use M25 concrete & fe 415 steel.

- (b) What is Intz tank? Where it is used? Draw the neat sketch of a Intz type overhead water tank supported with columns and braces on annular raft foundation. The depth of footing is 2m below ground level. Showing all the structural elements of the tank, Discuss in brief, how the container of the tank is designed by using membrane theory.
- (c) A curved beam circular in plan is loaded with uniform load of 150KN/m inclusive of self weight. The radius of the beam is 5m. The beam is supported on six symmetrically placed columns.
1. Draw the Shear force, bending moment and torque diagrams for one of the spans showing all critical values. Also locate the point of inflection.
 2. Design the support section for maximum bending moment.
- 2 Attempt any TWO parts of the following : $10 \times 2 = 20$
- (a) Discuss the different types of loads which act on column and bracing supported staging for the OH water tank. Explain the various loading combinations taken for the Design of staging and briefly discuss the Design of staging.
- (b) Discuss with neat sketches the various types of footing used for the Over Head water tanks supported on columns and bracings. Explain briefly their design features.

- (c) Design a spherical dome and ring beam of a cover of circular water tank. The dome has 16m diameter and 3m central rise supported over a ring beam. Use M20 concrete and fe 415 steel.
3. Attempt any Two parts of the following : $10 \times 2 = 20$
- (a) What are the multistory frames? How the load transfer takes place in a multistorey building? List and discuss the various types of possible vertical and horizontal loads which act on such buildings.
- (b) Design an interior span of a three span continuous beam in a multi - storey building. The effective length of each span is 5m. The beam is subjected to 2KN/m dead load and 4KN/m live load along all the spans. The beam is monolithic with supporting columns. Choose a rectangular cross section for the beam.
- (c) Analyse a three storey, three span building frame using the Portal method. The height of each storey is 4m and effective span length for each span is 5m. The frame is subjected to horizontal loads of 20KN at each floor level and roof level. Draw the bending moment and shear force diagrams for the frame.

- 4 Attempt any TWO parts of the following $10 \times 2 = 20$
- (a) Discuss the different types of IRC bridge loadings used in the design of R.C. Bridges in India.
 - (b) Enumerate the all possible types of horizontal and vertical loads acting on a typical R.C. Bridge
[1.] Sub structure [2.] Super Structure.
Discuss at least two forces from each category in detail along with formulae and how they are calculated.
 - (c) Analyse a reinforced concrete slab culvert for the following requirements. (Design not required)
Clear span = 7m, Support width = 400mm, width of carriageway = 7.5m, width of Kerb = 600mm, Type of loading : IRC class AA tracked vehicle, Concrete grade: M20, Grade of steel = fe 415.
- 5 Attempt any TWO parts of the following $10 \times 2 = 20$
- (a) What do you understand by High performance concrete? Discuss the various constituents used in its production and mix design aspects of high performance concrete.
 - (b) What do you understand by Ready mixed concrete? How it is produced and transported to the site?
 - (c) As per IS: 456-2000, how environment aggressivity is recognized ? What are the various measures taken to ensure durability of concrete recommended by IS code.