

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



VII SEMESTER B.TECH (CIVIL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: PROGRAM ELECTIVE III: ADVANCED REINFORCED

CONCRETE DESIGN [CIE 427]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL the questions.
- ✤ Missing data may be suitably assumed.
- ✤ Use of IS 456 and SP 16 is permitted

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1.	For a hall 10 m wide and 20 m long, portal frames are to be provided at 4 m centre to centre, dividing the hall into five equal parts. The portals are fixed at the base, and its height up to centre of horizontal member (beam) is 6.5 m. Design the roof and beam, if it carries a live load of 1.5 kN/m ² . Use M20 grade concrete and Fe 415 steel.	10
2.	The diameter of a conical dome of an Intze tank is 14 m at top and 10 m at bottom. If the height of cylindrical wall is 6 m and height of conical dome is 1.6 m, design the conical dome and bottom spherical dome. Central rise of bottom dome is 1.6 m Weight from top dome, cylindrical wall and ring beam B2 may be taken as 2975.4 kN. Use M30 grade concrete and Fe 415 steel. Design constants are $\sigma_{ct} = 1.5 \text{ N/mm}^2$, $\sigma_{cbc} = 10 \text{ N/mm}^2$, $\sigma_{cc} = 8 \text{ N/mm}^2$, $\sigma_{st} = 130 \text{ N/mm}^2$.	10
3.	A beam circular in plan is loaded with uniform load of 140 kN/m inclusive of self-weight. The radius of the beam is 4 m. The beam is supported by six symmetrically placed columns with $C_1 = 0.089$, $C_2 = 0.045$, $C_3 = 0.009$, $\phi_{max} = 12.75^{\circ}$. Design the beam. The materials are M20 grade concrete and Fe 415 steel.	10
4.	A square grid floor 20 m wide \times 30 m long is to be designed for a load of 7.25 kN/m ² (inclusive of self-weight of slab and beams). Spacing of ribs in both the directions is 2 m c/c. Analyse the floor using plate theory.	10
5.	The substitute frame of a multistoreyed building has three bays and a continuous beam ABCD with $AB = 5m$, $BC = 3.5 m$, $CD = 5 m$. Dead load and live load on the beam are 12 kN/m and 16 kN/m respectively. Height between the floors is 3.5 m. Flexural rigidity of beam and columns are same. Analyse the substitute frame and estimate the maximum design moments in the beam and columns.	10
6.	Design a circular bunker to store 40 tonnes of coal. The unit weight and angle of repose of coal may be taken as 8.1 kN/m ³ and 30° respectively. Diameter of bunker may be taken as 4 m. Use M20 grade concrete and Fe 415 steel.	10