

MANIPAL INSTITUTE OF TECHNOLOGY MANIPAL

VII SEMESTER B.TECH. (CIVIL ENGINEERING) **END SEMESTER EXAMINATIONS, NOV/DEC 2016**

SUBJECT: ADVANCED REINFORCED CONCRETE DESIGN [CIE 427]

REVISED CREDIT SYSTEM (25/11/2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitable assumed.
- ✤ IS 456 and SP16 is permitted.

1A.	A portal frame has a span of 10m and height of 4.5 m above the base. It carries a UDL of 25 kN/m . Design the portal if it is hinged at the base. Design the hinge also. Use M25 grade concrete and Fe 415 steel.	10
2.	Design the side walls of a square bunker to store 32 tonnes of coal. Density of coal is 8.5 kN/m^3 . Angle of repose may be taken as 30°. Use M20 grade concrete and Fe 415 steel.	10
3.	An Intze tank is to be designed to store 0.8 million litres of water. Central rise of top dome is 1.8 m, rise of bottom dome is 1.6 m, inside diameter of the tank is 12 m, diameter of supporting tower is 8 m, and depth of conical dome is 2 m. Design the top dome, top ring beam and cylindrical wall of the tank. 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
4.	Compare the horizontal pressures developed at 3 m intervals in a cement silo of internal diameter 6 m and height 24 m using Janssen and Airy's theories. Density of cement = $15 \text{ kN/m}^2 \mu' = 0.554$, $\mu = 0.316$, angle of repose of cement = 17.5° , ratio of horizontal to vertical pressure = 0.54 .	10
5.	A square grid floor 18 m wide x 26 m long is to be designed for a load of $7kN/m^2$ (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
6.	A beam circular in plan is loaded with uniform load of 30 kN/m inclusive of self- weight. The radius of the beam is 3 m. The beam is supported by five symmetrically placed columns with $C_1 = 0.108$, $C_2 = 0.054$, $C3 = 0.014$, $\phi max = 15.25^{\circ}$. Design the beam. The materials are M20 grade concrete and Fe415 steel.	10