Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VI SEMESTER B.TECH (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, MAY/ JUNE 2016

SUBJECT: STRUCTURAL DESIGN III [CIE 304]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.
- Use of IS: 456-2000 and SP 16: 1980 is permitted

1.	Following are the data related to a circular tank with flexible base, i) Capacity of the tank = 2,00,000 litres ii) Depth of water tank including a free board of 200 mm = 6.2 m iii) Grade of concrete - M 30, Grade of steel - Fe 415 iv) σ_c = 1.5 N/mm^2, σ_{st} = 130 N/mm^2 and σ_{cbc} = 10 N/mm^2 v) Effective cover = 45mm. Calculate reinforcement required for the tank wall for 4 m from base by considering 1 m depth each time. Consider 12# bars for main reinforcements. Check for wall thickness is not required.	10
2.	A rectangular water tank is 8 m × 5 m in dimensions. Height of the water tank is 4 m which includes a freeboard of 0.12 m. Use M 30 grade concrete and Fe 415 steel. Consider σ_c = 1.5 N/mm^2, σ_{st} = 130 N/mm^2 and σ_{cbc} = 10 N/mm^2. Assume overall wall thickness as 350 mm with an effective cover of 45 mm. Calculate reinforcement required for both long wall and short wall, near ends only	10
3.	Design an intermediate flight of waist-slab type dog legged stair case, for a multi- storeyed building. Use M 30 concrete and Fe 500 steel. Clear dimensions of stair room = 4.52 m × 2.2 m, floor to floor height = 3.4 m, tread = 280 mm, rise = 170 mm, waist-slab thickness = 200 mm inclusive of 30 mm effective cover, width of flight = 1m, thickness of supporting wall = 230 mm, live load = 3.5 kN/m^2 and floor finish = 0.6 kN/ m^2. Staircase is supported at the edge of landing slab which spans parallel with the risers. Perform all the necessary checks.	10
4.	Details of an interior panel of a flat slab is as follows, i) Panel dimensions 6.5 m x 6.5 m ii) Column strip width is 3.25 m iii) Drop dimension is 3.25 m x 3.25 m iv) Drop thickness is 100 mm v) Slab thickness is 230 mm which includes 30 mm effective cover vi) Column head diameter is 1.25 m vii) column is 400 mm in diameter vii) Live load and floor finish loads are 6 kN/m^2 and 0.7 kN/m^2 respectively. Use M30 grade concrete and Fe 415 grade steel. Design middle strip positive reinforcements. Perform all the checks required for the design except deflection.	10

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5.	A beam and slab type of footing is to be designed for two columns C_1 (300 mm x 300 mm) and Column C_2 (400 mm x 400 mm) carrying service loads of 800 kN and 900 kN respectively. The centre to centre distance between columns is 4.5 m. The SBC of soil is 120 kN/m^2. Width of footing is 2 m. Width of beam = 400 mm. Design beam only. Shear design of beam and design of footing slab is not required. Materials used are M 20 concrete and Fe 415 steel. Assume an effective cover of 50 mm.	10
6.	Check the stability of the given section fig.Q.No.(6) of a cantilever retaining wall against sliding and overturning. Wall retains the earth of 4 m high, Width of base slab is 2.7 m. Width of heel slab is 1.45 m. Width of stem at top is 200 mm. Bottom width of Stem is 350 mm. Thickness of base slab is 350 mm. Depth of foundation is 1.0 m. SBC of soil is =150 kN/m^2. Coefficient of friction is 0.55. Angle of Repose = 30^o. Unit weight of the soil is 17 kN/m^3. Use M20 concrete and Fe 415 grade steel. Also design heel slab for bending only. Check for shear is not required.	10

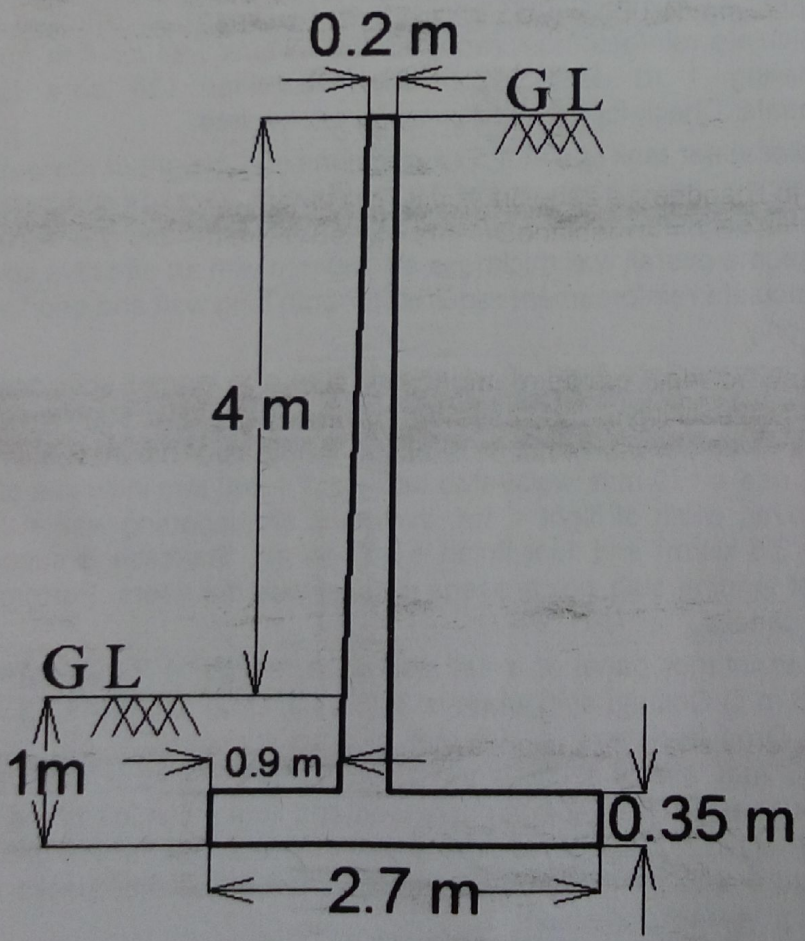

Fig.Q.No.6