Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL

(A constituent institution of MAHE, Manipal)

VI SEMESTER B.TECH. (CIVIL ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL/MAY 2018

SUBJECT: ADVANCED REINFORCED CONCRETE DESIGN [CIE 4014)

REVISED CREDIT SYSTEM

(24/ 04/ 2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitable assumed.
- Use of IS:456-2000 and 15:3370-2009 are permitted

Q.No	Questions	Marks	CO
1.	Details of interior panel of a flat slab supported on circular columns are given below Size of the panel = 5.8m X 4.8m Width of drop (square in plan) and column strips = 2.4m Thickness of slab = 200mm (inclusive of 25mm effective cover) Thickness of drop = 80mm Total factored load on the panel = 25kN/m^2 Absolute sum of positive and average negative factored bending moments in longer and shorter spans = 500kNm and 350kNm respectively Grade of concrete and steel = M30 and Fe415 respectively Check whether the slab is safe for punching shear around drop and calculate reinforcement for middle strips by direct design method.	**10**	**2**
2.	Details of cantilever type retaining wall are given below. Top and bottom widths of the stem (inclined face towards the material retained) = 175mm and 400mm respectively Density and angle of repose of soil = 18kN/m^3 and 32° respectively. Difference in soil level on either face of the wall = 5m Depth of foundation = 1.2m Thickness of base slab can be assumed equal to the bottom width of stem Width of base and heel slabs = 3.3m and 1.8m respectively Co-efficient of friction between foundation soil and concrete = 0.35 SBC of foundation soil = 230 kN/m^2 Check if the resultant force falls in the middle one-third of the base. Calculate reinforcement required for stem and check for possible shear using M25 concrete and Fe415 steel. Assume effective cover as 50mm.	**10**	**3**

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3.	Check the grid floor for maximum deflection and calculate maximum shear along longer span. Adopt plate theory. Number of grid beams (excluding peripheral beams) in x and y directions = 6 and 8 respectively Spacing of grid beams = 1.8m c/c Total expected service load on floor = 8kN/m^2 Size of grid beams in both directions = 250mm X 700mm (depth is inclusive of slab of thickness 100mm) Moment of inertia of grid beams = 1.47X1010 mm^4 Grade and poisson's ratio of concrete used = M35 and 0.17 D/B: 1.5, 2.0, 2.5, 3.0 — k: 0.196, 0.229, 0.249, 0.263	**10**	**4**
4.	Analyze a 3 bay substitute frame for bending moments if the maximum sagging moment of the beam is to occur at centre of middle span. Spans of 3 continuous bays = 3m, 5m and 4m respectively Spacing of beams parallel to the frame considered = 4m c/c Length of columns = 3.6m c/c Thickness of floor slab = 125mm . Live and floor finish loads = 2.5kN/m^2 and 0.7kN/m^2 respectively Size of beams and columns = 250mm X 350mm	**10**	**4**
5.	Details of circular water tank with rigid base are given below. Overall height of the tank = 4.5m Diameter of the tank available for storage = 14m Thickness of tank wall = 200mm (inclusive of 50mm effective cover) Grade of concrete and steel = M35 and Fe415 Check if the thickness provided for the wall is sufficient and calculate reinforcement for cantilever portion (assumed as per approximate analysis).	**10**	**5**