Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

APRIL/MAY 2019

SUBJECT: BASIC REINFORCED CONCRETE DESIGN [CIE 2203]

Date of Exam: **/ /2019** Time of Exam: **2:00 PM to 5.00 PM** Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions. Any missing data may be suitably assumed.
- Use of IS 456 – 2000 and SP-16 is permitted.
- Use limit state approach unless specified otherwise.

Sl. No.	Questions	Marks	CO
1A.	State assumptions made in working stress approach.	4	1
1B.	A beam of 230 mm wide and 550 mm effective depth is reinforced with 4 bars of 25 mm dia. on the tension side, and 2 bars of 16 mm dia. on compression side. If the grade of concrete is M 25 and steel is Fe 250, State the type of the beam. [Use working stress approach]	3	2
1C.	Calculate the moment of resistance of a T-beam with a flange of 1200 mm wide and a flange depth 125 mm is reinforced with 4 bars of 16 mm diameter on its tension side. The beam is of 600 mm in effective depth and made up of M30 grade concrete and Fe415 steel.	3	2
2A.	Design a simply supported beam of width 230 mm having an effective span of 7 m subjected to a total load of 20 kN/m inclusive of self-weight at service conditions. Use M25 grade concrete and Fe415 steel. Consider 'mild' exposure condition. Deflection check is not required.	7	2
2B.	Determine the minimum dimensions of an isolated footing for a rectangular column of size 250 mm × 600 mm to carry a factored axial load of 1500 kN. The safe bearing capacity of soil is 200 kN/m^2.	3	4
3A.	Design the interior span of a one way continuous slab with an effective span of 4 m. The slab is subjected to a floor finish load of 1 kN/m^2 and a live load of 3 kN/m^2 at service conditions. Use M20 grade concrete and Fe415 steel. Consider 'moderate' exposure condition. Design for shear and deflection check is not required.	7	3
3B.	A column of size 230 mm × 450 mm is reinforced with 8 bars of 16 mm dia. all around. The unsupported length of column is 3 m and is fixed at both the ends. If the grade of concrete is M30 and steel is Fe415, check the column for axial load and combined bending with axial load. Based on this, what is the ultimate load carrying capacity of the column?	3	4

4A.	Design a short column of size 300 mm × 600 mm is subjected to a factored load of 2000 kN and a factored moment of 200 kN.m about its minor axis. Use M30 grade concrete and Fe 415 steel. Consider an effective cover of 60 mm. Lateral ties need not be designed.	**4**	**4**
4B.	Design a short column of size 250 mm × 500 mm subjected to a factored axial load of 1500 kN. The column is subjected to a factored bending moment of 175 kN.m and 75 kN.m about its major and minor axes respectively. Use M40 grade concrete and Fe 415 steel. Assume an effective cover of 50 mm.	**6**	**4**
5A.	Calculate deflection due to shrinkage for a simply supported beam of span 4.5 m with a cross section of 300 mm × 500 mm. The beam is reinforced with 4 bars of 16 mm diameter on tension side and 2 bars of 12 mm diameter on compression side. Use M25 grade concrete and Fe 415 steel. Assume an effective cover of 50 mm. for both compression and tension reinforcement. What must be the increase in compression reinforcement so as to eliminate the deflection due to shrinkage? [Use working stress approach]	**4**	**5**
5B.	Calculate crack widths at the locations as indicated for a beam of size 250 mm × 500 mm as shown in the fig. Q.5B. The beam is reinforced with 4 bars of 20 mm diameter on tension side and 2 bars of 16 mm diameter on compression side. The beam is subjected to a bending moment of 160 kN.m at working condition. Use M30 grade concrete and Fe 415 steel. Assume a effective cover for all bars as 30 mm. [Use working stress approach]	**6**	**5**

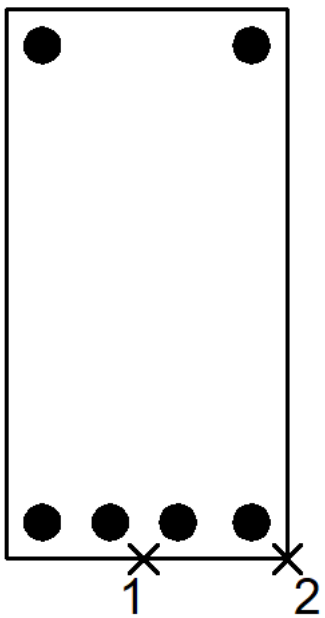

Fig. Q.5.B