Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH CIVIL ENGINEERING END SEMESTER EXAMINATIONS

APRIL/MAY-2019

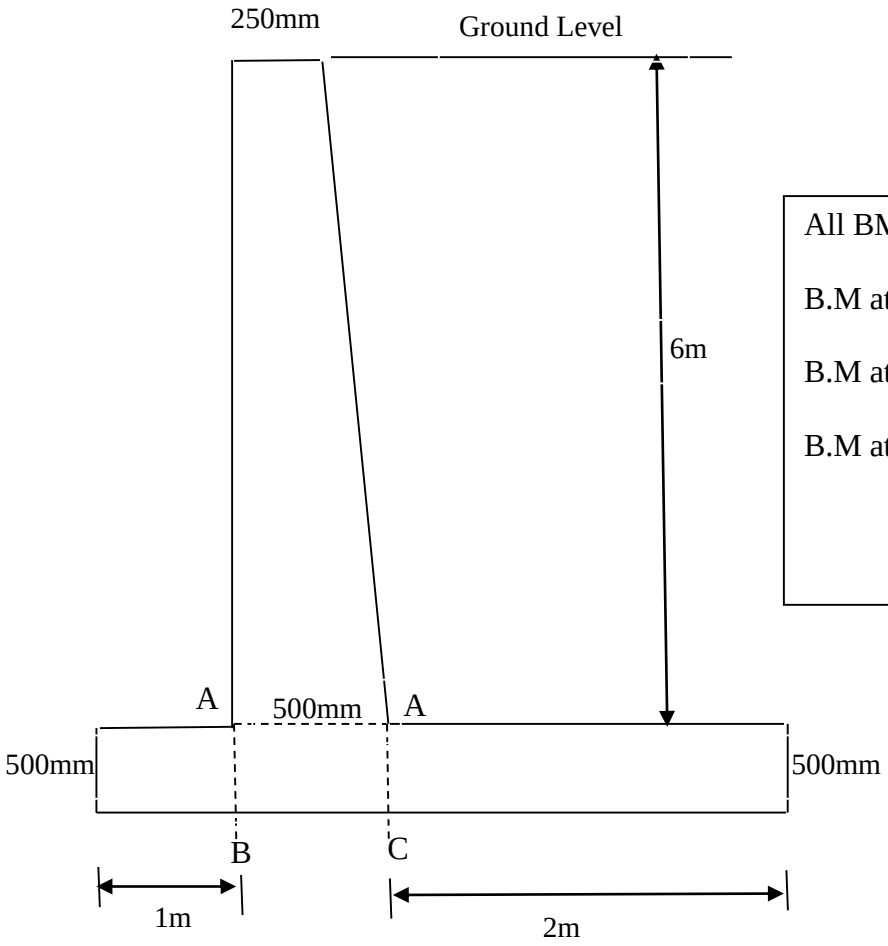
SUBJECT: ADVANCED REINFORCED CONCRETE DESIGN
[CIE 4014]

Date of Exam: **30/04/2019** Time of Exam: **2:00 pm to 5:00 pm** Max. Marks: **50**

Instructions to Candidates:

- Answer ALL the questions
- Usage of IS 456:2000, IS 3370- Part IV and SP16 is allowed
- Assume M20 concrete and Fe415 steel for all questions
- Missing data , if any, may be suitably assumed

1A.	Determine factored bending moments for an interior flat slab panel of size 7mX 7m for a Live Load of 4 kN/m^2 and Floor Finish of 1 kN/m^2 and dead load due to self weight. The slab is supported by columns of size 0.7X 0.7m.	**8**	**CO2**
1B.	Explain punching shear calculation in flat slabs. Write the allowable shear stress in flat slabs as per limit state method.	**2**	**CO2**
2A.	A grid floor is to be designed for a floor of dimension 10m×16m. The spacing of grid beams are at 1m c/c and top slab thickness is 90mm. Determine the maximum design bending moments and shear forces in the grid beams in both directions. The LL on the slab is 4 kN/m^2 and floor finish is 1 kN/m^2. Ignore self-weight of grid beams.	**4**	**CO3**
2B.	Proportion an isolated footing for a factored column load of 500kN. Size of column is 300mm×300 mm. Determine thickness of footing required and evaluate the stresses in soil if SBC of the soil is 180 kN/m^2.	**6**	**CO3**
3A	With neat sketch, explain the structural behavior of a cantilever retaining wall.	**3**	**CO4**
3B	Design and detail the reinforcements for the cantilever retaining wall shown in **Fig.Q3B.** Bending moments at various sections are given with the figure. A shear key of 0.5m×0.5m is provided.	**7**	**CO4**
4A	Design a circular water tank to store 1,00,000 litres of water. The clear area available on the site is 7m × 12m. Assume the water tank rests on a firm ground and walls are rigidly connected to base.	**7**	**CO5**
4B	A flexible base water tank has a diameter of 5m and thickness of 150mm. If it is provided with 0.3% of hoop steel, then determine the maximum height of water permissible in tank.	**3**	**CO5**
5A	Determine the maximum hoop tension and corresponding reinforcement required in vertical walls of a circular bunker of size 3m diameter and 4m height when it is used to store coal of density 9kN/m^2 and angle of repose 30^o.	**5**	**CO5**
5B	Derive Rankine Grashoff formula for load distribution in a rectangular slab. Determine bending moment in both direction of a simply supported panel of size 4m×6m subjected to a uniform load of 5kN/m^2.	**3**	**CO1**
5C	Explain the differences between cantilever and counterfort retaining walls.	**2**	**CO4**



All BM are factored.

B.M at s/n AA= 310kNm

B.M at s/n AB= 150kNm

B.M at s/n AC= 205kNm

Fig. Q3B