Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

IV SEMESTER B.TECH (CIVIL ENGINEERING)
END SEMESTER EXAMINATIONS, MAY/JUNE 2016

SUBJECT: BASIC REINFORCED CONCRETE DESIGN [CIE 2203]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- **Answer ALL the questions.**
- ***Additional data, if required, may be suitably assumed***
- ***Usage of IS :456 -2000 and SP-16 is permitted.***
- ***Use Limit State Method of Design unless specifically mentioned***

1A.	A doubly reinforced rectangular beam of overall size **230×550mm** is reinforced with **2 bars of 20mm** diameter on compression side and **4 bars of 20mm** diameter on tension side. Find the moment of resistance of the section. Take effective cover as **50mm**. use **M20** grade concrete and **Fe415** steel. **(Adopt working stress method)**	**5**
1B.	A simply supported beam with cross section **300mm** wide and **550mm** effective depth is reinforced with **3 bars of 25mm** diameter on the tension side. Calculate the safe UDL including the self-weight over a span of **6m**. The materials used are **M25** grade concrete and **Fe415** grade steel.	**5**
2.	Design a cantilever beam to carry a working load of **35kN/m** inclusive of its self-weight over a span of **2m effective**. The width of supporting beam is **300mm,** do all the necessary checks as per IS: 456-2000**.** Use **M25** grade concrete and **Fe415** steel**,** the exposure condition is mild. And also sketch the reinforcement details.	**10**
3.	Design the slab for a floor to suite the following data. Size **3.7m× 5.2m**, all the edges are continuous, supporting walls are **250mm** thick with corners restrained, Live load= **2.0 kN/m^2**, floor finish= **0.8 kN/m^2**. Do all the necessary checks as per IS:456-2000. Adopt **M25** concrete, **Fe415** steel and severe exposure condition.	**10**
4A.	Briefly explain classification of columns based on loading type.	**02**
4B.	Design a short column of size **400mm×650mm** subjected to a factored load of **2500kN**, **Mux=350kN-m, Muy= 60 kN-m**. The unsupported length of the column is **2.5m**. The materials are **M40** grade concrete and reinforcement of grade **Fe415**.	**08**
5A.	Calculate the short term deflection at the center of the simply supported beam carrying total load of (DL+LL) of **40kN/m over a span of 6.5m**. Beam of **350mm×650mm** overall depth is reinforced with **4 bars of 20mm** diameter on the tension side and **2 bars of 16mm** diameter on compression side. Assume **M25** grade of concrete, **Fe415** steel and effective cover as **50mm**.	**5**
5B.	Briefly explain different types of footing.	**2**
5C	Determine the size of the footing for a rectangular column of size **400mm×600mm** supporting an axial load of **1200kN**.The SBC of soil is **200kN/m^2**. Use **M20** grade concrete and **Fe415** steel. The angle of internal friction of soil is **30^0** and unit weight is **18 kN/m^3**	**3**