



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 beam is 230mm wide and 500mm effective depth, calculate the design constants, balanced depth of neutral axis and area of steel for balanced section if M40 grade concrete and Fe415 grade steel is used.(Use working stress method)	4
1B.	For a beam of cross section 300mm × 550mm overall depth, calculate the area of steel required if the bending moment at working load is 200 kN-m . Use M25 grade concrete and Fe415 grade steel. Effective cover for both compression and tension side is 35 mm .	6
2.	Design the end span of a continuous beam having an effective span of 6m carrying a dead load of 20kN/m and live load of 10kN/m . Do all the necessary checks as per IS: 456-2000. The grade of concrete is M25 and grade of steel is Fe415 the beam is located in severe exposure condition and assuming breadth of the beam as 250mm . And also sketch the reinforcement details.	10
3.	Design a simply supported one way slab having a clear span of 5m and support width of 230mm . The live load on slab is 3.0kN/m² and floor finish of 1.0kN/m² . Do all necessary checks as per IS:456-2000 . Adopt M30 grade concrete and Fe415 grade steel. Consider moderate exposure condition and sketch the reinforcement details.	10
4A.	What are the assumptions made for limit state of collapse in compression	02
4B.	Design a short circular column for an unsupported length of 4m , with both ends fixed to carry an axial factored load of 1600kN . Use helical reinforcement, adopt M40 grade of concrete and Fe415 steel. Also sketch the reinforcement details.	08
5A.	Explain briefly different types of footings.	2
5B.	A simply supported rectangular beam section 250 mm×500mm overall depth is reinforced with 4 bars of 16mm diameter as tension reinforcement and the hanger bars are 2 numbers of 12mm diameter at the compression face with an effective cover of 50mm for both the reinforcement. The beam has an effective span of 5.5m which supports a service load of 20kN/m (inclusive of self-weight). Assuming M35 concrete and Fe415 steel, compute a) short term deflection b) crack width at a point which is on the tension edge below the corner bar. Es = 200GPa.	8