

University of Mumbai

Program: Civil Engineering

Curriculum Scheme: Rev2019

Examination: TE Semester: V

Course Code: CEC-501

Course Name: Theory of Reinforced Concrete Structures (TRCS)

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Limit State Method is based on
Option A:	calculations on service load conditions alone
Option B:	calculations on ultimate load conditions alone
Option C:	calculations at working loads and ultimate loads
Option D:	calculations on earthquake loads
2.	What is the minimum tension reinforcement provided in beams when Fe415 grade of steel is used?
Option A:	0.8%
Option B:	0.12%
Option C:	0.15%
Option D:	0.2%
3.	Modular ratio for M20 grade of concrete is
Option A:	15.54
Option B:	13.53
Option C:	13.23
Option D:	11.56
4.	Which of the following relation is correct?
Option A:	Design Load = Characteristic Load
Option B:	Design Load = Characteristic Load + Partial factor of safety
Option C:	Design Load = Characteristic Load / Partial factor of safety
Option D:	Design Load = Characteristic Load x Partial factor of safety
5.	Limiting Moment of resistance for an effective section 230mm x 500mm for M25 and Fe415 grades of materials is
Option A:	234.53 kNm
Option B:	198.38 kNm
Option C:	191.187 kNm
Option D:	212.75 kNm
6.	The effective span of a simply supported slab, is
Option A:	distance between the centres of the bearings
Option B:	clear distance between the inner faces of the walls plus the thickness of the wall
Option C:	clear span plus effective depth of the slab
Option D:	none of these.

7.	Design of R.C.C. simply supported beams carrying U.D.L. is based on the resultant B.M. at
Option A:	Mid span
Option B:	Support
Option C:	Corner
Option D:	Anywhere in the section
8.	The amount of reinforcement for main bars in a slab, is based upon
Option A:	minimum bending moment
Option B:	maximum shear force
Option C:	maximum bending moment
Option D:	minimum shear force.
9.	The self-weight of the footing, is
Option A:	not considered for calculating the upward pressure on footing
Option B:	also considered for calculating the upward pressure on footing
Option C:	not considered for calculating the area of the footing
Option D:	both (b) and (c)
10.	In a slab, the pitch of the main reinforcement should not exceed its effective depth
Option A:	Three times
Option B:	Four times
Option C:	Five times
Option D:	Two times

Q2 (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	<i>The cross section of a singly- reinforced concrete beams 300 mm wide and 450 mm deep to the center of the reinforcement which consists of 4 bars of 16 mm diameters. If the stresses in concrete and steel are not exceed 7 N/mm² and 230 N/mm², determine the moment of resistance of the section. Take $m = 13.33$. Cover to center of compression steel is 50 mm.</i>	
B	<i>A Reinforced Concrete Beam of rectangular section 230 mm wide and 550 mm deep is reinforced with 5 bars of 12 mm dia. Provided with effective cover of 40 mm. calculate the ultimate Moment of resistance & maximum Uniformly distributed super imposed load this beam can carry if it is simply supported over a span of 4 m. The materials used are concrete grade M-20 & Fe- 415 Steel.</i>	
C	<i>Design a slab on a hall of size 3m * 5m effective. The slab is simply supported on 230mm wall on all four sides. Consider LL = 4KN/m² & FF = 1KN/m². Assume M20 grade of concrete & Fe415 steel.</i>	

Q3 (20 Marks)	Solve any Two Questions out of Three	10 marks each
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A	<i>A Column of 350 mm diameter has 6 bars of 16 mm diameter calculate the Ultimate load on the column. Assume clear cover of 50 mm. Use M-20 and Fe-415..</i>
B	<i>Design an isolated footing to carry a load of 2500 KN on a column of size 450mm x 450mm. Consider SBC as 300 KN/m². Use M20 grade of concrete and Fe415 grade of steel.</i>
C	<i>Design shear reinforcement for a beam of span 6m subjected to an ultimate load of 60 KN/m. Size of beam is 230mm x 800mm and reinforcement in beam is 4-20mm Ø bars. Assume steel of grade Fe415 and concrete of grade M20.</i>

Q4. (20 Marks)	Solve any Two Questions out of Three	10 marks each
A	<i>Design a slab on hall of size 4m x 6m effective. The slab is simply supported on 230mm wall on all four sides. Consider LL = 3KN/m²& FF = 1KN/m² . Assume M20 & Fe415 steel.</i>	
B	<i>RC beam has 250mm x 450mm effective is subjected to Ultimate Moment & Torsional Moment of 45 KN-m & 20 KN-m respectively. Assume effective cover as 50mm & M20 & Fe415, Vu= 45 KN.</i>	
C	<i>Derive the expression for the position of neutral axis and Moment of resistance of balanced rectangular section..</i>	