

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination (Regular), November 2016

B. Tech in Civil Engineering, Semester V

Roll No.....

CE 507: DESIGN OF RCC STRUCTURES

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on the question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units and drawing neat sketches wherever, required are an integral part of the answer.
4. Use of IS: 456-2000 is to be permitted.

Q.1A	Objective type multiple choice questions (10 questions @ 1 mark)	10
i.	The maximum area of compression reinforcement in a beam of cross-section $B \times D$ is limited to; 1. $0.02 BD$ 2. $0.04 BD$ 3. $0.03 BD$ 4. $0.05 BD$	
ii.	Pick up the correct statement regarding columns. 1. In helically reinforced column, the minimum number of longitudinal reinforcement should be six 2. The cross-sectional area of longitudinal reinforcement, should not be less than 0.8% nor more than 4% of its gross sectional area 3. The minimum of longitudinal bars provided in rectangular and circular columns are 4 and 6 respectively 4. All the above	
iii.	The grade of concrete generally not used in the reinforced concrete, is 1. M 10 2. M 15 3. M 20 4. M 40	
iv.	The reinforcing bars in beams are not bundled in contact if the diameter of the bars, exceeds 1. 20 mm 2. 35 mm 3. 12 mm 4. 36 mm	

v.	The maximum characteristic strength of the stirrups reinforcement, is taken 1. 415 N/mm² 2. 395 N/mm² 3. 375 N/mm² 4. 350 N/mm²
vi.	The minimum area of cross section of reinforcement in either direction of a slab should not be less than of the slab cross section 1. 0.20% 2. 0.15% 3. 0.75% 4. 0.10%
vii.	All reinforcement should be free from 1. loose mill scales 2. All the above. 3. paints 4. loose rust
viii.	Pick up the correct statement from the following: 1. All the above 2. The unit weight of reinforced concrete is assumed as 2500 N/m³ 3. The unit weight of plain concrete is assumed as 2400 N/m³ 4. The dead load includes self weight of the structural member plus weight of finishes and walls or partitions
ix.	The minimum diameter of longitudinal reinforcement of a column should not be less than 1. 6 mm 2. 8 mm 3. 10 mm 4. 12 mm
x.	For spans upto 10 m, the safe span to depth ratio for 1. simply supported beams is 20 2. cantilever is 7 3. continuous beams is 26 4. all the above

Q.2	Short answer type questions (4 questions @ 2.5 marks)	10
A.	The reduced level of third floor of a building near a column is 205.350 m. The reduced levels of the undersides of four beams supporting the fourth floor framing into the column mutually perpendicular are 208.350 m, 208.450 m, 208.500 m and 208.550 m. The supported length of the column is; 1. 3.100 m 2. 3.000 m 3. 3.200 m 4. 3.150 m	
B.	For design purpose, the moment at the support where two unequal spans or spans not equally loaded meet, is 1. none of these 2. lesser value 3. greater value 4. average of two values Give the reason.	
C.	Define one way and two way slab.	
D.	Explain two major differences between singly reinforced section and doubly reinforced section.	
Q.3	A singly reinforced RCC beam 300mmX 650mm effective is reinforced with effective cover 50mm. the beam is simply supported for a span 5.2m. It is loaded by 50 KN/m. Design the reinforcement use M20 grade concrete and Fe 415 grade steel.	15
Q.4	A RCC column footing of 500mm X 500mm is loaded by 1200 KN. Design suitable square footing using M20 grade concrete and mild (Fe-250) steel if bearing capacity of soil is 150 KN/m ² .	15
Q.5	A rectangular RCC column of cross section dimensions 300 mm X 600 mm is to be design to support an ultimate axial load of 2000 KN. Design suitable reinforcements in the column using M20 grade concrete and Fe-415 grade steel.	20
Q.6	Design a simply supported RCC slab for 3.2m span. Thickness of support is 200 mm, live load is 3.5 KN/m ² , floor finishing 50 mm thick cement concrete. Use M20 grade concrete and Fe 415 grade steel.	20
OR		
Q.6	Design two way RCC slab for a room 3.4m X4.4m for the following data width of support=300mm, M20 grade concrete and mild steel are used, Imposed (live load)= 3.5 KN/m ² Floor Finishing load = 0.8 KN/m ²	20

Q.7	Design bending moment and shear forces of continuous beam if, Effective span= 8 m M20 grade concrete Fe 415 grade steel Dead load =10 KN/m Live load= 15 KN/m Width of beam $b = 300$ mm Effective Depth of beam = 850 mm.	10
-----	---	----

TABLE 95 AREAS OF GIVEN NUMBERS OF BARS IN cm²

NUMBER OF BARS	BAR DIAMETER, mm												
	6	8	10	12	14	16	18	20	22	25	28	32	36
1	0.28	0.50	0.79	1.13	1.54	2.01	2.54	3.14	3.80	4.91	6.16	8.04	10.18
2	0.56	1.00	1.57	2.26	3.07	4.02	5.08	6.28	7.60	9.81	12.31	16.08	20.35
3	0.84	1.50	2.35	3.39	4.61	6.03	7.63	9.42	11.40	14.72	18.47	24.12	30.53
4	1.13	2.01	3.14	4.52	6.15	8.04	10.17	12.56	15.20	19.63	24.63	32.17	40.71
5	1.41	2.51	3.92	5.63	7.69	10.03	12.72	15.70	19.00	24.54	30.78	40.21	50.89
6	1.69	3.01	4.71	6.78	9.23	12.06	15.26	18.83	22.80	29.45	36.94	48.25	61.07
7	1.97	3.51	5.49	7.91	10.77	14.07	17.81	21.99	26.60	34.36	43.10	56.29	71.25
8	2.26	4.02	6.28	9.04	12.31	16.08	20.35	25.13	30.41	39.27	49.26	64.34	81.43
9	2.54	4.52	7.06	10.17	13.85	18.09	22.90	28.27	34.21	44.17	55.41	72.38	91.60
10	2.82	5.02	7.85	11.31	15.39	20.10	25.44	31.41	38.01	49.08	61.57	80.42	101.78
11	3.11	5.52	8.63	12.44	16.93	22.11	27.99	34.55	41.81	53.99	67.73	88.46	111.96
12	3.39	6.03	9.42	13.57	18.47	24.12	30.33	37.69	45.61	58.90	73.89	96.51	122.14
13	3.67	6.53	10.21	14.70	20.01	26.13	33.08	40.84	49.41	63.81	80.04	104.55	132.32
14	3.95	7.03	10.99	15.83	21.55	28.14	35.62	43.98	53.21	68.72	86.20	112.59	142.50
15	4.24	7.54	11.78	16.96	23.09	30.15	38.17	47.12	57.02	73.63	92.36	120.63	152.68
16	4.52	8.04	12.56	18.09	24.63	32.17	40.71	50.26	60.82	78.54	98.52	128.68	162.86
17	4.80	8.54	13.35	19.22	26.17	34.18	43.26	53.40	64.62	83.44	104.67	136.72	173.03
18	5.08	9.04	14.13	20.35	27.70	36.19	45.80	56.54	68.42	88.35	110.83	144.76	183.21
19	5.37	9.55	14.92	21.48	29.24	38.20	48.34	59.69	72.22	93.26	116.99	152.80	193.39
20	5.65	10.05	15.70	22.62	30.78	40.21	50.89	62.83	76.02	98.17	123.15	160.85	203.57