

B.E. Fifth Semester (Civil Engineering) (CGS)
Reinforced Cement Concrete - II : 5 CE 01

P. Pages : 2

Time : Four Hours



AU - 3530

Max. Marks : 80

- Notes :
1. Assume suitable data wherever necessary.
 2. Use of electronic calculators is permitted.
 3. I.S. 456 & IS : 3370 (Revised) I.S. 875 may be consulted.
 4. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Draw BMD for the wall of a circular water tank with rigid based. 1
- b) Design a circular water tank of 8,00,00 litres capacity resting over firm ground & having a flexible base. Material grades are M: 25 & Fe : 415. Draw detail. 12

OR

2. An open square tank 8m* 8m* 6m deep rests on firm ground. Design the tank. Use M:25 grade concrete & Fe : 415 grade main steel. Draw detail Assume sbc of soil as 300 kN/m² 13
3. a) Differentiate between Working Stress & Limit State Methods. 5
- b) What is the compulsion for designing a doubly reinforced section? 1
- c) A beam section having 230* 600mm overall dimensions, carries an ultimate moment of 250 kN-m. Material grades are M:20 & Fe: 415. Design the section. Assume an effective cover of 50mm to tension steel & 35 mm to compression steel. 7

OR

4. Design a three span one-way continuous slab system. Assume c/c distance between all supports to be 5m. Material grades are M:20 & Fe : 415 (Main steel). Use Limit state method. Assume an imposed service load of 3kN/m². D. L. Due to finishes is 1 kN/m². It is not necessary to design the supports. Draw detail. 13
5. Design a simply supported staircase flight having 10 treads of 300mm each & 11 risers of 150 mm each. The width of the supporting beams at both ends is 300mm. Imposed/live load (service) on stair is 5 kN/m² D. L. Due to finishes is 1 kN/m². Design the flight & draw details. Material grades are M:20 & Fe : 415. There is no landing to the left & the going directly rests over a 230mm wide beam. Clear width of landing to the right is 1.2 m, after which the supporting beam having 230mm width exists. 14

OR

6. An R.C.C. floor system gird in plan consists of solid slabs resting over suspended continuous beams in both directions. Assuming an imposed service load of 3kN/m², design a corner panel of effective size 6m*7.2 m. Assume service dead load due to finishes equal to 1 kN/m². Material grades are M:25 & Fe : 415. Also design for torsion at corners. Draw detail. 14

SECTION - B

7. Completely design a multi-span (simply supported at A) continuous beam A-B-C-D-E carrying a superimposed service load of 40 kN/m^2 excluding self-weight. Each span is 8m c/c. Adopt overall beam size of $300 \times 900\text{ mm}$. Material grades are M : 20 & Fe : 415 (main steel). Use Limit state Method. Design only the end span AB at the penultimate support B. Assume a 3m high, full brick thick wall over the beam. Draw detail. 14

OR

8. Completely design a multi-span continuous beam A-B-C-D-E- carrying a superimposed service load of 40 kN/m^2 excluding beam self-weight. Each span is 9m c/c. Adopt overall beam size of $300 \times 850\text{ mm}$ (including slab). Material grades are M : 25 & Fe : 415 (main steel). Use Limit state Method. Design only the end span AB at centre (mid. span) as a T-beam. Assume slab thickness as 150 mm (D_r) & flange width as 2500 mm (b_f). There is no wall over the beam. Draw detail. 14

9. Design an eccentrically loaded braced column for the following data: 13
Ultimate Axial Load = 2000 kN
Unsupported length = $L = 3500\text{ mm}$
Column C/S = $400 \times 750\text{ mm}$
Material grades are M : 20 & Fe : 415
The column is subjected to a 400 kN-m moment in the stronger direction.
Ignore moment, if any, in the weaker direction.

OR

10. Design an isolated footing for a $500 \times 500\text{ mm}$ column subjected to an axial service load of 1600kN. Assume S.B.C. of soil to be 400 kN/m^2 Material grades are M : 20 & Fe : 415. Draw detail. 13
11. Explain with sketches the recommendations laid down by IS : 13920 for design & detailing of Beam - Column internal & external joints. 13

OR

12. Design a $9.6\text{ m} \times 14.4\text{ m}$ Grid floor to cover a hall. The grid slab is discontinuous on all four edges. Material grades are M:25 & Fe:415 (main steel). Mild steel can be used as distribution steel/shear reinforcement. Take c/c spacing of grids in both directions as 1.2 m. No need to design for torsion at corners. Assume breadth of rib (b_r) as 150 mm. 13
