

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / I	Time	3 hrs.

**Subject: - Design of RCC Structure (CE702)**

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.
- ✓ Use of IS: 456-2000; IS 1893 and SP16 are allowed. But, use of SP 16 is allowed only for column design.

1. a) State all the possible safety and requirements of limit state and define limit state of strength and serviceability. [4]
- b) Design a rectangle footing to carry a column load of 1150 kN and BM of 250 kN-m from 600×600 mm square column with the 20 mm diameter longitudinal steel. The bearing capacity of soil is 200 kN/m<sup>2</sup>. Consider depth of foundation as 1.5 m. Take unit weight of earth is 17 kN/m<sup>3</sup>. Use M20 concrete and Fe 415 steel. [16]
2. a) How do you consider earthquake loads while designing RCC structures? Explain briefly. [4]
- b) Design a slab for a room of size 3.6 m × 4.2 m prevented uplifting by walls (230 mm thick) loads for a intermediate storey of a residential building. Use M20 grade of concrete and Fe 415 grade of steel. Sketch the reinforcements. Carry out all necessary checks require in slab design. Take live load = 3kN/m<sup>2</sup>, floor finish = 1 kN/m<sup>2</sup>. [16]
3. a) Derive the formula  $L_d \leq \frac{M_1}{V} + L_0$ , where the symbols have their usual meanings. [4]
- b) Determine the longitudinal and transverse reinforcements in a short rectangular column subjected to a factored axial load of 2000 kN and factored moment  $M_{ux}$  about major axis of 190 kN-m and  $M_{uy}$  about minor axis of 95 kN-m. The size of the column is 300 mm×500mm and the unsupported length of 3 m. Adopt M30 concrete and Fe 500 grade steel. [16]
4. a) Explain with the help of sketches the requirements on reinforcement detailing in beams to ensure sufficient ductility. [6]
- b) A L-beam has a flange of effective width 900 mm and depth of 100 mm. The web below is 250 mm×500 mm. Determine the amount of reinforcement required for the cross-section if it has to carry a factored bending moment of 615 kN-m and SF of 50 kN. Adopt M20 concrete mix and Fe 500 grade steel. [14]

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