Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80213

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6505 — DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two advantages of limit state method over elastic method.
2. What is the formula used to find the actual neutral axis in working stress method?
3. On what circumstances doubly reinforced beams are to be adopted?
4. Write any two general features of two way slab?
5. What is the important mechanism of shear resistance in beams with web reinforcement?
6. Define flexural bond and anchorage bond.
7. Write any two reinforcement provision in columns.
8. What is the salient condition for minimum eccentricity of column?
9. Define punching shear.
10. Enumerate proportioning of footings.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the codal recommendations for limit states design? State their significance. (16)

Or

(b) Design a rectangular section for a simply supported reinforced concrete beam of effective span of 4 m carrying a concentrated load of 35 kN at its mid span. The concrete to be used is of grade M 20 and the reinforcement consists of Fe 415 steel bars.

(i) Self weight of beam is ignored.

(ii) Self weight of beam is considered. Use working stress method. (16)

12. (a) Design a T-beam section with a flange width of 1200 mm, a flange depth of 100 mm, a web width of 250 mm and an effective depth of 500 mm, which is subjected to a factored moment of 550 kNm. The concrete mix is to be used is of grade M20 and steel is of grade Fe415. Use limit state method. (16)

Or

(b) Design a slab over a room 5 m × 7m as per I.S. code. The slab is supported on masonry walls all round with adequate restraint and the corners are held down. The live load on the slab is 330 N/m². The slab has a bearing of 150 mm on the supporting walls. (16)

13. (a) Design a shear of rectangular reinforced concrete beam section to carry a factored bending Moment of 220 kNm, factored shear force of 140 kN, and a factored torsional moment of 80 kNm. Use M20 grade concrete and Fe415 steel. (16)

Or

(b) A simply supported RC beam of size 300 × 500mm effective is reinforced with 4 bars of 16 mm diameter HYSD steel of grade Fe415. Determine the anchorage length of the bars at the simply supported end if it is subjected to a factored force of 350 kN at the centre of 300 mm wide masonry support. The concrete mix of grade M20 is to be used. Draw the reinforcement details. (16)

14. (a) Design a column having an effective length of 4.50 m to support a factored load of 1600 kN. Consider the reinforcement ratio p to be in the range 1.5 to 2.0 percent and the effective cover to longitudinal steel of 55 mm. The materials to be used are M25 grade of concrete and HYSD steel bars of grade Fe415. (16)

Or

(b) A braced reinforced concrete column of circular cross-section of 500mm diameter is to support a factored axial load of 2300 kN along with a factored moment of 165 kNm. The unsupported length of the column is 6.3 m with effective length of 5.5m. Design the column when it is to be provided with :

(i) lateral ties and

(ii) spiral reinforcement. The M25 grade of concrete and HYSD steel bars of grade Fe415. (16)

15. (a) A 230 mm thick masonry wall is to be provided with a reinforced concrete footing on a site having soil with SBC, unit weight and angle of repose of 130 kN/m², 17.5 kN/m³ and 30° respectively. The M20 grade of concrete and HYSD steel bars of grade Fe 415. Design the footing when the wall supports at service state: a load of 150 kN/m length. (16)

Or

(b) A Rectangular column 550 × 350 mm carries a load of 775 kN. Design a rectangular footing to support the column. The safe bearing capacity of the soil is 210 kN/m². Use M15 grade concrete. (16)

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