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Question Paper Code : 90130

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Fifth Semester

Civil Engineering

CE 8501 : DESIGN OF REINFORCED CEMENT CONCRETE ELEMENTS

(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A (10×2=20 Marks)

1. What is characteristic load ?
2. What are the three methods of design of reinforced concrete structural elements ?
3. Write short note on balanced section.
4. Briefly explain about partial safety factor.
5. Define Bond stress.
6. Write short note on splices in tensile reinforcement.
7. What is the importance of slenderness ratio in column ?
8. What are the points to be considered while designing longitudinal reinforcement for columns ?
9. What are the assumptions made in the design of strap footings ?
10. What are the causes for the failure of a structure ?

PART – B (5×13=65 Marks)

11. a) An isolated T beam has a flange width of 1000 mm, flange thickness of 80 mm and effective depth of 400 mm. The rib is 240 mm wide and reinforced with 5 bars of 20 mm diameter. Determine the moment of resistance of the section if the permissible stresses in concrete and steel are 5.2 N/mm^2 and 140 N/mm^2 and m as 18. Neglect the compressive force in the web. The beam is simply supported over a span of 4 m.

(OR)

b) A doubly reinforced concrete beam is 240 mm wide and 500 mm deep. If the limiting stress in concrete and steel are 5 N/mm^2 and 230 N/mm^2 respectively. Determine the steel area for bending moment of 80 kN/m. Assume the steel is buried on both faces with its centre 40 m from either face. Take m as 19.

12. a) Design a RC continuous beam of rectangular cross section to support a dead load of 5 kN/m and a service load of 10 kN/m over 4 span of 5 m each. Assume the ends are simply supported. Adopt M20 concrete and Fe 415 steel.

(OR)

b) The cross section of a simply supported reinforced beam is 200 mm wide and 300 mm deep to the centre of reinforcement which consists of 3 bars of 16 mm dia. Determine from the first principles the depth of N.A. and maximum stress of concrete when steel is stressed to 120 N/mm^2. Take m as 19.

13. a) Design a RC slab for a room having inside dimensions of 3m × 6m. The thickness of the supporting wall is 300 mm. The slab carries 100 mm thick line concrete at its top, the unit weight which may be taken as 19000 N/m^3. The line load on slab is taken as 2500 N/m^2. Assume the slab to simply supported at ends. Use M20 concrete and Fe 415 steel.

(OR)

b) Design a dog legged stair for building in which vertical distance between floors is 3.6 m. The stair hall measures 25 m × 5m. The live load may be taken as 2500 N/m^2. Use M20 concrete and HYSD bars.

14. a) Design a short square column to carry an axial load of 1200 kN. Use M25 concrete and Fe 415 steel.

(OR)

b) Design a column 10 m long to carry an axial load of 600 kN. The column is restrained at ends. Use M25 concrete and Fe 415 steel reinforcement.

15. a) Design a combined rectangular footing for two columns A and B carrying loads of 500 and 700 kN respectively. Column A is 300 × 300 mm in size and column B is 400 × 400 mm in size. The centre to centre spacing of column is 3.4 m. The safe bearing capacity of soil may be taken as 150 N/m^2. Use M20 concrete and Fe 415 steel.

(OR)

b) Explain in detail about the different types of foundations based on soil investigation.

PART – C **(1×15=15 Marks)**

16. a) Find the moment of resistance of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth reinforced with 4 bars of 16 mm diameter of Fe 415 steel. Take M20 concrete. Use IS code method. Redesign the beam if necessary. Also find moment of resistance if reinforcement consists of 3 nos of 16 mm dia bars of Fe 415 steel and determine the actual stress subjected to limiting moment of resistance.

(OR)

b) Design the reinforcement of T.beam for the following data.

Effective span = 8 m with ends simply supported

Spacing of beams = 3.3 m centre to centre

Thickness of slab = 130 mm

Width of web = 300 mm

Total depth = 450 mm

Live load on floor = 10 kN/m^2

Floor finish load = 0.5 kN/m^2

The beam also supports and transmits load of 12 kN/m run use M20 concrete and Fe 415 steel.