FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I-Semester (Main) Examination, November 2013

Subject : Reinforced Cement Concrete

Time : 3 Hours   **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B. IS 456 - 2000 is permitted in the examination. Any data which is not given and found necessary may assumed suitably.

PART – A (10x2.5=25 Marks)

1. Define characteristic strength and characteristic load.
2. What are the limiting values of depth of neutral axes for different grades of steel?
3. Draw neat sketch showing stress block of concrete as per limit state design.
4. Differentiate between balanced, under-reinforced and over-reinforced section in working stress method of design.
5. Calculate balanced percentage of steel for M20 grade concrete and Fe 415 grade steel.
6. Define lower bound, upper bound and uniqueness theorems.
7. Draw yield line pattern for a rectangular slab fixed at all edges.
8. Write the assumptions of yield line theory.
9. Explain one way shear and two way shear in footing.
10. What are the IS code recommendations to convert torsional moment (T) into equivalent bending moment and equivalent shear.

PART – B (50 Marks)

11.(a) Define workability of concrete and factors affecting workability. Write any two tests to find workability.   (4)

(b) Differentiate between working stress method and limit state method of design.   (6)

12. An RCC beam of effective dimensions 230 x 300 mm is provided with 4-bars of 16mm diameter on tension face and 2-bars of 10mm diameter on compression face. Determine (a) Moment capacity of beam (b) u.d.l. it can carry if the effective span is 5m. Use limit state method. Use M20 grade concrete and Fe 500 grade steel.   (10)

13. An RCC beam is subjected to a factored SF of 60 KN. The effective dimensions of the beam are 230mm x 300mm. It is provided with 4-bars of 12mm diameter on tension face out of which 2 bars are bend at 45° near the support. Design the beam for shear. Use limit state method. Use M20 grade concrete and Fe 415 grade steel.   (10)

14. An RCC slab of effective dimensions 4m x 5m is reinforced orthotropically. The moment capacities are 6 kN-m and 4kN-m per meter length along shorter and longer directions. Determine the collapse load assuming suitable yield line failure pattern.   (10)

15. A short circular RCC column carries a working load of 750 kN axially. Design the column if it is provided with helical reinforcement. Use M20 grade concrete and Fe 415 grade steel. Use limit state method. Draw neat sketches showing reinforcement details.   (10)

16. A square RCC column 400mm x 400mm carries a working load of 650 kN axially. Design a square footing if SBC of soil is 225kN/m^2. Use m25 grade concrete and Fe 500 grade steel. Use limit state method.   (10)

17. Check an RCC beam for deflection if its effective dimensions are 300 mm x 450mm It consists of 5 bars of 20mm diameter on tension face and 2 bars of 16mm diameter on compression face. Effective span of the beam is 7.5m. Use M20 grade concrete and Fe 415 grade steel.   (10)

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