15128

B. Tech 5th Semester Examination

Design of Concrete Structures-I (OS)

CE-5002

Time : 3 Hours   Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i)   Attempt five questions in all selecting one question from each section A, B, C and D of the question paper and all question in section E.

(ii)   Use of IS 456-200 is allowed.

(iii)   Missing data if any can be assumed suitably.

SECTION - A

1. (a)   What do you understand by balanced, under reinforced and over reinforced section? Why is it not preferred to design over reinforced section?

   (b)   Write down the steps of design concrete mixes.   (20)

2. (a)   What are idealized and actual stress strain curve for (a) concrete, (b) steel. Explain?

   (b)   Derive an expression for MOR of rectangular section reinforced both in compression and tension.   (20)

SECTION - B

3. A T beam slab floor has 125 mm thick slab forming part of T-beam which is of 8m clear span. The end bearing are 450 mm thick. Spacing of T-beam is 3.5 m. the live load on the floor is 3 KN/m^2. Design one of the intermediate beams. Use M20 concrete and Fe-415 steel.   (20)

4. The overall cross-section of a RC beam is 300 x 600 mm. the factored design moment at a particular section of the beam is 330 KN-m. Design the necessary reinforcement by limit state method; if the effective cover to the reinforcement is 35 mm. adopt M25 concrete and Fe-415 steel.   (20)

SECTION - C

5. Design reinforcement concrete slab of size 6m x 4m whose one short edge is discontinuous and corners are restrained at supports. The slab has to carry live load of 3 KN/m^2 and a floor finishing of 1 KN/m^2. Use M20 concrete and Fe-415 steel. Sketch the details of reinforcements.   (20)

6. A rectangular simply supported beam of span 5 m is 300 mm x 650 mm in cross section and is reinforced with 3 bars of 20 mm on tension side at an effective cover of 50 mm. Determine the short term deflection due to an imposed working load of 20 KN/m, (excluding self-weight). Use grade of concrete M20 and grade of steel as Fe-415.   (20)

SECTION - D

7. Design a RC circular column section to carry a factored load of 2400 KN. Provide helical reinforcements. Adopt M20 concrete and Fe-415 steel.   (20)

8. Design a cantilever retaining wall to retain earthfill to 4.5 m above ground level. The surcharge on the earthfill is 15 KN/m^2. The angle of repose of soil is 30°. Unit weight of soil is 16 KN/m^3, Coefficient of friction between soil and concrete is 0.6 and the safe bearing capacity of soil is 150 KN/m^2. Use M20 Concrete and Fe-500 steel.   (20)

SECTION - E

9. (a) What is the modular ratio? What is its significance in design?

    (b) Define diagonal tension in beams. How it can be prevented?

    (c) What is the effect of varying percentage of steel on the moment of resistance of RCC section?

    (d) Explain steel beam theory. Why this method of design is not recommended by IS code?

    (e) Define Poisson's ratio, creep, shrinkage and modulus of elasticity of concrete.

    (f) State the assumption of limit state of collapse (flexure).

    (g) What is the necessity of providing shear reinforcement?

    (h) Distinguish between active and passive earth pressure.

    (i) What is the function of transverse reinforcement in columns?

    (j) Why helical ties are preferred over lateral links?

                                                  (10×2=20)