[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

15164

B. Tech 5th Semester Examination

Design of Concrete Structures (NS)

CE-312

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 : Attempt five questions in all, select one question from each sections A, B, C and D. Section E (Question-9) is compulsory. Use of non-programmable calculator is allowed.

SECTION - A

1. (a) What is the fundamental assumption in flexural theory? Is it valid at the ultimate state? (3)

   (b) The term balanced section is used in both *working stress method* (WSM) and *limit state method* (LSM). Discuss the difference in meaning. (5)

   (c) Determine the ultimate moment of resistance of the singly reinforced beam of 350mmx700mm with clear cover of 30mm and 4-25mm ϕ bars. Use M-25 concrete and Fe-415 steel. (12)

2. A rectangular reinforced concrete beam, located inside a building in a coastal town, is simply supported on two masonry walls 230 mm thick and 6m apart (centre to centre). The beam has to carry, in addition to its own weight, a distributed live load of 10kN/m and a dead load of 5kN/m. Design the beam section for maximum moment at mid-span. Assume M25 and Fe-415. (20)

[P.T.O.]

SECTION - B

3. A room of size 5×6m^2 is fixed at all of its four edges. Find the Moment at support and mid span of a slab along shorter and longer span. Also Design the slab for a loading of 3kN/m^2. Assume M20 and Fe250. (20)

4. Design a single flight straight staircase, with 11 risers, each 160mm and with the tread 280mm, and upper and lower landings of 1250mm wide each. The edges of the two landings are simply supported on two masonry walls, 230mm thick. Design a 'waist slab' type stair assuming M20 concrete and Fe 415 steel. Apply the live loads of 5kN/m^2. Assume mild exposure conditions. (20)

SECTION - C

5. Design the reinforcement in a column of size 450mm×600mm subjected to an axial load of 2000kN under service load and live loads. The column has an unsupported length of 3.0m and is braced against sideway in both directions. Use M 20 concrete and Fe 415 steel. (20)

6. Design a plain concrete footing for a column, 300mmx300mm, carrying an axial load of 330kN (under service loads, due to dead and live loads). Assume an allowable soil bearing pressure of 360 kN/m^2 at a depth of 1.0m below ground. Assume M20 grade concrete and Fe 415 grade steel used for the footing. (20)

SECTION - D

7. Determine suitable dimensions of a cantilever retaining wall, which is required to support a bank of earth 4.0 m high above ground level on the toe side of the wall. Consider the backfill surface to be inclined at an angle of 0° with the horizontal. Assume good soil for foundation at a depth of 1.25m below the ground level with a safe bearing capacity of 160kN/m^2.

Further assume the backfill to comprise granular soil with a unit weight of 16kN/ m^3 and an angle of shearing resistance of 30°. Assume the coefficient of friction between soil and concrete to be 0.5. (20)

8. Design a suitable counterfort retaining wall to support a level backfill, 7.5m high above the ground level on the toe side. Assume good soil for foundation at a depth of 1.5m below ground level, with a safe bearing capacity of 180kN/m^2. Further assume the backfill to comprise granular soil with a unit weight of 16kN/m^3 and an angler of shearing resistance of 30° Assume co-efficient of friction, μ=0.5, between soil and concrete. Use M25 and Fe 415. (20)

SECTION - E

9. (a) Define "effective flange width" and the parameters on which the value of it for T-beam and L-beams will depend.

   (b) A flat slab is supported on a circular column of radius 60 cm. the gross thickness of the slab is 150 mm and having a clear cover of 25 mm. If the load in the column is 30 kN then what will be the value of punching shear in the slab.

   (c) Under What circumstances is a trapezoidal shape preferred to a rectangular shape for a two column combined footing and why?

   (d) Define development length. Find the value for M25 grade concrete and Fe415 grade steel.

   (e) What is the purpose of retaining wall? What are the different types of concrete retaining walls used for various situations? (5x4=20)