Registration No. : | | | | | | | | | | |

Total number of printed pages – 2

B. Tech

PCCI 4301

Fifth Semester Back Examination – 2014

DESIGN OF CONCRETE STRUCTURES

BRANCH : CIVIL

QUESTION CODE : L 215

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*
The figures in the right-hand margin indicate marks.
Use of IS : 456-2000 is allowed for reference.

1. Answer the following questions : 2×10

(a) Draw the stress block for limit state method of design and show the location and direction of compressive force and tensile force.

(b) What are the situations, where double reinforced concrete sections are adopted ?

(c) Calculate the critical neutral axis depth for a rectangular section of M20 grade concrete and Fe 415 steel.

(d) Explain the behaviour of a column subjected to uniaxial eccentric loading. Draw a figure to show the effect.

(e) State one case, where torsional reinforcement is provided for a two way slab. Draw a figure.

(f) Show the plan and elevation of a rectangular isolated footing.

(g) Explain uniaxial and biaxial bending in a column.

(h) What are the special features of a RCC T beam compared to a rectangular beam ?

(i) What do you mean by a waist slab ?

(j) Why, the clear cover is provided to the reinforcement for various types of RCC members ? State the minimum clear covers provided for a column and a slab.

P.T.O.

2. Design the shear reinforcement for a simply supported beam of 5 m span with cross section 250 mm × 350 mm (b×d) carrying a udl of 16 kN/m and a concentrated load of 20 kN at the centre of span. The beam is provided with 4 bars of 12 mm dia as tensile reinforcement. Adopt M25 concrete and Fe 415 steel. Show the reinforcement detailing. Assume any other data if required. 10

3. Find the anchorage length required for 2, 12 mm dia tensile reinforcement bars extended into the support of a simply supported beam. Assume the following data. Width of beam = 250 mm, Overall depth = 400 mm, width of support = 250 mm. Show the reinforcement detailing alongwith the anchorage length. 10

4. Design a two way simply supported slab of size 4 m by 6 m if three sides are continuous. The service load is 2.5 kN/sq m and floor finish is 1 kN/sq m. Use M25 concrete and Fe 415 steel. 10

5. A simply supported beam of 6m effective span has an effective depth of 400 mm. It carries a udl of 5 kN per m throughout the span. The beam is reinforced with tension steel of 1.75 per cent. Check, whether the deflection control criteria of the beam is satisfied as per codal provision. Assume M20 concrete and Fe 415 steel. 10

6. Design a short rectangular column provided with lateral ties to carry an axial load of 1200 kN using M25 concrete and Fe 415 steel. Show the reinforcement detailing. 10

7. Design an isolated footing for a square column of size 400 mm × 400 mm with 8, 16 mm diameter longitudinal bars carrying service loads of 1200 KN using M20 concrete and Fe 415 steel. The safe bearing capacity of soil is 200 kN/m^2 at a depth of 1 m below the ground level. 10

8. Write short notes on : 2.5×4

   (a) stress-strain curves for Fe250 and Fe415 steel

   (b) one way slab and two way slab

   (c) single shear and double shear

   (d) diagonal tension and diagonal compression.
