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

Total Number of Pages : 02 **B.Tech.**

PCI4I103

4th Semester Regular / Back Examination 2017-18

DESIGN OF CONCRETE STRUCTURES

BRANCH : CIVIL

Time : 3 Hours

Max Marks : 100

Q.CODE : C1006

Answer Part-A which is compulsory and any four from Part-B.

The figures in the right hand margin indicate marks.

IS456:2000 is allowed to examination hall.

Answer all parts of a question at a place.

Part – A (Answer all the questions)

Q1 **Answer the following questions: *multiple type or dash fill up type :*** **(2 x 10)**

a) The pH value of water for concrete shall be ----.

b) The anchorage value of a hook is assumed four times the diameter of the bar if the angle of the bend, is
i) 30^0 ii) 45^0 iii) 60^0 iv) 90^0

c) A part of the slab may be considered as the flange of the T-beam if ----

d) Design of RCC simple supported beams carrying uniformly distributed load is based on the maximum bending moment at
i) supports ii) at every section iii) mid span iv) quarter span

e) The minimum number of main steel bar required for a RC circular column is ---

f) The number of treads in a flight is equal to ----------

g) For limit state method of design, permissible bearing stress on full area of concrete is ----------

h) In water tanks, bar spacing should generally not exceed ---------

i) Total pressure on the vertical face of a retaining wall of height *h* per unit run exerted by the retained earth weighing *w* per unit volume, is

j) Factor of safety for sliding for a counterfort retaining wall is ----.

Q2 **Answer the following questions: *Short answer type :*** **(2 x 10)**

a) Explain limit state of collapse.

b) Define development length.

c) When side face reinforcement is provided in a beam?

d) What is the advantage of limit state method of design over working stress method design?

e) Differentiate between one way slab and two way slab.

f) Show torsion reinforcement in a two way slab.

g) Write suitability of combined footing.

h) Where retaining walls are provided.

i) Sketch an elevated water tank and show its components.

j) Write forces that act on a cantilever retaining wall.

Part – B (Answer any four questions)

Q3 **a)** A rectangular beam section of 300 mm width and 550 mm effective depth is reinforced with 8 bars of 25 mm diameter bars. Design the beam for shear using both vertical and bent up bars. The ultimate shear force is 250 kN. Consider concrete of grade M20 and steel of grade Fe 415 **(10)**

b) Design a single reinforced RC beam subjected to an ultimate moment of 180 kNm. Use M30 and Fe415 **(5)**

Q4 **a)** A doubly reinforced simple supported rectangular beam of size 240 mm x 520 mm is reinforced with 4 -20# bars in tension face and 3-16 # in compression face. If the effective span is 6m, what is the maximum superimposed load that the beam can carry? Use M 25 grade of concrete and Fe415 grade steel. Cover to reinforcement both in tension and compression is 25 mm. **(10)**

b) A RC T beam has 120 mm thick slab, flange width 1500 mm, rib width 240 mm and overall depth 440 mm. The section is reinforced with 4 nos 25 mm HYSD bars. Effective cover to reinforcement is 40 mm. calculate moment of resistance. Use M20 and Fe415. **(5)**

Q5 **a)** Design a simple supported RC slab for a room measuring 2.8m x 8.0 m size. It is subjected to live load of 3 kN/m^2 and floor finishes of 0.75 kN/m^2. Use M20 &.Fe415. **(10)**

b) Design a two way slab for a room 3.6x4.6m clear in size if the superimposed load is 5KN/m^2 . Use M 25 grade of concrete and Fe415 grade steel. The edges are simple supported and corners are not held down. **(5)**

Q6 **a)** Design a two flight staircase with steps o waist slab for floor to floor height of 3.3m width of flight 1.25m superimposed load of 3kN/$m^2$for following support condition: simply supported at the ending of the landing slab with span in the direction of flight. Use M25 &.Fe415 **(10)**

b) A short RCC column carries an axial load of 1170 kN accompanied by moments Mx=120 kNm& My=30 kNm about the major & minor axes. Effective length about x-axis $l_{ex} = 5.25m$ &Effective length about y-axis $l_{ey} = 4m$. Unsupported length of column about both axes =4.75m. Calculate the final design force and moments for the column. **(5)**

Q7 **a)** Design a short circular column of subjected to a factored load of 2400 kN. Use M30 concrete and Fe 415 steel. **(10)**

b) A rectangular RC column, 400 mm x 600 mm carries a factored axial load of 3000 kN. Design the dimensions of rectangular isolated footing based on bending and one way shear criteria. Safe bearing capacity of the soil is 150 kN/m^2. Use M 25 and Fe 415. **(5)**

Q8 **a)** Design a circular tank having diameter 6 m and height 3m. the tank is covered with domed roof. Use M25 and Fe415. Design top dome, ring beam and cylindrical wall. **(10)**

b) Calculate dimension of an Intze type tank to store 600000 liters of water and show it in drawing. **(5)**

Q9 **a)** A cantilever retaining wall has is to be constructed to retain earth of 4.2 m above ground level. The top of the earth is to be leveled. The density of earth is 18 kN/m3 and coefficient of friction is 0.6. Check the stability of the retaining wall and design the stem. Use M 20 concrete and Fe 415 steel. **(10)**

b) Show reinforcement detailing of a section through counter fort of a retaining wall. **(5)**