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

Total Number of Pages: 02

Course: B.Tech
Sub_Code: RCI5C001

5th Semester Back Examination: 2025-26
SUBJECT: Design of Concrete Structures
BRANCH(S): CIVIL
Time: 3 Hours
Max Marks: 100
Q.Code: U217

Answer Q1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.
(Use of relevant IS codes is permissible)

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Why steel bars are used to reinforced concrete?
b) Reinforced concrete structures are designed to resist which types of loads.
c) Define bond stress.
d) What is creep of concrete?
e) Determine the modulus of rupture and modulus of elasticity of M25 grade concrete.
f) Determine the equivalent nominal shear for a beam of 250 mm wide and 500 mm effective depth, subjected to an ultimate twisting moment of 100 kNm and ultimate sheer force of 60 kN.
g) What is doubly reinforced beam?
h) Differentiate between one way slab and two-way slab.
i) Define bearing capacity of soil.
j) Write the different forces consider during the design of a water tank.

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Discuss different methods of reinforced concrete design.
b) Write short notes on balanced, under reinforced, and over reinforced sections.
c) Discuss the various types of reinforcements used to resist shear.
d) A doubly reinforced concrete section has a width of 300 mm and is reinforced with tension reinforcement of area 2455 mm^2 at an effective depth of 600 mm, Compression Steel of area 982 mm^2 is provided at an effective cover of 60 mm. Using M20 Concrete and Fe415 steel, estimate the ultimate moment capacity of the section.
e) Differentiate between primary torsion and secondary torsion
f) Determine the minimum effective depth required and the corresponding area of tension reinforcement for a rectangular beam having a width of 200 mm to resist an ultimate moment of 200 kNm. Use M20 concrete and Fe415 steel.

g) A T-beam has an effective flange width of 2500 mm and depth of 150 mm, Width of rib = 300 mm, Effective depth = 800 mm. Using M20 Concrete and Fe415 steel, estimate the area of tension steel required if the section has to resist a factored moment of 1000 kNm.

h) Explain reinforcement specifications in R. C. Columns with figure.

i) What is meant by eccentric loading on a footing, under what circumstances does it occur?

j) Explain the structural behavior of staircases slab spanning longitudinally with figure.

k) Design a circular tank to the following requirements: Diameter of the tank = 3.5 m, Depth of water = 3 m, the tank rests on ground, the walls and base slab are not monolithic. Use M20 concrete and Fe415 steel.

l) Briefly explain the design requirements of elevated type water tanks.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 A reinforced concrete beam of rectangular section with a width of 35 mm and overall depth of 800 mm is subjected to a factored bending moment of 215 kNm, ultimate torsional moment of 105 kNm and ultimate shear force of 150 kN. Using M20 grade concrete and Fe415 steel and side, top and bottom covers of 50 mm, design suitable reinforcement in the section. **(16)**

Q4 A simply supported slab has a clear span of 2.1 m and is supported on walls 400 mm thick along the edges. If the live load on the slab is 4 kN/m^2, and the floor finish weighs 0.6 kN/m^2, design the slab using M20 concrete and Fe415 steel. Sketch the details of reinforcements in the slab. **(16)**

Q5 A rectangular RC column, 240 mm x 300 mm carries an axial load of 400 kN. Design a rectangular footing of uniform thickness, if the safe bearing capacity of the soil is 80 kN/m^2. Use M20 concrete and Fe415 steel. **(16)**

Q6 **a)** Discuss the stability requirement of retaining walls. **(8 x 2)**

b) What is the purpose of a retaining wall? What are the different types of concrete retaining wall?