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

Total Number of Pages: 02

Course: B.Tech/IDD
Sub_Code: CIPC3001

5th Semester Regular Examination: 2025-26
SUBJECT: Design of RCC Structures
BRANCH(S): C&EE, CIVIL, CE
Time: 3 Hours
Max Marks: 100
Q.Code: U123

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 does the code limit the compressive strength of concrete in structural design to 0.67fck, and not fck?
b) What are the circumstances where doubly reinforced beams are preferred?
c) A cantilever beam having a width of 200 mm and effective depth 300 mm is reinforced with four bars of 16 mm diameter. If the factored total load is 80 kN. Calculate the anchorage length required. Use M20 concrete and Fe415 steel.
d) What are critical sections for shear?
e) Why steel is preferred as the best reinforcing material?
f) Where combined footing is provided?
g) What is slender column?
h) State various forces acting on retaining wall.
i) List out the loads consider for design of staircases.
j) State different types of reinforced concrete water tanks.

Part-II

Q2 **only focused-short answer type questions- (answer any eight out of twelve)** **(6 x 8)**

a) Discuss philosophy of limit state design.
b) Explain the reinforcement specifications in R. C. slabs with figure.
c) Discuss the major types of shear failure modes encountered in reinforced concrete beams with figure.
d) A rectangular reinforced concrete section having a breadth of 350 mm is reinforced with 2 bars of 28 mm and 2 bars of 25 mm diameter at an effective depth of 700 mm. Adopting M20 concrete and Fe415 steel determine the ultimate moment of resistance of the section.
e) Design the shear reinforcements in a beam of rectangular section having a width of 300 mm and effective depth 600 mm. the ultimate shear at the section is 100 kN. The beam is reinforced with 4 bars of 25 mm diameter in the tensile zone. Use M20 concrete and Fe415 steel.

f) Determine the area of tensile reinforcement required in a flanged beam having the following sectional dimensions to support a factored moment of 300 kNm. Width of Flange = 750 mm, Width of rib = 300 mm, Thickness of Flange =120 mm, Effective Depth = 600 mm. Use M20 Grade Concrete and Fe415 steel

g) Explain the different type of torsion that occurs in reinforced concrete.

h) Enumerate the functions of the transverse reinforcement in a reinforced concrete column.

i) Briefly describe the behavior of the various elements of a cantilever retaining wall.

j) Discuss briefly the design requirements of a water tank.

k) Illustrate the different structural components of a flight of stairs with figure.

l) Discuss the stability requirements in retaining wall.

Part-III

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

Q3 A beam of rectangular section in a multistory frame is 250 mm wide by 500 mm deep, the section is subjected to a factored bending moment of 55 kNm and torsional moment of 30 kNm together with an ultimate sheer force of 40 kN. Using M20 concrete and Fe415 steel design suitable reinforcements in the section assuming an effective cover of 50 mm in the depth and width directions. **(16)**

Q4 Design a two-way slab for a residential roof to suit the following data: **(16)**
Size of roof = 4.5 m by 6 m.
Edge conditions: simply supported on all the sides on load bearing masonry walls 300 mm thick without any provision for torsion at corners.
Use M20 grade concrete and Fe415 steel.
Sketch the details of reinforcements in the slab.

Q5 Design a reinforced concrete circular footing for a circular column of 300 mm diameter supporting a design ultimate load of 750 kN. The safe bearing capacity of the soil at site is 200 kN/m^2. Use M20 concrete and Fe415 steel. Show the reinforcement details in the circular footing. **(16)**

Q6 Design the side walls of a rectangular reinforced concrete water tank of interior dimensions 5 m by 2 m with the depth of storage water being 2 m. Use M20 grade concrete and Fe415 steel. **(16)**