PAPER ID-310108

Roll No:

B. TECH
(SEM V) THEORY EXAMINATION 2020-21
DESIGN OF CONCRETE STRUCTURES-1

Time: 3 Hours   *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 10 = 20**

Q.No.	Question
a.	Distinguish between term 'factor of safety' and 'partial safety factor'.
b.	Explain the necessity for specifying max and min tension steel in reinforced beams. What are their values?
c.	Enumerate at least three situations in which doubly reinforced beams become necessary.
d.	Derive the equation of M.O.R for under-reinforced flanged beams.
e.	What is meant by equivalent length of a column?
f.	Span/depth ratio can be used to control deflection in beams. Justify
g.	What are the Codal recommendations of torsion steel in Two-way slab
h.	What is the difference between lap length and anchorage length?
i.	Interaction diagrams are convex outwards. Explain.
j.	Distinguish between Creep and shrinkage of concrete.

SECTION B

2.   **Attempt any *three* of the following:**   **10x3=30**

Q.No.	Question
a.	Design a beam of size 300 X 600 mm subjected to a factored bending moment of 150 KNm, factored shear force of 100 KN and factored torsional moment of 50KNm.Use M20 concrete and Fe 415.
b.	What is meant by limit states? Discuss the various limit states to be Considered in design.
c.	Design a one way slab, with a clear span of 4.0 m, simply supported on 230 mm thick masonry walls and subjected to a live load of 4 kN/m 2 and a surface finish of 1 kN/m 2 .Assume M 20 mix and Fe 415 grade steel.
d.	A T beam of flanged width 1200 mm, flanged thickness 80mm, effective depth 500mm and width of web is 200 mm has to be designed as a balanced section. Determine the area of steel required and limiting moment of resistant. Use M20 Concrete and Fe 415steel.
e.	What do you mean by design of a structure? Discuss the various design philosophies.

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Roll No:

SECTION C

3.   **Attempt any *one* part of the following:**   **10x1=10**

Q.No.	Question
a.	Shear reinforcement is necessary in a beam? Justify.
b.	A R.C. beam is 200 x 400 mm effective depth and is reinforced with 4- 20 mm Fe 415 grade bars. Design the shear reinforcement for a factored shear force of 150 KN. Assume M20 mix and mild steel stirrups.

4.   **Attempt any *one* part of the following:**   **10x1=10**

Q.No.	Question
a.	Explain the term equivalent shear force and equivalent bending.
b.	Design a beam of size 300 X 600 mm subjected to a factored bending moment of 150 KNm, factored shear force of 100 KN and factored torsional moment of 50KNm.Use M20 concrete and Fe 415.

5.   **Attempt any *one* part of the following:**   **10x1=10**

Q,No.	Question
a.	Design a cantilever balcony slab projecting 1.1 m from a beam .Thickness of slab is 175mm at beam support and gradually reduced to 100mm at free end. Adopt LL=3KN/m2. Use M20 and Fe 415.
b.	A simply supported slab of a corridor of a hospital building has a clear span 2.5 m and supported on beams 230mm width. Design the slab, if the beam is carrying a live load of 5 KN/m2. Use M-20 concrete and HYSD Fe415 steel.

6.   **Attempt any *one* part of the following:**   **10x1=10**

Q.No.	Question
a.	Design a two-way slab simply supported on all the four edges for a room 6 m x 4 m clear in size. The superimposed working load is 4 kN/m^2, and corners of slab are held down. Use M-20 grade of concrete and steel Fe415.
b.	Determine the tension and compression steel for a doubly reinforced beam 360 mm wide x750 mm effective depth to resist a B.M. of 300 kN-m. Assume concrete grade M 20 and steel grade Fe 415 and effective cover to compression steel equal to 50 mm. Assume σ cbc = 7 N/mm 2 , σ st = 190N/mm.

7.   **Attempt any *one* part of the following:**   **10x1=10**

Q.No.	Question
a.	Design the longitudinal and lateral reinforcements in a rectangular R.C. column of size 300 mm by 600 mm to support factored axial load of 1400 kN. The column has an unsupported length of 3 m and is braced against side sway in both directions. Adopt M20 mix and Fe415 grade steel.
b.	Design a rectangular column, 5m long restrained in position and direction at both ends, to carry an axial load of 120 KN. uses M20 and Fe415 grades