Paper id: 251010

Roll No: | | | | | | | | | | | | |

BTECH
(SEM VI) THEORY EXAMINATION 2024-25
DESIGN OF CONCRETE STRUCTURES

TIME: 3 HRS   **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **02 x 7 = 14**

Q no.	Question
a.	State the limitations of the Working Stress Method (WSM).
b.	Given: Dead Load = 100 kN, Live Load = 150 kN, Wind Load = 50 kN. Calculate the Design Load.
c.	Write the expression for minimum shear reinforcement in RCC beams.
d.	State the IS Code expression used to check the bond length in reinforced concrete members.
e.	Provide the IS code specifications for the spacing of main bars in slabs.
f.	How do you classify a column as short or long?
g.	Define a retaining wall and its purpose in structures.

SECTION B

2. **Attempt any *three* of the following:**   **07 x 3 = 21**

a.	Discuss the assumptions of the Working Stress Method (WSM) and explain their significance.
b.	A simply supported RCC beam of 250 mm width and 450 mm effective depth is reinforced with 4 bars of 18 mm diameter. Design the shear reinforcement if M20 concrete and Fe415 steel are used, and the beam is subjected to a shear force of 200 kN at service load.
c.	Describe the design procedure for a two-way slab using the Limit State Method.
d.	List and explain the codal provisions related to lateral and longitudinal reinforcement in columns as per IS code.
e.	Explain the step-by-step design of an isolated footing along with a neat sketch.

SECTION C

3. **Attempt any *one* part of the following:**   **07 x 1 = 07**

a.	A singly reinforced concrete beam is 300 mm wide and 450 mm effective depth, reinforced with 4 bars of 16 mm diameter. If safe stress in concrete and steel are 7N/mm^2 and 230N/mm^2. Respectively. Find moment of resistance of section. m=13.33.
b.	Explain the different design philosophies used in reinforced concrete design.

4. **Attempt any *one* part of the following:**   **07 x 1 = 07**

a.	A T-beam with flange width = 1400 mm, flange thickness = 100 mm, rib width = 300 mm, and effective depth = 500 mm is to be designed as a balanced section. Find the required reinforcement and the limiting moment of resistance. Use M20 and Fe250.
b.	Design a singly reinforced concrete beam of width 300 mm, subjected to an ultimate moment of 250 kN-m. Assume f_{ck} = 25 MPa and f_y = 415 MPa.

5. **Attempt any *one* part of the following:**   **07 x 1 = 07**

a.	Design a simply supported roof slab for a room having clear dimensions of 7.5 m ×

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	3.5 m. The slab is subjected to an imposed load of 5 kN/m². Use M20 grade concrete and Fe415 grade steel. Assume a bearing width of 200 mm on the supporting walls. Also, check for the shear and bond length.
b.	Design a reinforced concrete slab for a room of clear dimensions 4m×5m.The slab is supported on walls of width 300mm.The slab is carrying a live load of 4 KN/m2and floor finish 1 KN/m2.Use M 20 concrete and Fe415 steel .The corners of slab are held down.
6.	**Attempt any *one* part of the following:** 07 x 1 = 07
a.	Design A R-C-column of size 450 mm x 600 mm subject to an axial total of 2000 kN under service load condition. Unsupported length of column is 3m, use M 20 concrete and Fe 415 steel. Assume leff = l.
b.	Design the reinforcement in a spiral column of 400-mm diameter subjected to a factored load of 1500 kN. The column has an unsupported length of 3.4 m and is braced against sideway. Use M 25 concrete and Fe 415 steel.
7.	**Attempt any *one* part of the following:** 07 x 1 = 07
a.	Write neat sketch explain the deflected shape of a cantilever retaining wall under loading for stem, Heel slab, Toe slab.
b.	Find the depth of square footing by Punching shear and find the reinforcement for an axially loaded column of 450mm× 450mm size. The safe bearing capacity of soil is 190kN/m². Load on column is 850KN. Use M 20 concrete and Fe 415 steel. Draw neat sketch.