

**B.TECH**  
**(SEM VIII ) THEORY EXAMINATION 2022-23**  
**ADVANCED CONCRETE DESIGN**

**Time: 3 Hours****Total Marks: 70**

**Note:** Attempt all Sections. If require any missing data; then choose suitably. Use of IS 456 and IS 3370 is permitted.

**SECTION A**

- 1. Attempt all questions in brief. 2 x 7 = 14**
- a. Define the term tank and its capacity.
  - b. Define spherical dome.
  - c. State the assumptions made in prestressed concrete design.
  - d. Enlist the advantages of prestressing.
  - e. Classify various losses in prestressing.
  - f. Define Kern distance.
  - g. Why check for local failure is needed in beam?

**SECTION B**

- 2. Attempt any three of the following: 7 x 3 = 21**
- a. Explain the method of design of rectangular tanks which are inside the ground.
  - b. Determine the internal dimensions of a intze type tank for a capacity of 250 KL, c/c diameter of staging shall be taken as 7.5m and central diameter of cylindrical wall shall be taken as 9.5 m. vertical wall is 120mm thick. Cone makes an angle of 45<sup>0</sup> with the horizontal.
  - c. What are the various systems of prestressing? Explain with neat sketch.
  - d. A prestressed concrete beam 450mm \* 650mm in section has a span of 7.5 m and is subjected to a uniformly distributed load of 15 KN/m including the self weight of the beam. The prestressing tendons which are located along the longitudinal centroidal axis provide an effective prestressing force of 1245 KN. Determine the extreme stresses in concrete at the mid span section.
  - e. Explain the IS Code Recommendation for the design of deep beams.

**SECTION C**

- 3. Attempt any one part of the following: 7 x 1 = 7**
- (a) Discuss the following in design of water tanks:
    - (i) Permissible stress in the concrete
    - (ii) Permissible stress in steel
  - (b) Explain the strength and serviceability design requirements of water retaining structures recommended by I.S. Code.

**4. Attempt any one part of the following: 7 x 1 = 7**

- (a) Design a circular tank with flexible base for capacity of 4,00,000 liters. The depth of water to be 4 m, including a free board of 200mm. Use M20 concrete and Fe 250 steel.
- (b) What is “Intze-type” tank . Discuss its various components.

**5. Attempt any one part of the following: 7 x 1 = 7**

- (a) Determine the profile of a load balancing cable for a beam of span 8 m carrying an all inclusive load of 40 KN/m. The prestressing force in the tendon is 1250KN. The section of the beam is 450mm\*600mm. Find also the stress on the beam section.
- (b) What do you mean by pressure line or thrust line ? How it is located. Explain with neat sketch.

**6. Attempt any one part of the following: 7 x 1 = 7**

- (a) Explain the concept for analysis of Prestressed concrete member.
- (b) A prestressed concrete beam is 350mm \* 350mm in section and is provided with 45 wires of 3 mm diameter distributed uniformly over the section. Initially the wires are tensioned in the prestressing beds with a total pull of 500KN. Determine the final stress in concrete and the percentage loss of stress in the wires.  
Take  $E_s = 2.10 \times 10^5 \text{ N/mm}^2$ ;  $E_c = 3.25 \times 10^4 \text{ N/mm}^2$   
Creep shortening =  $35 \times 10^{-6} \text{ mm/mm per N/mm}^2$  of stress  
Total shrinkage strain =  $205 \times 10^{-6}$   
Relaxation loss of stress in steel = 4.25% of the initial stress

**7. Attempt any one part of the following: 7 x 1 = 7**

- (a) Design a deep beam 300mm wide and 4 m deep , simply supported over a clear span of 6 m. The beam carries a live load of 160 KN/m at the service state and is supported on walls of 600 mm thick on each end. .Use M 20 concrete and Fe 415 steel having permissible tensile stress of  $230 \text{ N/mm}^2$ .
- (b) A corbel, attached to a 250mm\* 250mm R.C.C column , carries a factored load of 400 KN at a distance of 170 mm from the face of the column. Design the corbel using M25 concrete.