

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018  
**ADVANCED STRUCTURAL ENGINEERING**  
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

*Question paper consists of Part-A and Part-B*

*Answer ONE question from Part-A*

*Answer any THREE questions from Part-B*

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**PART-A (1x28 Marks)**

1. Design a reinforced concrete raft foundation connecting the columns of a multi storied building. The columns are arranged in square grid 16 m by 16 m with their spacing's 4 m apart. The safe bearing capacity of the soil at the site is  $100 \text{ kN/m}^2$ . The total service load on all the columns is 4800 kN. The columns are 400 mm by 400 mm in section. Adopt M20 grade concrete and Fe 415 HYSD bars. Sketch the details of reinforcements in the raft foundation. [28]
2. A rectangular water tank is to be designed to store 2500 kl water. The tank is to be made just above the ground level and the safe bearing capacity of the soil is  $75 \text{ kN/m}^2$ . Design the water tank for safe bearing capacity of soil of  $75 \text{ kN/m}^2$ . The roof and bottom slabs and the columns are with M20 concrete and the walls are with M20 concrete. [28]

**PART-B (3x14 = 42 Marks)**

3. Design an Intze tank for a capacity of 250,000 liters. Assume height of tank floor as 12 m above ground level. Take the bearing capacity of soil as  $100 \text{ kN/m}^2$ . Wind pressure can be taken as  $1200 \text{ N/m}^2$  or as per IS 875. [14]
4. Design a flat slab with drop panels for a large single storey warehouse flat slab roof with a panel size of 6 m x 6 m supported by columns of size 500 mm x 500 mm. The height of the columns is 5 m. Take live load as  $3.0 \text{ kN/m}^2$  and the weight of finishes including waterproof treatment as  $2.5 \text{ kN/m}^2$ . Use M25 concrete and Fe 415 steel. Assume mild environment. [14]
5. Design side walls and hopper bottom of a rectangular bunker of capacity 300 kN to store coal using M20 concrete and Fe 415 steel. Use unit weight of coal is  $8 \text{ kN/m}^3$ . [14]

6. Design a R.C chimney using M25 concrete and Fe 415 steel for the following requirement and check the stresses at a depth 50 m below the top:  
Diameter of chimney:  
External = 4.3 m  
Internal = 4.0 m  
Air gap = 100 mm  
Thickness of fire brick lining = 100 mm  
Temperature difference =  $80^{\circ}\text{C}$ .  
Coefficient of thermal expansion =  $11 \times 10^{-6}/\text{C}$ .  
 $E_s = 210 \times 10^3 \text{ N/mm}^2$ .  
Unit weight of brick lined =  $20 \text{ kN/m}^3$   
Use M25 concrete and Fe 415 steel.  
Assume wind load as per IS 875. [14]
7. Explain the following bracing systems used in transmission towers and sketch them.  
(a) Single web system  
(b) warren system  
(c) Pratt system  
(d) Portal system.  
(e) Offset bracing system. [14]