Note: First question is compulsory. Attempt two questions from each section A and B.

1(a) What are the different types of limit state of collapse?
(b) Explain in brief gravity retaining wall?
(c) How are the selections of pile and raft foundation carried out?
(d) Explain in brief over head water tank?  

2. T-beam of a flange width 1400mm, flange thickness 100mm, web width 250mm and effective depth 500 mm. Beam is reinforced with 4 bars of 20mm diameter. Find the ultimate moment of resistance? Take M15and Fe 415. Use LSM method.  

3. Design a cantilever retaining wall to retain an earth fill of 3.5m above the basement level? Take Angle of repose of soil is 30degree, unit weight of soil= 16KN/m³, \( \gamma_{\text{sat}} = 12\text{KN/m}^3 \), coefficient of friction=0.6, bearing capacity of soil=200KN/m³, grade of concrete M20 and grade of steel Fe415. Also consider water table rises 1.5m above the ground level. Use LSM method.  

4. A raft of size 6 m \( \times \) 12 m is placed at a depth of 2 m on saturated clay. The unconfined Compressive strength of which is 86 kN/m² and the unit weight \( \gamma = 18 \text{kN/m}^3 \).  

   SECTION-B

5. Design a circular water tank for 4500 litres capacity on ground. Use WSM method.

6(a) Explain Pu-Mu interaction diagram for column in limit state method?
(b) Explain earth pressure theory for horizontal and inclined backfill?

7(a) Elaborate reinforcement detailing for raft foundation?
(b) Explain water pressure theory for water tank?