

Code: 1G682

IV B.Tech. II Semester Supplementary Examinations Nov/Dec 2019

Advanced Structural Engineering

(Civil Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any **five** questionsAll Questions carry equal marks (**14 Marks** each)

Assume suitable data, if necessary

1. A flat slab consists of 5 m x 6 m panels and is without drop and column head. It has to carry a live load of 4kN/m² and a finishing load of 1 kN/m². It has to be designed using M20 and Fe415 steel. The size of the columns supporting the system is 500 mm x 500 mm and floor to floor height is 4.5 m. Calculate the design moments in the interior panel and middle strip in both the directions.
2. Design a bunker to store 500 tonnes of coal using M20 concrete and Fe415 steel. The Angle of repose and unit weight of coal may be taken as 30° and 8000N/m³ respectively. The stored coal is surcharged at its angle of repose.
3. Design a chimney of height 30 m having external diameter of 2.6 m throughout the height. The chimney has fire brick lining of 100 mm thickness provided upto a height of 24 m above base, with air gap of 100mm. The temperature of gases above surrounding air is 240°C. Take coefficient of thermal expansion $11 \times 10^{-6}/^{\circ}\text{C}$. Use M25 grade concrete mix.
4. Design an Intz-type tank of 900,000 litres capacity. The height of tank above general ground level is 16 m. The bearing capacity of soil may be assumed as 150 kN/m². Use M20 concrete and HYSD bars.
5. Design a rectangular water tank of size 5 m x 8 m x 3 m deep resting on firm ground. The tank is open at the top and the walls are rigidly fixed to the base.
6. A cantilever retaining wall having 5 m stem retains levelled soil up to its top. The density of soil is 20 kN/m³ and the angle of repose is 30°. The bearing capacity of soil is 200kN/m². The coefficient of friction between the soil and the base slab is 0.60. The base slab may be of 3.6 m wide and 500 mm thick. Design the wall by using M-20 concrete and Fe-415 steel. Sketch the reinforcement details.
7. Design a grid floor to cover a floor area of size 15 m x 12 m. The spacing of the ribs in mutually perpendicular direction is 2 m C/C. Live load = 2 kN/m². Use M-20 concrete and Fe-415 steel. Analyze the grid floor for moments and shears by Rankine Grashoff method. Sketch the reinforcement details.
8. Obtain the fixed end moments for the symmetrically loaded slab less stair case of your choice with odd number of steps.
