

Code: 9A01801

B.Tech IV Year II Semester (R09) Regular & Supplementary Examinations May/June 2014

ADVANCED STRUCTURAL ENGINEERING

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Design an interior panel of a flat slab 6 m X 6 m, for a live load of 7 kN/m². Use M20 grade concrete and provide two way reinforcement.
- 2 Design the side wall and hopper bottom of a circular cylindrical bunker of capacity 350 kN to store wheat. Unit weight of wheat 8.5 kN/m³, angle of repose 28°, coefficient of friction is 0.444. Use M20 and Fe415 steel.
- 3 Design a chimney of height 70 m and check stresses in bars. External diameter at top 4 m at base 4.8 m, shell thickness at top 200 mm and at base 400 mm, wind intensity 1.8 kN/m² throughout. Thickness of fire brick lining 100 mm. Air gap - 100 mm, temperature difference 70°C, coefficient of the rmal expansion - $11 \times 10^{-6}/C^{\circ}$, $E_s = 210 \times 10^3 \text{ N/mm}^2$, unit weight of brick line = 20 kN/m³.
- 4 Design an Intz type water tank of capacity 1 million liters supported on symmetrically placed 8 columns. Use M25 concrete and Fe415 steel.
- 5 Design an open rectangular tank of size 3 m X 8 m X 3 m deep, resting on a firm ground. Use M25 concrete and Fe415 steel.
- 6 Design a counterfort retaining wall if the height of wall above the ground level is 5.6 m, SBC of soil = 180 kN/m², angle of friction $\phi = 30^{\circ}$ and unit weight of back fill = 16 kN/m³. Keep spacing of counter forts as 3 m. Coefficient of friction between soil and concrete $\mu = 0.5$. Adopt M20 grade concrete mix and Fe415 steel.
- 7 A RC grid floor is to be designed to cover a floor area of 12 m X 18 m. The spacing of the ribs in mutually perpendicular directions is 1.5 m c/c. Live load on floor is 3 kN/m². Adopt M20 concrete and Fe415 grade steel. Assume ends are simple supported. Analyze the grid floor and design suitable reinforcements in the grid floor.
- 8 A longitudinal type of stair case spans a distance of 3.75 m centre to centre of beams. The rise is 175 mm going 250 mm and tread 270 mm. The treads have 15 mm granolithic finish and consists of 15 steps. Live load is 5 kN/m². Design stair case. Assume M25 grade concrete and Fe415 steel. Breadth of stair case is 1.5 m.
