Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70363

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Seventh Semester

Civil Engineering

CE 8703 – STRUCTURAL DESIGN AND DRAWING

(Regulations 2017)

Time : Three hours Maximum : 100 marks

(Use of relevant IS Codes are permitted)

IS456, IS800, Steel tables, IS875 — Permitted

Answer ALL questions.

(5 × 20 = 100 marks)

1. (a) Design a reinforced concrete cantilever retaining wall supporting a backfill of height 4.5 m above ground. Take density of soil = 19 kN/m^3. Angle of repose = 30°. SBC of soil = 200 kN/m^2 and coefficient of friction between concrete and soil = 0.55. Grade of concrete is M20 and steel is Fe 415. Design the stem and toe of wall Draw reinforcement details of toe and stem with curtailment of reinforcements. (20)

Or

(b) Design Counterfort retaining wall to retain 9m of horizontal backfill.
The Density of the soil is 16 kN/m^3
Safe Bearing Capacity of the Soil = 200 kN/m^2
Angle of internal Friction of Soil = 30° Surcharge angle = 10°
Spacing of counterfort is 3.5m c/c. Use M20 concrete and Fe415 steel.
Draw sectional elevation and sectional plan of counterforts at the base. (20)

2. (a) A flat slab system of a ware house is 24 m × 24 m and divided into 6 m × 6 m (interior slab) along column center lines. Loading is estimated as 5 kN/m^2. Supporting column diameter is 400 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops. Design the Interior Panel and sketch the reinforcement details. (20)

Or

(b) Design a Deck slab bridge two lane for Class AA loading (tracked vehicle) with the following data
Clear Span - 6 m Safety kerbs — 600mm wide
Road width - 6.8 m Average thickness of wearing coat – 80mm
Materials — M40 and grade Fe 500 steel
Use IRC Standards. Sketch the reinforcement details. (20)

3. (a) Design a rectangular tank 5 m × 4.5 m in plan and 3.5 in height. Tank is resting on firm ground. Grade of concrete is M25 and steel is Fe 415. Design the following and Draw neat sketches showing the reinforcement details (i) Side walls (ii) Base slab. (20)

Or

(b) Design a cylindrical steel tank with hemispherical bottom for a capacity of 350 m^3 with the elevation of the tank as 18 m. The free board is 15 cm and bearing on the concrete is 40 kg/cm^2. Take SBC of soil as 15t/m^3. Use IS 804, IS 800 and IS 875 code books. (20)

4. (a) Design a purlin for a roof truss having the following data :

Span of the truss = 6.0 m — Spacing of truss = 3 m c/c

Inclination of roof = 30° — Spacing of Purlin = 2 m c/c

Wind pressure = 1.5 kN/m^2 — Roof cover AC Sheeting weighing 200 N/m^2

Provide a channel section Purlin. Draw the structural details. (20)

Or

(b) A beam-column of effective length of 6 m carries an axial load of 450 kN and equal end moments of 50 kN-m each about the major axis. Design the H- Section of the Column. Assume that members in the frame where side sway is prevented and not subjected to transverse loading between their supports and column bends either in single or in double curvature. Draw the structural details. (20)

5. (a) Design a welded plate girder (with Thick web plate) 20m span to support a UDL (live load) of 70 kN/m over the span, with yield stress of steel as 250 N/mm^2. Use IS 800 and steel tables. (20)

Or

(b) Design a hand operated overhead crane, which is provided in a shed, whose details are :
Capacity of Crane = 50 kN
Longitudinal spacing of column = 6 m
Center to center distance of gantry girder = 12 m
Wheel spacing = 3 m
Edge distance = 1 m
Weight of crane girder = 40 kN
Weight of trolley car = 10 kN. (20)
