17-12-22 - FN

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

Question Paper Code : 90338

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh Semester

Civil Engineering

CE 8703 — STRUCTURAL DESIGN AND DRAWING

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

(5 × 20 = 100)

1. (a) A counterfort type retaining wall to suit the following data

Height of wall above ground level = 6m

Safe bearing capacity of the soil site = 160 kN/m²

Angle of internal friction = 30°

Density of soil = 16 kN/m³

Spacing of counterforts = 3m c/c

Use M20 grade concrete and Fe 415 steel.

(i) Design the retaining wall (12)

(ii) Draw the sectional elevation of vertical wall and base slab. (8)

Or

(b) A RCC cantilever type retaining wall is required to support the earth to a height of 5m above the ground level. The top surface of the backfill is horizontal. The safe bearing capacity of the soil is 180 kN/m². Unit weight of soil is 17 kN/m³. The angle of repose of soil is 30°. The coefficient of friction between concrete and soil is 0.55. Use M20 grade concrete and Fe415 grade steel.

(i) Design the retaining wall (12)

(ii) Draw the sectional elevation of vertical wall and base slab. (8)

2. (a) The interior panel of a flat slab 5.6 × 6.6 m in size, for a super – imposed load of 7 kN/m². Provide two way reinforcement. Use M20 concrete and Fe 415 steel.

(i) Design the Flat slab. (12)

(ii) Sketch the reinforcement details. (8)

Or

(b) A solid slab bridge for class A loading for the following data

Clear span = 4.5m,

Clear width of the road way = 7m,

average thickness of wearing coat = 80mm,

Use M20 grade,

(i) Design the solid slab bridge. (15)

(ii) Sketch the reinforcement details. (5)

3. (a) A ground level circular water tank has capacity of 5,00,000 litres. The bottom of the tank is fixed and the top is free. The safe bearing capacity of the soil is 250 kN/m². Use M30 grade concrete and Fe415 grade steel

(i) Design the water tank (15)

(ii) Draw the sectional elevation of vertical wall and plan of base slab. (5)

Or

(b) An underground rectangular tank 10 m × 6 m × 3 m deep.

The tank is cover at top. Take density of soil as 16 kN/m² and angle of repose as 30°.

(i) Design the underground water tank (15)

(ii) Draw the sectional elevation of vertical wall and plan of base slab. (5)

4. (a) A steel roof truss to the following data :

Span of the truss = 10 m

Type of truss = Fan type

Roof cover = Galvanized corrugated sheeting

Spacing of roof trusses = 4.5 m

Wind pressure = 1 kN/m²

(i) Design a steel roof truss (15)

(ii) Draw the elevation of the roof truss and details of any one joint. (5)

Or

(b) A channel section purlin for the following data :

Spacing of trusses = 4.2 m

Spacing of purlin = 2 m

Live load on galvanized iron roofing sheets = 0.6kN/m²

Wind load = 1.4 kN/m²

Slope of main rafter = 31°

(i) Design a channel section for purlin. (12)

(ii) Draw structural details. (8)

5. (a) A welded plate girder of 30 m span to support a live load of 75kN/m uniformly distributed over the span.

(i) Design a welded plate girder. (12)

(ii) Draw the longitudinal elevation, cross section and plan of the plate girder. (8)

Or

(b) Design a gantry girder for an industrial building carrying a manually operated overhead travelling crane for the following data

(i) Crane capacity = 200 kN

(ii) Self weight of the crane girder excluding trolley = 200 kN

(iii) Self weight of the trolley, electric motor, hook, etc = 50 kN

(iv) Minimum approach of the crane hook to the gantry girder = 1 .20 m

(v) Wheel base = 3.60 m

(vi) c/c distance between gantry rails = 20 m

(vii) c/c between columns = 8 m

(viii) Self weight of rail section = 300 N/m

(ix) Diameter of crane wheels = 150 mm

(x) Grade of steel = Fe 410

(1) Design the gantry girder (12)

(2) Draw the structural details. (8)

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