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

Question Paper Code: 99121

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Elective

Civil Engineering

19UCE921- Structural Design And Drawing

(Regulations 2019)

Duration: Three hours | Maximum: 100 Marks

PART A - (5x 20 = 100 Marks)

1. (a) Design a heel slab and toe slab of a Cantilever retaining wall to retain 4m of horizontal backfill. CO1-App (16)

The Density of the soil is 18kN/m3

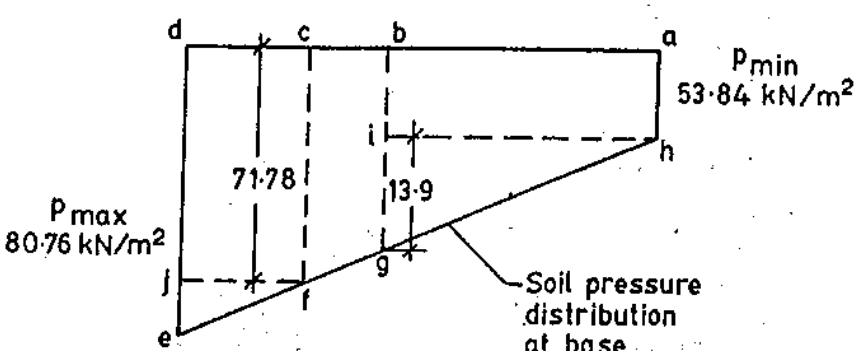
Safe Bearing Capacity of the Soil=200kN/m2

Angle of internal Friction of Soil=30^o

The Coefficient of friction between base slab and concrete=0.55

Use M20 concrete and Fe415 Steel.

Draw cross section and longitudinal section.Also check against sliding.



Or

(b) Design stem of a Cantilever retaining wall to retain 4m of horizontal backfill — CO1-App — (16)

The Density of the soil is 18kN/m3
Safe Bearing Capacity of the Soil=200kN/m2
Angle of internal Friction of Soil=30^o
The Coefficient of friction between base slab and concrete=0.55
Use M20 concrete and Fe415 Steel.
Draw cross sectional viewof stem. And also check the stability.

2. (a) Estimate the reinforcement and design a stem of a Cantilever retaining wall with sloping surcharge to retain 4.5m of backfill. — CO2- App — (16)

The Density of the soil is 1500 kg/m3
Safe Bearing Capacity of the Soil=200kN/m2
Angle of internal Friction of Soil=30^o
Surcharge angle = 20^o
Use M20 concrete and Fe415 Steel,
Draw the cross sectional view of the stem .And also check the stability

Or

(b) Design a circular water tank with fixed base for capacity of 400000 liters. The depth of water is to be 4m.free board =200 mm. — CO2- App — (16)

Use M-20 grade of concrete and Grade I mild steel.
Permissible direct tensile stress in concrete = 1.2 N/mm2
Permissible stress in steel in direct tension = 100 N/mm2
Sketch the details of reinforcements in tank walls.
Adopt IS code Tables for coefficients.

3. (a) Design A Rectangular R.C water tank with an open top is required to store 80000 litres of water.The inside dimensions of tank may be taken as 6mX4m .The tank rests on all four sides. Design the side walls of the tank using M-20 concrete and grade I steel. — CO2-App — (16)

Permissible stresses
σcb =7 N/mm2
σst =100 N/mm2(on faces near water face)
σst =125 N/mm2(on faces away from water face)
m = 13
Q = 1.41 J = 0.84

Or

(b) Design a circular water tank with fixed base for capacity of 400000 liters. The depth of water is to be 4m.free board =200 mm.Use M-20 grade of concrete and Grade I mild steel.
Permissible direct tensile stress in concrete = 1.2 N/mm2
Permissible stress in steel in direct tension = 100 N/mm2
Sketch the details of reinforcements in tank walls.
Adopt IS code Tables for coefficients. CO2-App (16)

4. (a) Design an underground tank of internal dimensions 8 m x 2 m x 2m. the soil surrounding the tank is likely to get wet. Angle of respose of soil in dry state is 300 and in wet state is 60 soil weighs 20 KN/m3 CO2-App (16)

Or

(b) Write down the design procedure of a circular water tank is resting on the ground. CO2-App (16)

5. (a) Design a simply supported gantry girder to carry electric overhead travelling crane, given:
Span of gantry girder = 6 m ,Span of crane girder = 15 m
Crane capacity = 200 kN, Self weight of rails = 0.2 kN/m
Self weight of trolley, hook, electric motor etc. = 40 kN
Self weight of crane girder excluding trolley = 200 kN
Minimum hook approach = 1.0 m ,Distance between wheels = 3 m CO3-App (16)

Or

(b) Design an I-section purlin, for an industrial building situated in the outskirt of Kolkata, to support a galvanized iron sheet roof for the following data:
Slope of truss = 30o, Spacing of truss c/c = 5.0 m
Span of truss = 12.0 m , spacing of purlins c/c = 2 m
wind speed = 50 m/s ,Weight of galvanized sheets = 120 N/m2
Grade of steel = Fe 410 CO3-App (16)

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