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Code No: 156BA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, March - 2024

FOUNDATION ENGINEERING

(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is a soil profile?	[2]
b)	Calculate depth of soil exploration for a 15-storey heavy steel building.	[3]
c)	What is the stability criteria of finite slope?	[2]
d)	Explain conditions considered for dams stability.	[3]
e)	Cohesionless soils are best suited as backfill material? Justify your answer.	[2]
f)	What is the stability of cantilever sheet pile wall?	[3]
g)	What are the different types of foundation settlements?	[2]
h)	List out the two criteria for design of rectangular combined footings.	[3]
i)	What do you understand by negative skin friction?	[2]
j)	What are the situations where raft foundations are preferred?	[3]

PART – B

(50 Marks)

2.a) Explain with neat figure area ratio, inside and outside clearances of a cutting edge used for soil exploration borings.

b) An SPT was conducted in a dense sand deposit at a depth of 20 m, and a value of 48 was observed for N. The density of the sand was 14 kN/m^3. What is the value of N, corrected for overburden pressure? [5+5]

OR

3. Write briefly about the Standard penetration test conducted in the field. What are the corrections to be made to the standard penetration value? [10]

4.a) What are the probable types of failure of a slope?

b) Write the expressions for the factor of safety using the method of slices when the slope of a homogeneous earth dam is dry and when fully submerged. Assume the soil to possess both cohesion and friction. [5+5]

OR

5.a) Describe the method of slices to analyse a slope.

b) An embankment is inclined at an angle of 35^0 and its height is 15 m. The angle of shearing resistance is 15^0 and the cohesion intercept is 200 kN/m^2. The unit weight of soil is 18.0 kN/m^3. If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion. [5+5]

6.a) Explain the Rankine's theory for various backfill condition to calculate active and passive state earth pressure.

b) A retaining wall 9.0 m high retains a cohesionless soil. The backfill surface is level with the top of the wall. The unit weight of the top 3 m of the fill is 21 kN/m^3, with an angle of internal friction 30^0 and that of the rest is 27 kN/m^3, with an angle of internal friction 33^0. A surcharge of 10 kPa is applied on the top of the backfill. Find the magnitude and point of application of the resultant active thrust. [5+5]

OR

7.a) A retaining wall 8 m high, with vertical back supports a backfill (γ= 22 kN/m^3 and $\varphi=0^0$) with horizontal ground surface. The angle of wall friction may be taken as 20^0. A footing, running parallel to the retaining wall and carrying a load intensity of 50 kN/m is to be constructed. Find the safe distance of the footing from the face of the wall so that there is no increase in lateral pressure on the wall due to the load of footing. Use Culmann's graphical method.

b) Explain Rebhann's Graphical method to evaluate the earth pressure on a retaining wall. [5+5]

8. Two load tests were conducted at a site - one with a 0.5 m square test plate and the other with a 1.0 m square test plate. For a settlement of 25 mm, the loads were found to be 60 kN and 180 kN, respectively in the two tests. Determine the allowable bearing pressure of the sand and the load which a square footing of 2 m × 2 m, can carry with the settlement not exceeding 25 mm. [10]

OR

9. Describe the procedure to conduct the plate load test with a sketch and state its limitations. [10]

10.a) List various types of pile foundations. What are the conditions where a pile foundation is more suitable than a shallow foundation?

b) What is the basis on which the dynamic formulae are derived? Mention two well known dynamic formulae and explain the symbols involved. [5+5]

OR

11. In a two layered cohesive soil, bored piles of 300mm are installed. The top layer has a thickness of 5m and the bottom one is of considerable depth. The "c" value of top layer is 40kN/m^2 and that of the bottom is 100kN/m^2. Determine the length of the pile required to carry a safe load of 400kN. Assume a F.S. of 3. [10]

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