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H – 2823

Reg No. : .....

Name : .....

**Eighth Semester B.Tech. Degree Examination, November 2019**

**13.805.3 : DEEP FOUNDATIONS (C)**

**Elective – III**

**(2013 Scheme)**

Time : 3 Hours

Max. Marks : 100

**PART – A**

Answer **all** questions : Each question carries **4** marks.

1. Write the classification of piles based on the soil displacement and explain it.
2. What is negative skin friction on a pile resting on granular soil and cohesive soil?
3. Describe the various stages in the construction of drilled piers with suitable diagrams.
4. What are the loads acting on a well foundation? Explain about the various possible load combinations.
5. Define grip length in a well foundation. Also write the calculation of grip length for different structures.

**(5 × 4 = 20 Marks)**

**PART – B**

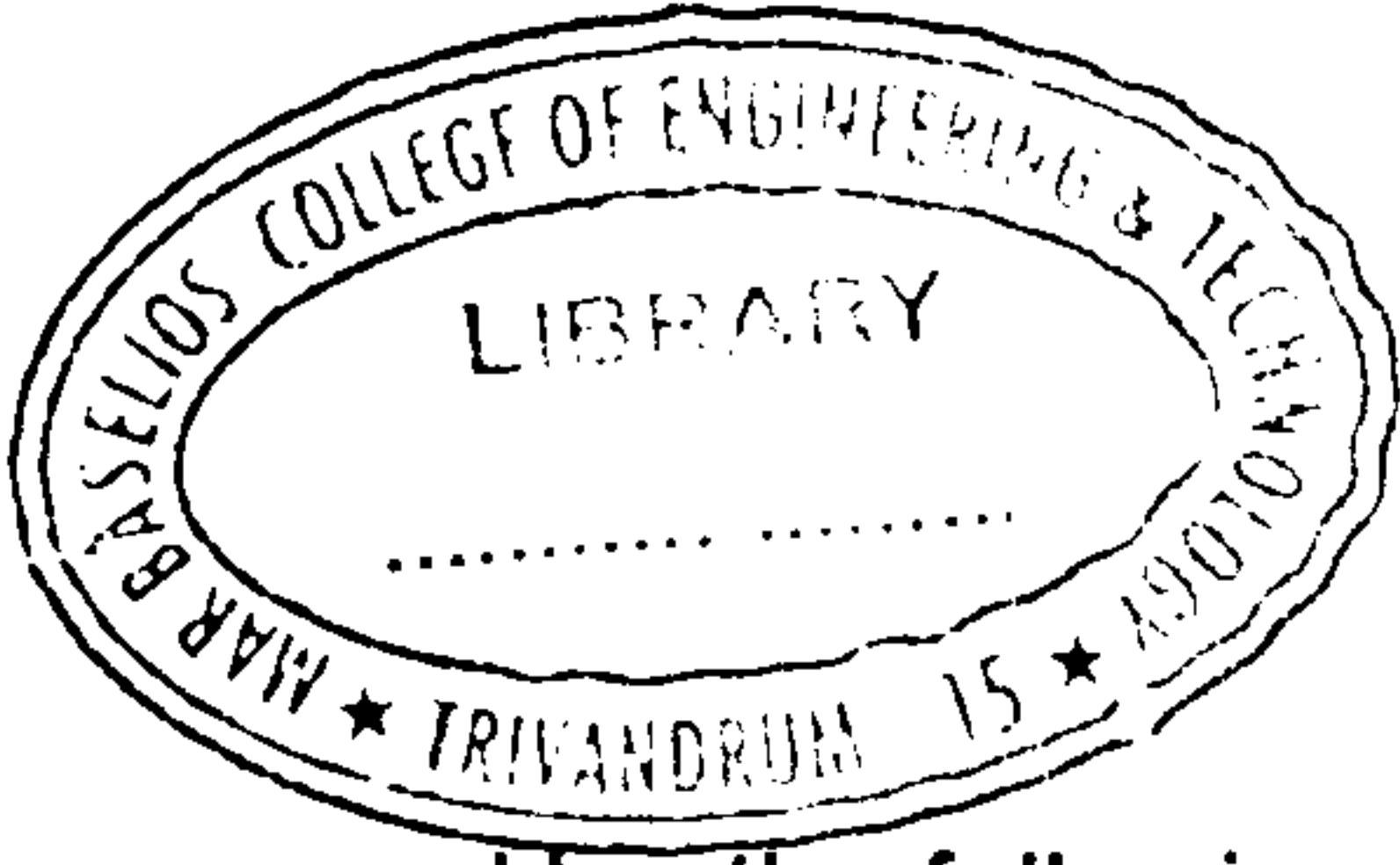
Answer **one full** question from each module. Each question carries **20** Marks.

**Module – I**

6. A precast concrete pile (0.4 m x 0.4 m) is driven by a single-acting team hammer. Estimate the allowable load using (a) Engineering News record formula (FOS = 6), (b) Hiley formula (FOS = 4) and (c) Danish formula (FOS = 4)

P.T.O.





Use the following data:

Maximum rated energy	=	3500 kN-cm
Weight of hammer	=	35 kN
Length of pile	=	15 m
Efficiency of hammer	=	0.8
Coefficient of restitution	=	0.5
Weight of pile cap	=	3 kN
No of blows for last 25.4 mm	=	6
Modulus of elasticity of concrete	=	$2 \times 10^7 \text{ kN/m}^2$ .

Assume any other data, if required. Take the weight of pile as 73.5 kN. **20**

OR

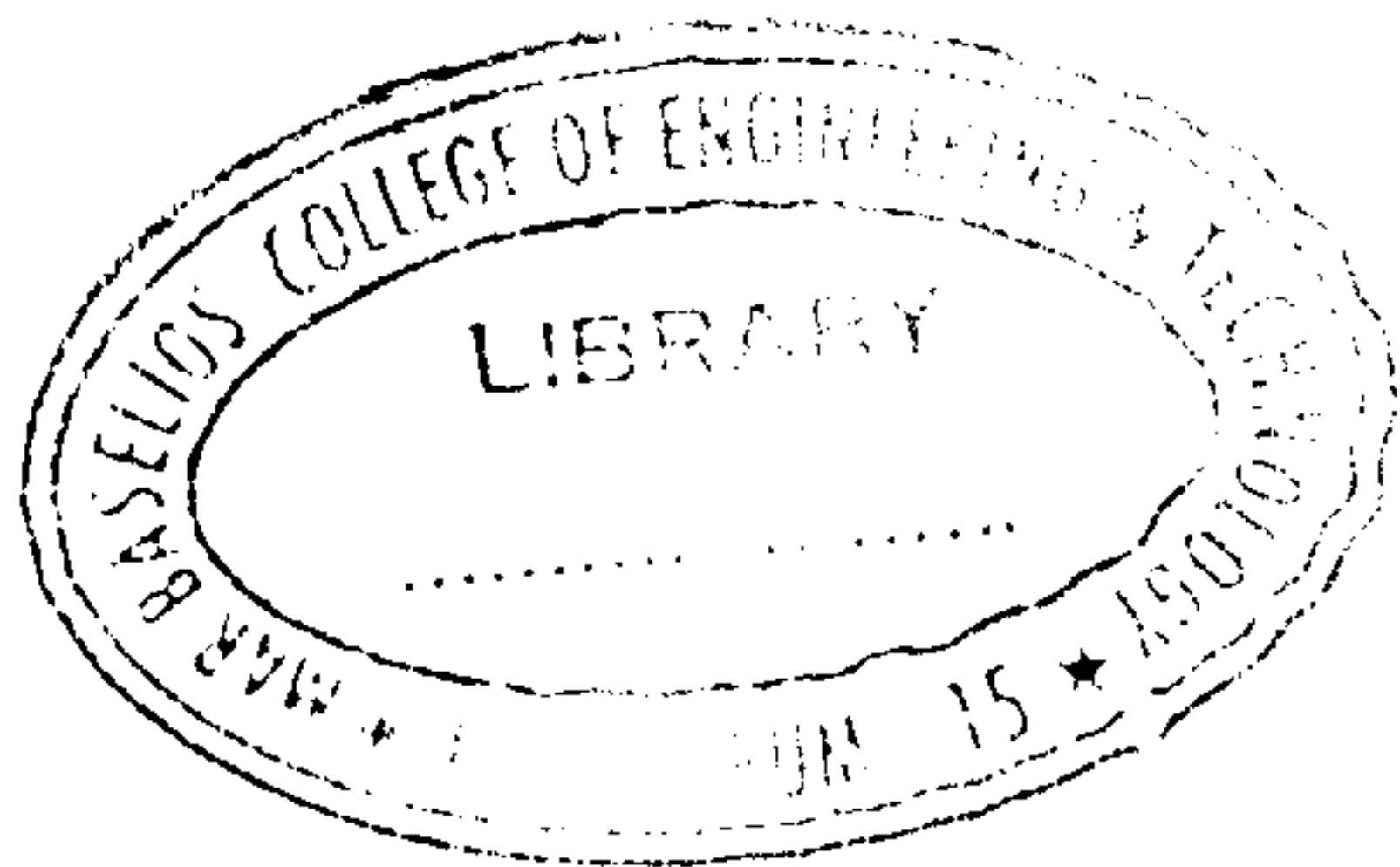
7. (a) A 40 cm diameter concrete pile is driven into a homogeneous consolidated clay deposit If  $c_u=40 \text{ kN/m}^2$  and  $\alpha =0.7$ . If the embedded length is 10 m, estimate the safe load. Take factor of safety as 3. **10**
- (b) Discuss the uses of penetration tests for the estimation of load carrying Capacity of piles. **10**

#### Module – II

8. (a) Write in detail about tension piles with enlarged base in clay soil. **8**
- (b) A group of nine piles arranged in a square pattern is to be proportioned in a deposit of soft clay. Assuming the piles to be square with side 300 mm and 10 m long, work out the spacing for 100 percent efficiency of the pile group. Neglect bearing and assume adhesion factor of 0.8. **12**

OR





9. (a) A group of 16 piles (diameter = 600 cm, length = 14 m, Center to center spacing = 1 m) arranged in a square pattern of size 3.5 m x 3.5m passes through a recent fill of thickness 3 m, overlying a soft clay deposit of thickness 5 m which is consolidating under the fill load and rests in a stiff clay strata. All the strata are saturated. The soil properties of different strata are:

Type of soil	Unit weight ( $\gamma$ ) KN/m <sup>3</sup>	Cohesion $c_u$ (kPa)	Friction angle $\phi_u$	Adhesion parameters
Fill	16	50	0	0.6
Soft clay	17	20	0	0.4
Stiff clay	21	70	0	0.45

Estimate the ultimate load capacity of the pile group. 12

- (b) Define the purpose of an under-reamed pile. Also derive the ultimate load carrying capacity of under-reamed pile with two bulbs. 8

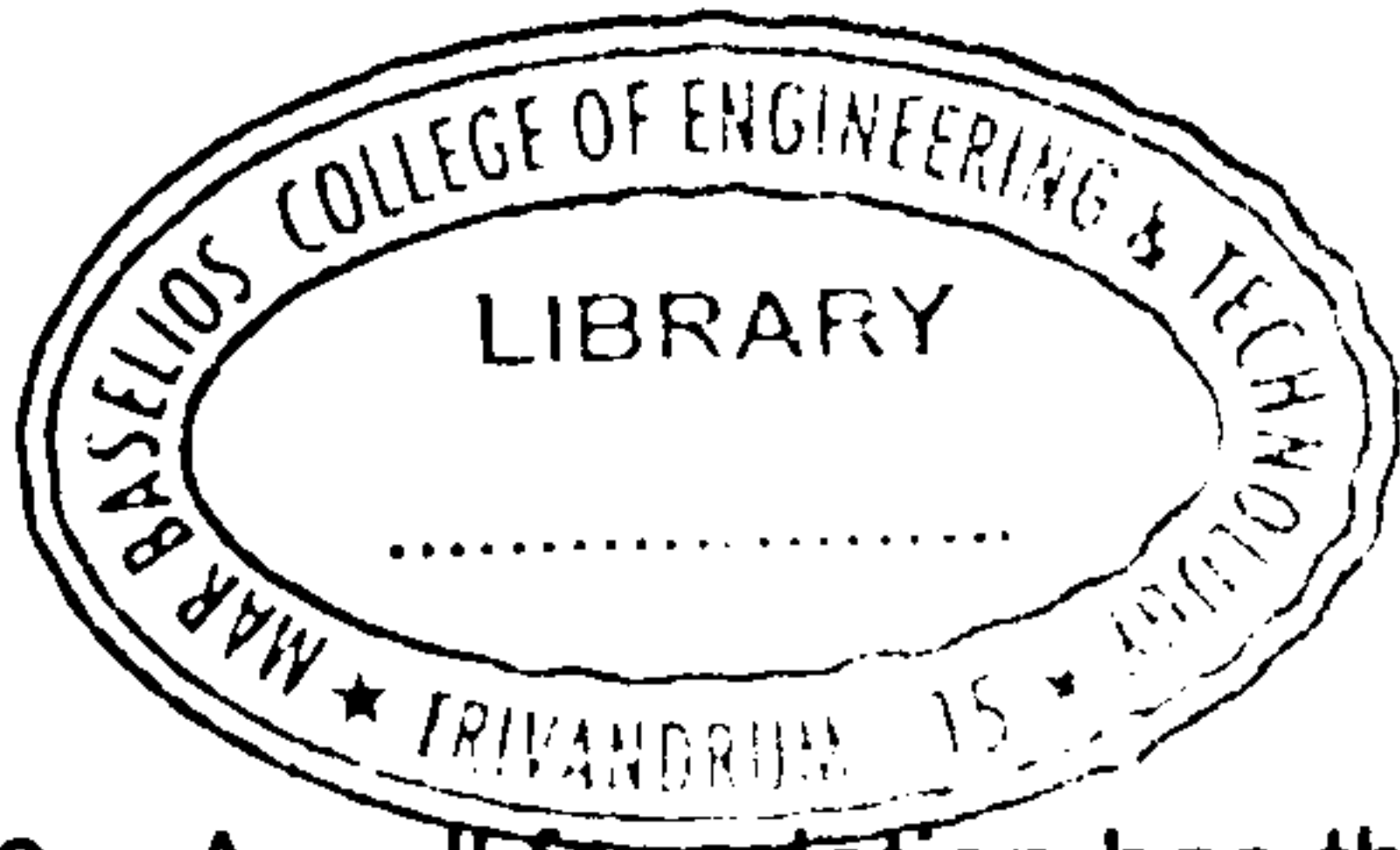
### Module – III

10. (a) A straight shaft drilled pier of 1.2 m diameter is constructed in a dense sand deposit ( $\phi = 40^\circ, K = 0.4, \tan \delta = 0.80$  and  $\gamma = 21 \text{ kN/m}^3$ ). The total depth of the pier is 14 m. Estimate the allowable load. Take factor of safety as 3. 10
- (b) Explain the load carrying capacity of drilled pier on cohesive and cohesionless soil. 10

OR

11. Explain the various methods used to analyze the settlement of pier foundation. 20





### Module – IV

12. A well foundation has the following details

Net downward load, including self-weight	= 12,000 kN
Height of point of application of horizontal force above the scour level	= 4 m
Depth of well below scour level	= 10 m
External diameter	= 7 m
Internal diameter	= 5 m
Vertical subgrade reaction	= $3 \times 10^4 \text{ kN/m}^3$
Poisson's ratio	= 0.5
Horizontal deformation of well cap at the scour level	= 20 mm
Allowable soil pressure	= $600 \text{ kN/m}^2$

Assuming the well to rotate about its base, determine the base pressure and lateral load per unit length of the well. Take  $\gamma_{sat} = 20 \text{ kN/m}^3$  and  $\phi = 30^\circ$ . **20**

OR

13. What are the different methods of analysis of a well foundation? Explain them in detail. **20**

**(4 × 20 = 80 Marks)**

