R22 Regulation *Subject code: 4P7AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VII Semester Regular/Supplementary Examinations, October 2026

FOUNDATION ENGINEERING

(CE)

Maximum Marks: 60 Date: 28.10.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What is the difference between a disturbed and an undisturbed soil sample?	1M	1	L2
b)	Name two key components that must be included in a Soil Investigation Report.	1M	1	L1
c)	Define finite and infinite slops.	1M	2	L2
d)	Write the mathematical expression for the factor of safety of a dry cohesionless infinite slope.	1M	2	L1
e)	List two fundamental assumptions of Rankine's earth pressure theory.	1M	3	L1
f)	How does the presence of a submerged water table affect the total lateral earth pressure diagram behind a retaining wall?	1M	3	L2
g)	Define Gross Ultimate Bearing Capacity.	1M	4	L1
h)	Write about safe bearing capacity.	1M	4	L1
i)	Define a Friction Pile and state where it is best deployed.	1M	5	L1
j)	Define Tilt and Shift in a well foundation.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Define significant depth of soil exploration? Give values for depth of soil exploration and number of bore holes for Multi storey buildings, closely spaced footings and Highway in filling and cutting.	10M	1	L3
	OR			
3	a) Write briefly about the staandard penetration test. b) Describe with a neat sketch wash boring method of soil exploration? What are the merits and demerits of it?	4M 6M	1	L2
4	Derive from first principles the expression for the factor of safety of an infinite slope in a cohesionless soil, when seepage occurs parallel to the slope surface right up to the ground level. Explain why the factor of safety drops by approximately 50% compared to a completely dry slope.	10M	2	L3
	OR			

5	a) Sketch and explain the primary modes of failure in finite slopes. b) Describe the step-by-step procedure of the Swedish Arc Method for a saturated cohesive clay soil.	5M 5M	2	L2
6	a) Explain the active and passive states of earth pressure acting on a retaining wall. b) Explain the Rankine's theory for various backfill condition to calculate active and passive state earth pressure.	5M 5M	3	L3
	OR			
7	A retaining wall 6m high with a smooth vertical back retains a clay backfill with $c' = 12kN/m^2$, $\gamma = 18kN/m^3$ and $\varphi' = 18^0$. Calculate the total active thrust on the wall if tension cracks may develop to the full theoretical depth.	10M	3	L4
8	a) State the fundamental assumptions made by Karl Terzaghi in his bearing capacity theory for shallow foundations. b) A square footing 1.6m × 1.6m is placed over sand of density $17kN/m^3$ and at a depth of 0.8m. The angle of shearing resistance is 20^0. The bearing capacity factors are Nc = 17.7, Nq = 7.4 and Nq = 5.0. Determine the total load that can be carried by the footing.	3M 7M	4	L3
	OR			
9	a) Discuss the various factors that affect the bearing capacity of a shallow footing. b) Discuss the procedure to determine the safe bearing capacity and settlement from plate load test data?	5M 5M	4	L3
10	a) Write a note on the pile dynamic formulae mentioning their limitations. b) Explain the procedure to estimate the pile group capacity in soil.	5M 5M	5	L3
	OR			
11	a) Illustrate with neat plan views the different geometric shapes of wells used in practice. b) Describe the step-by-step field operational procedure for the Sinking of a Well Foundation in a deep sandy riverbed, from casting the cutting edge to final position verification.	5M 5M	5	L2