R22 Regulation *Subject code:4E6AA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

SOIL MECHANICS

(CE)

Maximum Marks: 60 Date:13.04.2026 Duration: 3 hours

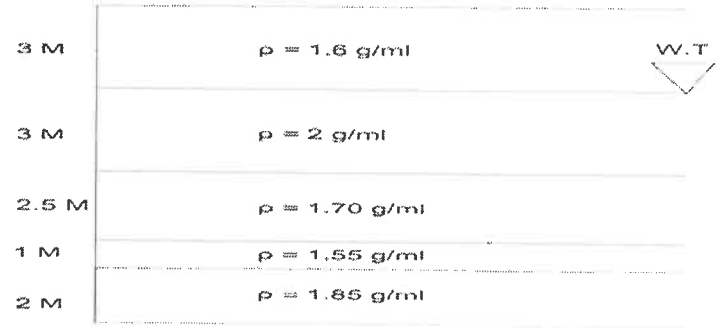
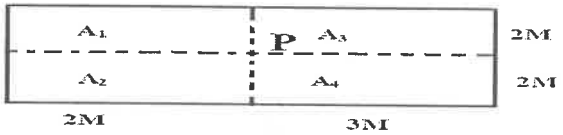
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	What is meant by residual and transported soils	1M	1	L1
b)	Define Relative Density.	1M	1	L1
c)	Define surface tension	1M	2	L1
d)	Write about Darcy's law	1M	2	L1
e)	State any two assumptions made in Westergaard's solution	1M	3	L1
f)	What is meant by compaction quality control	1M	3	L1
g)	Define coefficient of volume change	1M	3	L1
h)	What are the limitations of consolidation theory	1M	3	L1
i)	What are the different types of shear tests.	1M	4	L1
j)	Sketch the Mohr's circle	1M	4	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) What is the use of classification of soils? Discuss Indian standard classification system?	5M	1	L2
	b) A partially saturated sample of a soil has a density of 1950 kg/m^3 and a water content of 21% . If the specific gravity of solids is 2.65. Calculate degree of saturation and void ratio.	5M	1	L3
	OR			
3	Define Liquid Limit and Plastic Limit of soil. Explain the procedure for determining each of them and state their engineering significance.	10M	1	L2
4	a) Explain about factors affecting permeability.	5M	2	L2
	b) Determine the average coefficient of permeability in horizontal and vertical direction for a soil deposit consisting of three layers of thickness 5m, 1m and 2.5m and having the coefficient of permeability of 3x10^{-2}mm/sec, 3x10^{-5}mm/sec and 4x10^{-2}mm/sec respectively. Assume the layers are isotropic.	5M	2	L3
	OR			
5	Determine the total, neutral and effective stress at the bottom of the deposit as shown in fig	10M	2	L2

				
6	a) List and explain the factors affecting compaction of soils with suitable illustrations. b) A concentrated load of 2000 KN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m form the axis of the load.	5M 5M	3 3	L1 L2
	OR			
7	a) Using Boussinesq's theory, derive the expression for vertical stress at any point beneath a uniformly loaded rectangular area, with the help of a neat sketch. b) A rectangular foundation 4m x 5m carries a uniformly distribution load of 200kN/m^2. Determine the vertical stress at a point P locates as shown in the figure and at a depth of 2.5m. 	6M 4M	3 3	L1 L2
8	Explain the procedure for determination of the coefficient of consolidation by using square root of time method and logarithm of time method, with neat sketches.	10M	3	L2
	OR			
9	a) List any four assumptions of one-dimensional consolidation theory. b) Derive Terzaghi's one-dimensional consolidation equation and explain its significance in soil mechanics.	3M 7M	3 3	L1 L2
10	a) Explain the Mohr-Coulomb failure theory with a neat sketch showing normal and shear stress on a failure plane. b) Name any four advantages of the vane shear test.	7M 3M	4 4	L2 L1
	OR			
11	Explain in detail the Triaxial Compression Test, including apparatus, procedure, determination of shear strength parameters, advantages, and limitations. Include a neat labelled sketch.	10M	4	L2