R20 Regulation *Subject code: 3P5AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, November 2025

SOIL MECHANICS

(CE)

Maximum Marks: 70 Date: 10.11.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 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 (10X2M=20 Marks)		Marks	CO	BTL
1	Define activity number of clay.	2M	1	L1
2	Define void ratio , porosity.	2M	1	L1
3	Define permeability and hydraulic gradient.	2M	2	L1
4	Determine effective stress in a soil mass under hydrostatic conditions or under water bodies.	2M	2	L1
5	Write down the westergaard's equation for the stress at depth 'z' below the ground surface?	2M	3	L1
6	Write short notes on placement water content.	2M	3	L1
7	Define recompression index.	2M	4	L1
8	What is time factor?	2M	4	L1
9	What is dilatancy?	2M	5	L1
10	What is critical void ratio?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	What are different types of soil structures which can occur in nature? Describe in brief.	10M	1	L2
	OR			
12	In order to find the relative density of a sand, a mould of volume 1000 ml was used. When the sand was dynamically compacted in the mould, its mass was 2.10kg, whereas when the sand was poured in loosely, its mass was 1.635kg. if the in-situ density of the soil was 1.50 Mg/m^3, calculate the relative density. G = 2.70. assume that the sand is saturated.	10M	1	L2
13	Describe pumping-out methods for the determination of the coefficient of permeability in the field. What are their advantages and disadvantages? What are Dupits's assumptions.	10M	2	L2
	OR			
14	a)A soil profile consists of a surface layer of clay 4m thick (γ = 19.5 kN/m^3) and a sand layer 2 m thick (γ = 18.5 kN/m^3) overlying an impermeable rock. The water table is at the ground surface. If the water level in the stand pipe	5M	2	L2

	driven into the sand layer rises 2m above the ground surface, draw the plot showing variation of total stress, porewater pressure and effective stress. Take $\gamma_w = 10$ kN/m^3. b) Determine the increase in effective stress at the top of the rock when the artesian head in the sand is reduced by 1m.	5M		
15	Describe the method of calculating the stress at a point below the corner of a rectangular load. How is this method used for finding the stresses at points other than that below the corner?	10M	3	L2
	OR			
16	Describe standard proctor test and the modified proctor test. How would you decide whether the soil should be compacted the dry optimum or the wet of optimum?	10M	3	L2
17	Discuss Terzaghi's theory of consolidation, stating the various assumptions and their validity.	10M	4	L2
	OR			
18	a) Differentiate between primary consolidation and secondary consolidation. b) A stratum of clay is 2m thick and has an initial overburden pressure of 50 kN/m^2 at its middle. determine the final settlement due to an increase in pressure of 40 kN/m^2 at the middle of the clay layer. The clay is over-consolidated, with a preconsolidation pressure of 75 kN/m^2. The values of the coefficients of recompression and compression index are 0.05 and 0.25, respectively. Take initial void ratio as 1.40.	5M 5M	4	L2
19	Describe direct shear test. What are its merits and demerits.	10M	5	L2
	OR			
20	What is Mohr's circle? Discuss its importance characteristics.	10M	5	L2