

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– VII EXAMINATION – SUMMER 2026

Subject Code:3170620

Date:08-06-2026

Subject Name:Computational Geotechnics

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Briefly explain different linear and nonlinear analysis methods.	03
	(b) Enlist the types of boundary conditions. Explain Disichlet conditions.	04
	(c) Explain Runge-Kutta Second and Forth order methods of differential equations.	07
Q.2	(a) Explain Bisection method with suitable example.	03
	(b) Briefly explain discrete element method (DEM).	04
	(c) Solve the following system by Gauss Jacobi method. $20x+y-2z = 17$, $3x+20y-z = -18$ and $2x-3y+20z = 25$	07
	OR	
	(c) Solve the following system by Gauss Seidal method. $10x+y+z=12$, $2x+10y+z=13$, $2x+2y+10z=14$.	07
Q.3	(a) Explain application of FEM method for geotechnical engineering.	03
	(b) Briefly explain Drucker-Prager theory.	04
	(c) Explain Mohr-Coulomb theory.	07
	OR	
Q.3	(a) Briefly explain continuum modeling.	03
	(b) Differentiate between elastic model and plastic model.	04
	(c) Explain One-dimensional (1D) plasticity theory.	07
Q.4	(a) What are Disichlet conditions and Neumann conditions?	03
	(b) Explain compression index (C_c) and Swelling index (C_s).	04
	(c) Explain earth pressure coefficients based upon Lade-Duncan criterion.	07
	OR	
Q.4	(a) Explain the ordinary and partial differential equations with suitable example.	03
	(b) Explain the flow through porous media.	04
	(c) Explain Modified Mohr Coulomb failure theory for shear strength of soil? Draw and explain typical strength envelop for different type of soil.	07

Q.5	(a)	Explain Taylor's series method	03
	(b)	Explain concept of Cam clay.	04
	(c)	Explain consolidation mechanism through spring analogy theory.	07
OR			
Q.5	(a)	Enlist the assumptions made in Terzaghi's theory of 1-dimensional consolidation.	03
	(b)	Differentiate between consolidation and compaction.	04
	(c)	Explain Tri-axial Test with neat sketch.	07
