Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2023

Subject Code:3170620 Date:19-12-2023

Subject Name: Computational Geotechnics

Time: 10:30 AM TO 01:00 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)**	Explain N-R method with suitable example.	**03**
	(b)	Differentiate between FEM and FDM.	**04**
	(c)	Solve the following system by Gauss Seidal method: $10X_1 + X_2 + X_3 = 6$ $X_1 + 10X_2 + X_3 = 6$ $X_1 + X_2 + 10X_3 = 6$	**07**
Q.2	**(a)**	Explain the role of integration algorithm for solution of DEM problems.	**03**
	(b)	Briefly explain discrete element method (DEM).	**04**
	(c)	Use fourth order Runge-Kutta method to find y(0.2) with h=0.1, given that dy/dx = X+Y, y(0)=1.	**07**
		OR	
	(c)	Explain Runge-Kutta Second and Forth order methods of differential equations.	**07**
Q.3	**(a)**	Explain Taylor's series method.	**03**
	(b)	Briefly explain Drucker-Prager theory.	**04**
	(c)	Explain Terzaghi's theory of 1-dimensional consolidation with assumptions.	**07**
		OR	
Q.3	**(a)**	Explain Disichlet conditions.	**03**
	(b)	Explain the following terms: 1. Angle of Repose 2. Shear strength of Soil	**04**
	(c)	Write a detail note on FEM method. Explain the applications of FEM method in geotechnical engineering.	**07**
Q.4	**(a)**	Differentiate between elastic model and plastic model.	**03**
	(b)	Explain Mohr Coulomb theory of shear strength.	**04**
	(c)	Explain the coefficient of earth pressure with the help of Lade-Duncan criterion.	**07**
		OR	
Q.4	**(a)**	Briefly explain Cam clay.	**03**
	(b)	Give the importance of boundary value problems in geotechnical engineering.	**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 compression index (Cc) and Swelling index (Cs).	**03**
	(b)	Write a note on flow through porous media.	**04**
	(c)	Explain Tri-axial Test with neat sketch.	**07**
		OR	

Q.5	**(a)**	Define following terms: 1. Immediate Settlement 2. Primary Consolidation 3. Secondary Consolidation	**03**
	(b)	Briefly explain spring analogy theory.	**04**
	(c)	Explain the applications of numerical solution.	**07**

.********