Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170620   **Date:12-01-2023**
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)**	Briefly explain different linear and nonlinear analysis methods.	**03**
	(b)	Explain Newton-Raphson method with suitable example.	**04**
	(c)	Solve the following system by Gauss Seidal method. $10x+y+z=12$ $2x+10y+z=13$ $2x+2y+10z=14$.	**07**

Q.2	**(a)**	Enlist different ODE and PDE method.	**03**
	(b)	Explain Taylor's series method.	**04**
	(c)	Use second order Runge-Kutta method to find y(0.2) with h=0.1, given that $dy/dx = $ x-y^2, y(0)=1.	**07**

OR

	(c)	Use fourth order Runge-Kutta method to find y(1.1) with h=0.05, given that $dydx = $ x-y, y(1)=1.	**07**

Q.3	**(a)**	Differentiate between discrete modeling versus continuum modeling.	**03**
	(b)	Explain application of FEM for geotechnical engineering.	**04**
	(c)	Explain One-dimensional (1D) plasticity theory for understanding the soil behavior.	**07**

OR

Q.3	**(a)**	Briefly explain discrete element method (DEM).	**03**
	(b)	Briefly explain Drucker-Prager theory.	**04**
	(c)	Explain Mohr-Coulomb theory.	**07**

Q.4	**(a)**	Explain Mohr Coulomb theory of shear strength.	**03**
	(b)	Explain concept of Cam clay.	**04**
	(c)	Explain classical plasticity. Explain general framework of it.	**07**

OR

Q.4	**(a)**	Explain the importance of initial boundary value problem.	**03**
	(b)	Differentiate between elastic model and plastic model.	**04**
	(c)	Explain theory of Lade-Duncan criterion for earth pressure coefficient.	**07**

Q.5	**(a)**	List the assumption made in the theory of 1-D consolidation.	**03**
	(b)	Briefly explain flow through porous media.	**04**
	(c)	Explain theory of Terzaghi for one dimensional consolidation.	**07**

OR

Q.5	**(a)**	Explain concept of consolidation.	**03**
	(b)	Explain compression index (C_c) and Swelling index (C_s)	**04**
	(c)	Explain Tri-axial test with neat sketch. Also enlist its limitation.	**07**

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