Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code:3170620 Date:01-06-2024

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)**	Explain Bisection method with suitable example.	**03**
	(b)	Explain Newton's Raphson method with suitable example.	**04**
	(c)	Solve the following system by Gauss Jacobi method. $20x+y-2z = 17$, $3x+20y-z = -18$ and $2x-3y+20z = 25$	**07**
Q.2	**(a)**	Explain False Position method with suitable example.	**03**
	(b)	Find a root of the equation $x^3 - 4x = 9$ using the Bisection method in four stages.	**04**
	(c)	Use second order Runge-Kutta method of solve initial value problem $y' = -y$, where $y(0)=1$ for $x_1 = 0.2$ and $x_2 = 0.4$	**07**
		OR	
	(c)	Use fourth order Runge-Kutta method to find $y(1.1)$ with $h=0.05$, given that $\frac{dy}{dx} = x-y$, $y(1)=1$.	**07**
Q.3	**(a)**	Briefly explain continuum modeling.	**03**
	(b)	Explain application of FEM method for geotechnical engineering.	**04**
	(c)	Explain basic concept of discrete modelling.	**07**
		OR	
Q.3	**(a)**	Give difference between discrete modeling versus continuum modeling.	**03**
	(b)	Explain Modified Mohr Coulomb failure theory for shear strength? Sketch typical strength envelop for different type of soil.	**04**
	(c)	Explain in detail One- dimensional plasticity theory for understanding the behavior of soil.	**07**
Q.4	**(a)**	Explain concept of consolidation.	**03**
	(b)	Briefly explain Drucker-Prager theory.	**04**
	(c)	Explain Mohr-Coulomb theory.	**07**
		OR	
Q.4	**(a)**	List the assumption made in the theory of 1-D 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**
Q.5	**(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**

OR

Q.5 **(a)** Define following terms: **03**

1. Immediate Settlement
2. Primary Consolidation
3. Secondary Consolidation

(b) Spring analogy to explain consolidation theory. **04**

(c) What is classical plasticity? Explain general framework of classical plasticity. **07**

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