Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (NEW) – • EXAMINATION – SUMMER 2016

Subject Code: 2713301 **Date: 16/05/2016**

Subject Name: Numerical Methods for Civil Engineering

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.**

Q.1	**(a)**	Explain the concept of stability in numerical analysis.	**07**
	(b)	Enlist and compare methods for curve fitting.	**07**
Q.2	**(a)**	Apply the Euler's method to the ordinary differential equation, $dy/dx= x+y$, $y(0) =1$, using increments of size $h = 0.2$. The exact solution is $y = -1 - x + 2e^x$. Determine the error and the percentage error at each step.	**07**
	(b)	Solve using Jacobi's method to solve the equations: $2x + y - 2z = 27$, $2x - 7y + 12z = 5$, $-3x + 2y - z + 22= 0$.	**07**
		OR	
	(b)	Write a C++ program for Newton forward difference formula.	**07**
Q.3	**(a)**	Explain interpolation and extrapolation with taking examples.	**07**
	(b)	Solve following systems using any of the methods used for solution of linear simultaneous equations. $x + 7y + 3z = 15$ $7x + 7y - 5z = -18$ $-2x + 5y + z = 9$	**07**
		OR	
Q.3	**(a)**	Elaborate on Eigen value problem showing some of the civil engineering applications. Also, explain the basic method for solution of Eigen value problems.	**07**
	(b)	Explain the use of finite difference method and its practical problem related to structural engineering or water resources engineering.	**07**
Q.4	**(a)**	Explain with example the principles of least squares.	**07**
	(b)	How Eular's equation is used in civil engineering perspective. Explain with some specific example.	**07**
		OR	
Q.4	**(a)**	Calculate support reactions for a prismatic fixed beam subjected to point load at center, using finite difference method.	**07**
	(b)	Explain the Fourier Transform method.	**07**
Q.5	**(a)**	Enlist and elaborate the types of errors.	**07**
	(b)	Explain the iterative method with the practical problem.	**07**
		OR	
Q.5	**(a)**	Elaborate various rules and formula for numerical integration.	**07**
	(b)	Find one root of $e^x - 3x = 0$, correct to two decimal places using the method of Bisection	**07**

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