Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER– II EXAMINATION – SUMMER 2017

Subject Code:2620004 Date:05/06/2017

Subject Name: Computer Oriented Numerical Methods

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.**

Q.1 **(a)** Explain the following terms: Blunders, Formulation Errors, Data Uncertainty. Explain Total Numerical Error. How can one control numerical errors ? **07**

(b) Explain the concept of successive approximation method used to find root of equation. Discuss the convergence of the method using graphical techniques. **07**

Q.2 **(a)** Find a real root of x^3−x = 1 between 1 and 2 by bisection method. Compute five iterations. **07**

(b) Solve for a positive root of x^3−4x+1= 0 by false position method. **07**

OR

(b) Using Newton-Raphson method find root of e^x=4x by taking x_0=2. **07**

Q.3 **(a)** Find Newton's forward difference interpolating polynomial for the following data and then obtain f(0.6). **07**

x	0.1	0.2	0.3	0.4	0.5
y=f(x)	1.40	1.56	1.76	2.00	2.28

(b) If P is the pull required to lift a load W by means of a pulley block, find a linear law of the form P=mW + c which connect P and W. Using the following data **07**

P(wt)	12	15	21	25
W(kg)	50	70	100	120

Also Compute P when W=150kg.

OR

Q.3 **(a)** Find function f(x) from following data using Langrange's interpolation formula. **07**

x	0	1	2	5
f(x)	2	3	12	147

(b) Using least square method to obtain normal equations of parabola on data set (x_1,y_1), (x_2,y_2),…., (x_n,y_n). **07**

Q.4 **(a)** Apply Newton's forward difference formula of interpolation to find f'(x), f''(x) at x=1 for following data. **07**

x	1	1.05	1.10	1.15	1.20	1.25	1.30
f(x)	1.0000	1.02470	1.04881	1.07238	1.09544	1.11803	1.14017

(b) Derive Newton cotes' general quadrature formula. Using it obtain Trapazodial formula for numerical integration. **07**

OR

Q.4 **(a)** Derive Newton's Backward Difference interpolation formula of first order differentiation. **07**

(b) Compute the value of definite integral $\int_4^{5.2} log_e\, x$ dx using simpson's 1/3 rule of numerical integration by taking h=0.2. **07**

Q.5 **(a)** Solve by Gauss-Seidel method, the following system of equations, 28x+4y-z=32, x+3y+10z=24, 2x+17y+4z=35 **07**

(b) Apply Runge-Kutta method of fourth order to find approximate value of y when x=0.4 given that $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}$, y(0)=1 by taking h=0.2 **07**

OR

Q.5 **(a)** Solve the system of equations using Gauss Elimination method. **07**
3x+y-z=3, 2x-8y+z= -5, x-2y+9z=8

(b) Given $\frac{dy}{dx}$ = 3x+$\frac{y}{2}$ and y(0) = 1. Find the values of y(0.1) and y(0. 2) using the Taylor series method. **07**

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