Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 1720110 Date:16/05/2015

Subject Name: Numerical Methods

Time: 02:30 pm to 5:00 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)** Using Lagrangeôs interpolation formula, find the value of y corresponding to $x=10$ from the following data. **07**

x	5	6	9	11
y	380	-2	196	508

(b) Use Newtonôs divided difference formula to find the equation of polynomial passing through the following points. **07**

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

Hence, find the value of $f(x)$ at $x=4$.

Q.2 **(a)** Using the Gauss-Seidel method solve the system of equations correct to three decimal places. **07**

$$x+2y+z=0$$
$$3x+y-z=0$$
$$x-y+4z=3$$

(b) Solve the following set of equations by Gauss ï Jordan method. **07**

$$2x_1+x_2-3x_3=11$$
$$4x_1-2x_2+3x_3=8$$
$$-2x_1+2x_2-x_3=-6$$

OR

(b) Fit a second degree parabola $y=a+bx+cx^2$ for the following data hence estimate y at $x=6$. **07**

x	1	2	3	4	5
y	10	12	13	16	19

Q.3 **(a)** Use the Bisection method to find a root of the equation $x^3-4x-8.95=0$ correct up to three decimal places. **07**

(b) Find a root of the equation $x^3-8x-5=0$ using the secant method. **07**

OR

Q.3 **(a)** Using the method of False Position, find a real root of the equation $x^4-11x+8=0$ correct up to four decimal places. **07**

(b) Using Newton-Raphson method, find a root of the function $f(x)=e^x-3x^2$ to an accuracy of 5 digits. **07**

Q.4 **(a)** Evaluate $\int_0^{12}\frac{dx}{1+x^2}$ using Simpsonôs 3/8 rule, taking seven ordinates. **07**

(b) Evaluate the integral $\int_0^{1.2} e^x dx$, taking n=6 using Simpsonôs 1/3 rule. **07**

OR

Q.4 **(a)** Evaluate $\int_0^{12} \frac{dx}{1+x^2}$ using trapezoidal rule, taking n=6, correct up to five decimal places. **07**

(b) Evaluate $\int_2^6 \log_{10} x dx$ by using Simpsonôs 1/3 rule, taking n=6. **07**

Q.5 **(a)** Use Eulerôs method to solve the following differential equation $\frac{dy}{dx} = \frac{x-y}{2}$, $y(0)=1$, and $0 \le x \le 1$. Use $h = 0.25$. **07**

(b) Use Runge Kutta method of second order to find the solution of the differential equation $\frac{dy}{dx} = x + y$ at $x = 0.1$ correct to four decimal places, take $h = 0.05$. **07**

OR

Q.5 **(a)** Compute the value of y at $x = 0.2$ and $x = 0.4$ using Runge Kutta fourth order method to solve the differential equation $\frac{dy}{dx} = y - \frac{2x}{y}$, $y(0)=1$. **07**

(b) User improved Eulerôs method to solve $\frac{dy}{dx} + 2xy^2 = 0$ with the initial condition $y(0)=1$. Compute the value of $y(0.4)$ taking $h = 0.2$. **07**

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