

Seat No.: _____

Enrolment N.50. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA. Sem-II Remedial Examination December 2010

Subject code: 620005

Subject Name: Computer Oriented Numerical Methods

Date: 20 /12 /2010

Time: 10.30 am – 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. Assume data where ever necessary.

- Q.1** (a) Describe the Newton-Raphson method and derive its formula analytically. One of the root of the equation $\sin x - x - 2 = 0$ lies near $x=2.5$. Find the root with tolerance 0.001. **07**
- (b) Solve the following system of equations using Gauss elimination method **07**
- $$\begin{aligned} 2x + y + z &= 10 \\ 3x + 2y + 3z &= 18 \\ x + 4y + 9z &= 16 \end{aligned}$$

- Q.2** (a) Discuss different type of difference table in detail with an assumed suitable example. **07**
- (b) Derive the formula to find the root using Bisection method also write algorithm for it. **07**

OR

- (b) Write a well commented program for Secant method. Also explain it in detail. **07**

- Q.3** (a) Given a function in the form of a table as **07**

x	2.0	3.0	4.0
Y(x)	6.6	9.2	8.6

Interpolate the value if $y(x)$ using Langrangian polynomial at

- a. $x = 2.8$
- b. $x = 3.1$

- (b) Give the table of values for function as **07**

x:	1.0	1.5	2.0	2.5	3.0	3.5
y:	6.2	7.5	9.0	10.00	11.5	12.0

Determine both the regression lines and also prove that the intersect at $(\sum x/n, \sum y/n)$ **OR**

- Q.3** (a) Given the following data find the cubic spline equations for the 4 intervals **07**

x	1	2	3	4	5
F(x)	6	-3	6	2	-6

Find the value of $f(x)$ at $x = 3.8$

- (b) From the Taylor series for $y(x)$, find $y(0.1)$ correct to four decimal places if $y(x)$ satisfies : **07**
 $y' = x - y^2$ and $y(0) = 1$

- Q.4** (a) Evaluate $\int_{-2}^2 \frac{3x}{(4+x)^2} dx$ using Trapezoidal and Simpson's 1/3rd rule with six intervals. **07**

- (b) Find the solution of the following differential equation $\frac{dy}{dx} = x^2 + y$ using Runge – Kutta second order method for $x=0.1$ and 0.2 . Given that $y = 1$ when $x = 0$. **07**

OR

- Q.4 (a)** Find the eigen value of the matrix **07**
$$A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 5 & 1 & 6 \end{pmatrix}$$

(b) Give $\frac{dy}{dx} = 1/(x+y)$, $y(0)=2, y(0.2)=2.0933, y(0.4)=2.1755, y(0.6)=2.2493$. Find $y(0.8)$ **07**
using Milne's Predictor Corrector formula.

- Q.5 (a)** Write a well commented program for Gauss – elimination method. **07**
(b) Solve by Gauss-Seidal method, the following system of Equations. **07**
$$\begin{aligned} 28x + 4y - z &= 32 \\ x + 3y + 10z &= 24 \\ 2x + 17y + 4z &= 35 \end{aligned}$$

OR

- Q.5 (a)** Discuss different types of errors and error propagation in detail; with example **07**
(b) Write an algorithm for false position method and explain the method in detail. **07**

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