

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER- II • EXAMINATION – WINTER 2016

Subject Code: 2620004

Date:05/01/2017

Subject Name: Computer Oriented Numerical Methods

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) Do as directed :

07

- (i) Find relative error for 3.14 as a approximation of $22/7$
- (ii) Round off four decimal digit: 0.00345575
- (iii) True/False : Number of row and Number of column is always same in scalar matrix
- (iv) Write the formula of A^{-1} (Assume A is a matrix).
- (v) Define Symmetric and skew symmetric matrix with example.
- (vi) Find positive root of $x^3 + 3x^2 - 27x + 25$ by discarte's Rule of sign.
- (vii) Give any two names of closed iterative method & Open iterative method

(b) Determine the root of equation $x^4 - x - 10 = 0$ correct upto 3 place of decimal by using Bisection method 07

Q.2 (a) Determine the root of equation $e^x = 2x + 1$ correct upto 3 place of decimal by using Newton Raphson(NR) method. 07

(b) Determine the root of equation $f(x) = x - \cos x$ correct upto 3 place of decimal by using False position method (Perform 5 iterations only) 07

OR

(b) Find the root of the equation $x^3 + 2x^2 + 10x - 20 = 0$ using Birge-Vieta method (Take $r_0 = 1$). Perform only three iterations. 07

Q.3 (a) The population of a certain town as obtained from census data is given in the following table : 07

Year	1931	1941	1951	1961	1971
Population	40.62	60.80	79.95	103.56	132.65

Find the rate of growth of the population in the year 1961.

- (b) Fit a Straight line $Y=aX+b$ by the method of Least square to the following data. 07

X	1	3	5	7	9
Y	1.5	2.8	4.0	4.7	6.0

OR

- Q.3 (a) Using langrange's interpolation, find $f(0)$ when the data are given in the following table. 07

X	-1	-2	2	4
f(x)	-1	-9	11	69

- (b) Find out $y(0.05)$ by using Newton's appropriate interpolation method when $y(0)=1, y(0.1)=0.9975, y(0.2)=0.9900, y(0.3)=0.9980$ 07

- Q.4 (a) Find $\int_0^4 (x^3 - 2x^2 + 1) dx$ using Trapezoidal rule and Simpson's $\frac{3}{8}$ rule taking $h = 1$ for both the cases. 07

- (b) Define any six type of matrix with example. 07

OR

- Q.4 (a) Find $\int_0^1 \frac{dx}{1+x}$ using Simpson's $1/3$ rule by taking 10 sub intervals. 07

- (b) Apply Gauss elimination method to find root of following linear equations. 07

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

$$x + y + z = 3$$

$$2x + 2y + z = 1$$

- Q.5 (a) Using Runge-Kutta method of order 2, find y for $x=1$ given that differential equation $dy/dx = y + x^2, y(0) = 1$ and $h=0.5$ 07

- (b) Find Transpose of matrix, Trace of matrix and Adjoint of following matrix 07

$$\begin{bmatrix} 3 & 7 & -2 \\ 2 & 3 & 1 \\ 4 & 5 & 9 \end{bmatrix}$$

OR

- Q.5 (a) Find $y(0.4)$ by using Milne's predictor corrector method when $dy/dx = xy+1$ & $y(0)=1, y(0.1)=1.1053, y(0.2)=1.2229, y(0.3)=1.3552$ 07

- (b) Find out cubic spline for following data & also find out $y(1.5)$ by cubic spline method when $y(1)=-6, y(2)=-1, y(3)=16$ 07
