

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER – II • EXAMINATION – SUMMER 2018

Subject Code: 620005

Date: 23-May-2018

Subject Name: Computer Oriented Numerical Methods

Time: 10.30 am to 1.00 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) Find the root of the equation $x^3 - x - 4 = 0$ using the Bisection method. **07**
 Perform iterations until the accuracy till four significant digit.

(b) Find the root of the equation $x^4 + 24x - 50 = 0$ correct up to three significant digits using Birge-Vieta method. Assume the initial value of the root = 1.5 **07**

Q.2 (a) (i) Explain total numerical error. How can one control numerical errors ? **07**

(ii) State Descartes rule of sign. Use it to determine the number of positive and negative roots of the polynomial equation : $x^4 - 3x^3 + 2x^2 + 20x - 20 = 0$

(b) Use secant method to find a root of the following equation $x^3 - 5x + 3 = 0$, correct up to three decimal places. **07**

OR

(b) Use Newton-Raphson method to find a root of the following equation $x^3 - 4x - 9 = 0$, correct up to three decimal places between 2.625 and 3. **07**

Q.3 (a) From the following table, find y when $x = 0.4$ using Lagrange's interpolation formula. **07**

X	0.3	0.5	0.6
y	0.61	0.69	0.72

(b) Fit a straight line of the form $y = a + bx$, to the following data : **07**

x	0.1	0.2	0.3	0.4	0.5	0.6
y	5.1	5.3	5.6	5.7	5.9	6.1

OR

Q.3 (a) Compute value of y at $x=0.02$ using suitable interpolating polynomial **07**

X	0.0	0.1	0.2	0.3	0.4
Y	1.0000	1.1052	1.2214	1.3499	1.4918

(b) Fit an exponential curve for the following data: **07**

x	600	500	400	350
y	2	10	26	61

Q.4 (a) Compute the second order derivative for the following set of data values at $x=3$ **07**

X	0	1	2	3
F(x)	-5	1	9	25

(b) Evaluate $\int_1^2 e^{\left(\frac{1}{2}x\right)} dx$ using trapezoidal rule for four intervals. **07**

OR

Q.4 (a) The distance (s) covered by a car in a given time (t) is given in the following table : **07**

Time (minutes)	10	12	16	17	22
Distance (kms)	12	15	20	22	32

Find speed of the car at $t=14$ minutes.

(b) Evaluate $\int_2^{\infty} (x^2 + 2x) dx$ using Gauss Quadrature formula. **07**

Q.5 (a) Solve the following system of simultaneous linear equations using Gauss-Elimination method: **07**
 $2x + 8y + 2z = 14$
 $x + 6y - z = 13$
 $2x - y + 2z = 5$

(b) Given $dy/dx = 1 + y^2$ with $y(0)=0, y(0.2)=0.2027, y(0.4)=0.4228, y(0.6)=0.6841$. **07**
compute $y(0.8)$ using Milne Simpson's Predictor-Corrector method.

OR

Q.5 (a) Solve the following system of simultaneous linear equations using Gauss-Seidel method: **07**
 $10x + y + 2z = 44$
 $2x + 10y + z = 51$
 $x + 2y + 10z = 61$

(b) Given $dy/dx = 1 + y^2$ with $y(0)=0, y(0.2)=0.2027, y(0.4)=0.4228, y(0.6)=0.6841$. **07**
compute $y(0.8)$ using Adam-Bashforth Predictor-Corrector method.

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