

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2140706

Date:22/05/2018

Subject Name:Numerical and Statistical Methods for Computer Engineering

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) Define terms: Relative errors, Percentage errors, Rounding errors. **03**
(b) Explain Bisection method geometrically and using it find the roots of equation $x^3 - x - 11 = 0$ for three iterations. **04**
(c) Calculate the coefficient of correlation for the following distribution. **07**

x	5	9	15	19	24	28	32
y	7	9	14	21	23	29	30
f	6	9	13	20	16	11	7

- Q.2** (a) Using Budan's method show that $f(x) = x^4 - 7x^2 + 6x - 1 = 0$ has no or even number of roots in $[-3, 0]$. **03**
(b) Find the interpolating polynomial for (0,2), (1,3), (2,12) and (5,147). **04**
(c) Fit a second degree parabola to the following data: **07**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

OR

- (c) Fit cubic Splines for first to interval from the following data: **07**

x	3	4.5	7	9
f(x)	2.5	10	2.5	0.5

- Q.3** (a) Evaluate the integral $\int_0^4 e^x dx$ by Simpson's 1/3 rule. (h=1) **03**
(b) Prove that 1. $(1 + \Delta)(1 - \nabla) = 1$, 2. $\Delta \nabla = \Delta - \nabla$ **04**
(c) Use Secant and Regula Falsi methods to determine the root of equation $\cos x - xe^x = 0$ taking the initial approximation as $x_0 = 0$ & $x_1 = 1$ at the end of five iterations. Compare the both results. **07**

OR

- Q.3** (a) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using Trapezoidal rule taking $h = 1/5$. **03**
(b) Show that $\nabla = \Delta E^{-1} = E^{-1} \Delta = 1 - E^{-1}$. **04**
(c) Solve $x^4 - 8x^3 + 39x^2 - 62x + 50$ by Bairstow method upto third iteration with $p_0 = q_0 = 0$. **07**

- Q.4** (a) By Newton's Divided differences formula, find $f(6)$: **03**

x	1	2	7	8
F(x)	1	5	5	4

(b) Wages earned in Rupees per day by the labourers are given the table : 04

Wages in Rs.	10-20	20-30	30-40	40-50	50-60
No. of Labourers	5	8	13	10	8

Find the median of the distribution.

(c) Solve the following linear system of equation by Gauss elimination method with partial pivoting: 07

$$x_1 - 2x_2 + 3x_3 + 9x_4 = 5,$$
$$3x_1 + 10x_2 + 4x_3 + 2x_4 = 7,$$
$$11x_1 + 5x_2 + 9x_3 + 2x_4 = 13,$$
$$2x_1 + 3x_2 + 7x_3 + 6x_4 = 11.$$

OR

Q.4 (a) Use Euler’s method, find the approximate solution of $\frac{dy}{dx} = x + y, y(0) = 0$ in four steps with $h = 2$. 03

(b) Find the mode for the following distribution: 04

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70
F	4	7	8	12	25	18	10

(c) Apply Gauss-Seidel iteration method to solve the following system of equations: 07

$$10x_1 - 2x_2 - x_3 - x_4 = 3,$$
$$-2x_1 + 10x_2 - x_3 - x_4 = 15,$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27,$$
$$-x_1 - x_2 - 2x_3 + 10x_4 = -9.$$

Q.5 (a) Find $P(A \cap B)$, given that $P(A) = \frac{1}{3}, P(B) = \frac{1}{4}$ & $P(A \cup B) = \frac{1}{5}$. 03

(b) Evaluate $\int_0^{\pi} \frac{\sin^2 \theta}{5 + 4 \cos \theta} d\theta$ by Simpson’s $\frac{3}{8}$ rule, taking $h = \frac{\pi}{6}$. 04

(c) Assume a four yearly cycle and calculate trend by method of moving averages from the following data relating to the production in pen drives in india. 07

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Production (million)	464	515	518	467	502	540	557	571	586	612

OR

Q.5 (a) Find $\Delta^4 y_0$, from the following data: 03

x	1	3	5	7	9
y	3	8	13	15	18

(b) From the following distribution , find the mean and variance: 04

x	1	2	3	4	5
f(x)	0.1	0.1	0.2	0.3	0.3

(c) Use fourth order Runge-Kutta method to find $y(0.2)$ with $h = 0.1$, given that 07

$$10 \frac{dy}{dx} = x^2 + y^2, y(0) = 1 .$$
