

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2017

Subject Code: 2140706

Date: 17/11/2017

Subject Name: Numerical and Statistical Methods for Computer

Engineering

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.

MARKS

Q.1 (a) If $\pi = 22/7$ is approximated as 3.14, find the absolute, relative and percentage errors **03**

(b) Find root of $x^2 - 4x - 10 = 0$ correct to three decimal places using bisection method **04**

(c) Use Gauss-Jordan method to solve: **07**
 $x + y + z = 9, 2x - 3y + 4z = 13, 3x + 4y + 5z = 40$

Q.2 (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Simpson's 1/3 rule taking $h=1/4$ **03**

(b) Find the Lagrange's interpolation polynomial from: **04**

x	0	1	4	5
$f(x)$	1	3	24	39

(c) Use fourth order Runge-Kutta method to find the value of y at $x=1$, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$ such that $y(0)=1$, taking $h=0.5$ **07**

OR

(c) Use Euler's method to find $y(2)$ from the differential equation $\frac{dy}{dx} = x + 2y$, $y(1) = 1$, taking $h=0.1$ **07**

Q.3 (a) Find the root of $x^3 - x - 1 = 0$, correct to four decimal places, using Newton-Raphson method **03**

(b) Fit a straight line to the following data: **04**

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

(c) Find dominant eigen value of $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 3 & 2 \\ 1 & 2 & 3 \end{bmatrix}$, using $\bar{x}_0 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ **07**

OR

Q.3 (a) Determine the area bounded by the given curve and X-axis between $x=25$ to $x=25.6$ by Trapezoidal rule from the following data: **03**

x	25.0	25.1	25.2	25.3	25.4	25.5	25.6
y	3.205	3.217	3.232	3.245	3.256	3.268	3.280

(b) From the following data find $f(10.5)$ using Newton Divided Difference formula: **04**

x	10	11	13	17
$f(x)$	2.3026	2.3979	2.5649	2.8332

- (c) Apply Budan's theorem to find the number of roots of the equation $f(x) = x^5 + x^4 - 4x^3 - 3x^2 + 3x + 1$ in the interval $[-2, -1]$, $[-1, 0]$, $[0, 1]$ and $[1, 2]$ **07**
- Q.4 (a)** Find the arithmetic mean for the following data: **03**
- | | | | | | | |
|-----|----|----|----|----|----|----|
| x | 35 | 45 | 55 | 60 | 75 | 80 |
| f | 12 | 18 | 10 | 6 | 3 | 11 |
- (b) Which of the following define probability distribution (i) $f(x) = \frac{x-2}{10}$, $x=0,1,2,3,4$ (ii) $f(x)=x/6$, $x=0,1,2,3$ **04**
- (c) Let $3x + 2y = 26$ and $6x + y = 31$ be the two regression lines. (i) Find the mean value and correlation coefficient between x and y (ii) if the variance of y is 4 find the standard deviation of x **07**
- OR**
- Q.4 (a)** Find standard deviation for the following data. Also find C.V. **03**
- | | | | | | |
|-----|---|----|----|----|----|
| x | 5 | 10 | 15 | 20 | 25 |
| f | 7 | 4 | 6 | 3 | 5 |
- (b) Find the coefficient of correlation from the data: $x = 7, 8, 9, 11, 10, 13, 12$ $y = 1, 2, 3, 4, 5, 6, 7$ **04**
- (c) A continuous r.v. X has a pdf $f(x) = \begin{cases} 3x^2, & 0 \leq x \leq 1 \\ 0, & \text{elsewhere} \end{cases}$. Obtain the first four central moments **07**
- Q.5 (a)** Find $\left(\frac{\Delta^2}{E}\right)x^3$ **03**
- (b) Find the missing frequency when median is 24 **04**
- | | | | | | |
|----------|------|-------|-------|-------|-------|
| Marks | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 |
| Students | 15 | 20 | x | 14 | 16 |
- (c) Find 3-year moving average and fit trend **07**
- | | | | | | | | | | | | |
|--------|------|------|------|------|------|------|------|------|------|------|------|
| Years | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
| Profit | 4 | 8 | 9 | 7 | 11 | 15 | 10 | 13 | 18 | 16 | 20 |
- (Profit is in lakhs)
- OR**
- Q.5 (a)** A machine produces on average of 500 items during the first week of the month and on average of 400 items during the last week of the month. The probability for these being 0.68 and 0.32. Determine the expected value of the production. **03**
- (b) Using Gauss-Seidel method solve the following system correct to two significant digits: $9x + 2y + 4z = 20$, $2x - 4y + 10z = -15$, $x + 10y + 4z = 6$ **04**
- (c) Fit a second degree parabola to the following data: **07**
- | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|
| x | 1 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| y | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |
