Printed Pages: 2 **Subject Code: NCS 303**

Paper Id: 110313 **Roll No.** | | | | | | | | | | |

B TECH

(SEM-III) THEORY EXAMINATION 2018-19

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. Write a formula to obtain roots in bisection method.
b. Write an equation for $T_4(x)$ chebyshev polynomial.
c. Define forward and backward difference operations.
d. If $f(x)=1/x^2$, find f(a,b) and f(a,b,c) by using divided difference.
e. What is Richardson extrapolation?
f. Write a formula for Trapezodial rule.
g. Write 4 point formula for Simpsons 1/3 rule.
h. Define Statistical Hypothesis.
i. Define Type-I and Type-II Errors.
j. Write RungeKutta's 4th order formula to solve dy/dx=f(x,y) with y(x0)=y0.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. A cromel-alumel thermocouple gives the following output for rise in temperature:

Temp (C^0)	0	10	20	30	40	50
Output (V)	0	0.4	0.8	1.2	1.61	2.02

b. In some determination of the value v of CO_2 dissolved in water in given volume of water at different temperatures, the values to be obtained by method of least square, a relation of form $v= a + b\theta$ which fits to the observations.

Θ	0	5	10	15
v	1.8	1.45	1.18	1.0

c. Use Birge-Vieta method to find out the roots of $x^4+x^3+5x^2+4x+4=0$ at the end of the iteration with initial value of $x_0=1$.
d. Consider the function $x= (3+\cos x)/2$. Obtain first three iterations x_1, x_2 and x_3 by fixed point iteration. Then obtain next approximation by Aitken's process Δ^2 process. Assume initial root $x_0=\Pi/2$.
e. Use bisection method to find the root of the equation $x^3-1.8x^2-10x+17=0$ that lies between the interval (1, 2) at the end of fifth iteration.

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

(a) Explain Gram-schmidt orthogonalizing process to obtain orthogonal polynomials.
(b) State Chebyshev polynomial and their properties.

4. Attempt any *one* part of the following: **10 x 1 = 10**

(a) $\int_1^{1.8} (e^x+e^{-x})/2 \, dx$ using Simpsons 1/3 rule by taking h=0.2.
(b) Find the output of the thermocouple for the temperature of 45^0C using Newton Divided difference interpolation method.

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Determine the constant a and b by the method of least square such that $y= ae^{bx}$ fits the data.

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

(b) For the following data values calculate the derivative at x=3 using Richardson extrapolation.

x	-1	1	2	3	4	5	7
y	1	1	16	81	256	625	2401

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Find the quadratic factor of $x^4-1.1x^3+2.3x^2+.5x+3.3=0$ after two iterations using Lin-Bairstow's method. Use $p_0=1$ and $q_0=1$.

(b) $y = x^3$ is given for x =1, 2,3,4,5. Use lagrange's formula to obtain x at y =3.375. Compare this result with correct value 1.5.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) With the help of Gauss elimination method find the solution.

$3x_1+3x_2+4x_3=20$

$x_1+x_2+x_3=6$

$2x_1+x_2+3x_3=13$

(b) Add the following Floating point numbers.

i) 0.3879 E7 and 0.813 E7

ii) 723.813 E14 and 89.73 E12

iii) 100.312 E25 and 81.813 E27

NCS303: CBNST

Morning Shift Dec 31, 2018

Question 2(a)

Q2(a). A cromel-alumel thermocouple gives the following output for rise in temperature:

Temp (C^0)	0	10	20	30	40	50
Output (V)	0	0.4	0.8	1.2	1.61	2.02

Find dV/dt at t = 5°C.