Sub Code:NCS303

Paper Id: 110313 Roll No: | | | | | | | | | | | | | |

B.TECH
(SEM-III) THEORY EXAMINATION 2019-20
COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

Time: 3 Hours *Total Marks: 100*

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

SECTION - A

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

a. What is Machine Epsilon and also define Error and its type?
b. Define rate of convergence. Obtain the rate of convergence of Newton Raphson Method.
c. Write down various relations between different operators.
d. Write the iterative formula for finding sqr root of N and inverse of N, where N is a real number by Newton Rapson method.
e. Write down the algorithm for Trapezoidal rule.
f. What is condition number?
g. What is Chebyshev Polynomial? Explain.
h. Add and Subtract the following floating point numbers:
0.78596E-2 and 0.78633E1
i. What is level of significance and Statistical Hypothesis?
j. What is Associative and Distributive law in Floating point arithmetic?

SECTION - B

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

a. Use bisection method find the root of following equation with an accuracy of 10^{-4}.
$x^3=\cos(x)$
b. Use Simpson's 3/8 rue and evaluate the following
$$\int_0^6 \frac{e^x}{1+x}dx$$
c. Discuss Chebyshev Polynomial and Economization of Power Series? Prove the following relation.
i. $hD \equiv \log(1+\Delta) \equiv -\log(1-\nabla) \equiv \sinh^{-1}(\mu\delta)$
ii. $\delta=E^{1/2}+E^{-1/2}$
d. Find the inverse of the following matrices by Gauss Elimination method

3	7	8	15
2	5	6	11
2	6	10	19
4	11	19	38

e. Find out the quadratic factor of the following equation using Lin Bairstow's method (perform two iterations).
i. $x^3-3.7x^2+6.25x-4.069=0$; p=-2.5, q= 3
ii. $x^4-x^3+6x^2+5x+10=0$; p=1.14, q=1.42

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SECTION - C

3. Attempt any *one* the following: 10x1=10

a. Give $dy/dx=1+y^2$, where y=0 when x=0. Find y(0.2),y(0.4), and y(0.6) by using Runge-Kutta Fourth order formula.

b. Write an algorithm and program of Bisection Method.

4. Attempt any *one* the following: 10x1=10

a. Using Lagrange interpolation formula, calculate f(3) from the following table:

a. *x:*	0	1	2	4	5	6
b. f *(x)* :	1	14	15	5	6	19

Also write the program of Lagrange method.

b. Derive Weddle's rule of integration. Hence, evaluate

$$\int_0^1 \frac{1}{1+x^2} dx$$

5. Attempt any *one* the following: 10x1=10

a. Solve this with the help of Birge Vieta Method upto correct three decimal places.

i. x6-x4-x3-1=0; p=1.5

ii. x4-3x3+3x2-3x+2=0; p=0.5

b. Write all relation between different operators. Write the program of Regula falsi Method with an example.

6. Attempt any *one* the following: 10x1=10

a. Form the following table, find the value of $e^{1.17}$ using Gauss's forward formula:

a. x:	1.00	1.05	1.10	1.15	1.20	1.25	1.30
b. e^x:	2.7183	2.8577	3.0042	3.1582	3.3201	3.4903	3.6693

b. What do you mean by Gram Schmidt Process of Orthogonalization? Write program of Trapezoidal rule.

7. Attempt any *one* the following: 10x1=10

a. Solve this by Cubic Spline Method y(1.5) from the following data:

x:	1	2	3
y:	-8	-1	18

also Economize the series:

$$f(x)= e^x$$

b. Define the following with example:

i. Richardson Extrapolation

ii. Satistical Hypothesis

iii. Radau Integeration method