PAPER ID-411919

Roll No:

BTECH
(SEM III) THEORY EXAMINATION 2021-22
COMPUTER BASED NUMERICAL & 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.	Describe briefly the floating-point representation of numbers.
b.	Suppose 1.212 is used as an approximation to $\sqrt{2}$. Find the absolute and relative errors.
c.	Differentiate between ill conditioned and well-conditioned methods
d.	Explain underflow and overflow conditions of error in floating point's addition and subtraction.
e.	Write difference between the truncation error and round off error.
f.	Differentiate false position method and secant method.
g.	How can the rate of convergence of two methods be compared, explain by taking an example?
h.	Write down algorithm for secant method.
i.	Discuss the significant digits with suitable example.
j.	Define testing of Statistical hypothesis.

SECTION B

2. **Attempt any *three* of the following:** **10x3=30**

a.	Write down the computer algorithms of least square curve fitting.
b.	Prove that Newton-Raphson method is quadratic convergent.
c.	Solve the following questions by relaxations method- 9x-y+2z=9 x+10y-2z=15 2x-2y-13z=-17
d.	The theory predicts the proportion of beans in the four groups A,B,C and D should be in the ratio 9:3:3:1. In an experiment with 1600 beans, the numbers in the four groups were 882,313,287 and 118. Does the experimental result support the theory?
e.	A cromel-alumel thermocouple gives the following output for rise in temperature:

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

SECTION C

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

a.	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 + bθ which fits to the observations.

Θ	0	5	10	15
v	1.8	1.45	1.18	1.0

b.	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.

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

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

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

a.	Evaluate the integral I=dx/(x2+1) in the interval[0,1] using the Lobatto and Radau3 point formula.
b.	Find a real root of the equation 2x-log 10x-7c, correct to three decimal places using Aitken's method and iteration method. Also show how the rate of convergence of Aitken's method is rapid than iteration method,

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

a.	Solve the following system of equation by Gauss elimination method: $x_1+2x_2+3x_3+4x_4=10$ $7x_1+10x_2+5x_3+2x_4=40$ $13x_1+6x_2+2x_3-3x_4=64$ $11x_1+13x_2+8x_3-x_4=64$
b.	Fit a natural cubic Spline to every subinterval for following data: X 0 1 2 3 Y 2 -6 -8 2 Here computer : y(2.5)

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

a.	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
b.	With the help of Gauss elimination method find the solution. $2x+y+z=10$ $3x+2y+3z=18$ $x+4y+9z=16$