



PAPER ID : 9967

TCS-302/TCS-305

Printed Pages : 7

Paper ID and Roll No. to be filled in your Answer Book

Roll No.

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B. Tech.

(SEM. III) (ODD SEM.) (REG. & BACK) EXAMINATION, 2012-13

COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES (CBNT)

Time : 3 Hours]

[Total Marks : 100

UNIT - I

Answer any 4 question : **4×5=20**

1. Find the root of the equation $f(x) = x^3 - 5x + 1$ using bisection method perform five iterations. **5**
2. Use Muller's method to find the root of $f(x) = 4x^2 - \exp(x)$. Start with $p_0 = 4.0$, $p_1 = 4.1$ and $p_2 = 4.2$ and find p_3, p_4, p_5 . **5**
3. (Linear convergence at a double root) Start with $p_0 = 1.2$ and use Newton-Raphson iteration to find the double root $p = 1$ of the polynomial $f(x) = x^3 - 3x + 2$. **5**
4. Differentiate between algebraic and transcendental equations. **5**
5. What will happen if the bisection method is used with the function $f(x) = \tan(x)$ (x is radians) and the interval is $[3, 4]$ and $[1, 3]$. **5**

6. Consider the function $f(x) = \cos(x)$. 3+2

(a) Find the Newton Raphson formula $g(P_k^{-1})$

(b) We want to find the root $p = 3\pi/2$ can we use $p_0 = 3$? Why?

UNIT - II

Answer any 2 question :

2×10=20

1. Using Newton's forward interpolation formulae, find a cubic polynomial which takes the following set of values : 10

x	0	1	2	3
f(x)	1	2	1	10

2. Solve $5x - y + z = 10$; $2x + 4y = 12$; and $x + y + 5z = -1$ Using Gauss-seidial method. 10

3. Let $f(x) = x + \frac{2}{x}$ 5+5

(a) Use quadratic Lagrange interpolation based on the nodes $x_0 = 1$, $x_1 = 2$ and $x_2 = 2.5$ to approximate $f(1.5)$ and $f(1.2)$.

(b) Use cubic Lagrange interpolation based on the nodes $x_0 = 0.5$, $x_1 = 1$ and $x_2 = 2$, $x_3 = 2.5$ to approximate $f(1.5)$ and $f(1.2)$.

b) Let $f(x) = x^3 - x + 2$. 2+3

i. Find the Newton Raphson formula

$g(P_k^{-1})$.

ii. Start with $p_0 = -1.5$ and P_1, P_2, P_3 .

UNIT - V

Answer any 2 question : 2×10=20

1. a) Use the newton divide difference formula 5
to calculate $f(3)$, $F(3)$ and $f''(3)$ from the
following table :

x :	0	1	2	4	5	6
F(x) :	1	14	15	5	6	19

- b) (Quadratic convergence at a simple root) 5
Start with $p_0 = -2.4$ and use Newton-
Raphson iteration to find the root $p = -2$
of the polynomial $f(x) = x^3 - 3x + 2$.
2. a) Use Muller's method t find the root of 5
 $f(x) = 1 + 2x - \tan(x)$. Start with $p_0 = 1.5$,
 $p_1 = 1.4$ and $p_2 = 1.3$ and find P_3, P_4, P_5 .
- b) What are the difference between the 5
bisection method and the regula falsi method.
3. a) Start with $p_0 = -2.6$ and with $p_1 = -2.4$ 5
and use the secant method to find the root
 $p = -2$ of the polynomial $f(x) = x^3 - 3x + 2$.

UNIT - III

Answer any 2 question : 2×10=20

1. A) Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ Using trapezoidal 5+5
rule. Take $h = 0.125$.

B) Given $y' = -y$ and $y(0) = 1$, determine the
value of $y(0.01)$ by Euler's method.

2. Verify that Simpson's rule ($M = 1, h = 1$) is 10
exact for polynomials of degree ≤ 3 of the form
 $f(x) = c_3x^3 + c_2x^2 + c_1x^1 + c_0$, over $[0, 2]$.
3. Use the Taylor expansions for $f(x+h)$, 10
 $f(x-h)$, $f(x+2h)$ and $f(x-2h)$ and derive the
central - difference formula.

$$f^{(4)}(X) \approx \frac{f(x+2h) - 4f(x+h) + 6f(x) - 4f(x-h) + f(x-2h)}{h^4}$$

in a small community between a family's annual income and the amount that the family saves. The following data from nine families are obtained :

<i>Annual Income (thousand of dollars)</i>	<i>Annual Savings (Thousands of dollars)</i>
12	0.0
13	0.1
14	0.2
15	0.2
16	0.5
17	0.5
18	0.6
19	0.7
20	0.8

Calculate the least -square regression line, where annual saving is the dependent variable and annual income is the independent variable, and interpret your results.

Answer any 2 question : **2×10=20**

1. Find the least square parabolic fit **10**

$$y = Ax^2 + Bx + C.$$

(a)

x_k	y_k
-3	15
-1	5
1	1
3	5

(b)

x_k	y_k
-3	-1
-1	25
1	25
3	1

2. Find the parabolic terminated cubic spline **10**

through (0, 0.0), (1, 0.5), (2, 2.0) and (3, 1.5) with the second derivative boundary conditions $S''(0) = -0.3$ and $S''(3) = 3.3$.