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CS—406

**B. TECH.**

FOURTH SEMESTER EXAMINATION, 2001-2002

**COMPUTER BASED NUMERICAL AND STATISTICAL  
TECHNIQUES**

*Time : Two Hours*

*Total Marks : 50*

**Note :** Attempt ALL questions.

**1.** Attempt any THREE of the following :— (4×3)

- (a) If 0.333 is the approximate value of  $\frac{1}{3}$ , find absolute, relative and percentage errors.
- (b) Draw a flow chart to find real roots of the equation  $ax^2 + bx + c = 0$ .
- (c) Write a computer program in 'C' for finding out a real root of equation  $f(x) = 0$  by Regula Falsi method.
- (d) Find the rate of convergence for Newton-Raphson method.
- (e) Find a positive real root of  $x - \cos x = 0$  by bisection method, correct upto 4 decimal places between 0 and 1.

**2.** Attempt any THREE of the following :— (4×3)

- (a) Prove that the  $n$ th difference of a polynomial function of  $n$ th degree is constant when the values of the independent variable are at equal

- (b) Find the cubic polynomial which takes the following values :—

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

- (c) Using Newton's divided difference formula, calculate the value of  $f(6)$  from the following data :—

$x$ :	1	2	7	8
$f(x)$ :	1	5	5	4

- (d) Find the missing value of the following data :—

$x$ :	1	2	3	4	5
$f(x)$ :	7	⊗	13	21	37

- (e) Given  $y_{20} = 24$ ,  $y_{24} = 32$ ,  $y_{28} = 35$  and  $y_{32} = 40$ , find  $y_{25}$  by Bessel's interpolation formula.

3. Attempt any TWO of the following :— (6×2)

- (a) Fit a second degree parabola to the following data taking  $y$  as dependent variable :—

$x$ :	1	2	3	4	5	6	7	8	9
$y$ :	2	6	7	8	10	11	11	10	9

- (b) The table given below reveals the velocity ' $v$ ' of a body during the time ' $t$ ' specified. Find its acceleration at  $t = 1.1$ .

$t$ :	1.0	1.1	1.2	1.3	1.4
$v$ :	43.1	47.7	52.1	56.4	60.8

- (c) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  by Simpson's one-third rule.

Also write a computer program in 'C' for the problem.

4. Attempt any TWO of the following :— (7×2)

- (a) Discuss frequency charts used in statistical documentation. Give figures to support your argument.
- (b) Obtain a regression plane by using multiple linear regression to fit the data given below :—

$x$ :	1	2	3	4
$y$ :	0	1	2	3
$z$ :	12	18	24	30

- (c) The following are the mean lengths and ranges of lengths of a finished product from 10 samples each of size 5. The specification limits for length are  $200 \pm 5$  cm. Construct  $\bar{X}$  and R-Chart and examine whether the process is under control and state your recommendations :—

Sample No.:	1	2	3	4	5	6	7	8	9	10
Mean ( $\bar{X}$ ) :	201	198	202	200	203	204	199	196	199	201
Range (R) :	5	0	7	3	3	7	2	8	5	6

