552008

Seat No._____

Second Year B. C. A. Examination

April / May – 2003

Scientific & Statistical Computing

Time : Hours] [Total Marks : **50**

Instructions : (1) All questions are **compulsory**.

(2) Figures to the right indicate full marks.

(3) Use of scientific calculator is allowed provided it is silent and battery operated.

(4) All intermediate steps of calculating must be shown.

1 (a) Attempt any **two** parts : **6**

(1) Discuss the various types of errors that occur while performing numerical computation.

(2) Given a number 0.05578, compute absolute error and relative error, if

(i) Rounded-off to three decimal digits

(ii) Truncted to three decimal digits.

(3) What is the normalized floating point representation ? Express the number 0.0009281 in normalized floating point representation.

(b) Calculate mean and median for the following distribution : **4**

Marks :	5–10	10–15	15–20	20–25	25–30
No. of students :	5	6	15	10	5

2 (a) Explain Newton–Raphson method graphically and derive its iterative formula for finding a root of the equation $f(x) = 0$. **4**

(b) Attempt any **two** parts : **6**

(1) Find a root of the equation $x^3 - x - 1 = 0$, using Bisection method correct upto two decimal places.

(2) Find a root of the equation $x^3 - 4x + 1 = 0$ by successive approximation method, correct to two decimal places after checking convergence criterion.

(3) Find a root of the equation $2x - 3\sin x - 5 = 0$, correct to three significant figures, by the secant method.

3 (a) Derive an expression for Newton's forward difference interpolating polynomial. In which situation it is applied ? **5**

(b) Attempt any **one** part : **5**

(1) The following data gives melting point of an alloy of lead and zinc where t°C is the temperature and P is the percentage of lead alloy :

P :	40	50	60	70	80	90
t :	184	204	226	250	276	304

Using Newton's backward interpolation formula, find the melting point of the alloy containing the 84% of lead.

(2) Given the following data. Evaluate $f(3)$ using Lagrange's interpoluting polynomial.

x	1	2	5
$f(x)$	1	4	10

4 (a) Define the following terms : **4**

(i) Mutually exclusive events

(ii) Independent events

(iii) Exhaustive events

(iv) Difference events.

(b) Attempt any **two** parts : **6**

(1) The probability that a student Pimal passed Mathematics is $\frac{2}{3}$, the probability that he passes Statistics is $\frac{4}{9}$. If the probability of passing at least one subject is $\frac{4}{5}$, what is the probability that Pimal will pass both the subjects ?

(2) Three persons X, Y and Z aim a target. The probabilities of their hitting the target are respectively, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{2}{3}$. Find the probability that the target will be hit.

(3) There are 12 balls in a bag, 8 red and 4 green. Three balls are drawn successively without replacement. What is the probability that they are alternately of the same colour ?

5 (a) Attempt any **two** parts : **8**

(i) Calculate the correlation-coefficient between the height of father and height of son from the given data :

Height of father : (in inches)	64	65	66	67	68	69	70
Height of son : (in inches)	66	67	65	68	70	68	72

(ii) Using a least square method, fit a linear equation to the following data and estimate the value of sales for the year 1985 :

Year :	**1979**	**1980**	**1981**	**1982**	**1983**
Sales : (in lakh Rs.)	**106**	**120**	**140**	**160**	**180**

(iii) The probability distribution of a random variable x is as follows :

x_i :	–1	0	1	2	3	4
$P(x_i)$:	$\frac{1}{6}$	$\frac{1}{3}$	k	k	$\frac{1}{12}$	$\frac{1}{12}$

Find the value of k and also obtain mean and variance of x.

(b) Do as directed : **2**

(i) The two regression coefficients are $byx = 0.2$ and $bxy = 0.8$. Using this find the value of correlation coefficient r.

(ii) If $E(x) = 3$ find out value of $E(3x+2)$.