2016

COMPUTER SCIENCE

(Major)

Paper : 5.2

(Computer-Oriented Numerical Analysis and Statistical Techniques)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions as directed : 1×6=6

(a) Associated and distributive laws of arithmetic are not always valid for floating point numbers.

(State True or False)

(b) The next iterative value of the root of $2x^2 - 3 = 0$ using the Secant method, if initial guesses are 2 and 3, is

(i) 1

(ii) 1·25

(iii) 1·5

(iv) None of the above

(Choose the correct option)

(c) Backward difference interpolation formula is commonly used for interpolation near the beginning of a set of tabular values.

(State True or False)

(d) A sufficient condition for obtaining a solution by Gauss-Seidel iteration method is the diagonal dominance.

(State True or False)

(e) The variance is a non-negative number.

(State True or False)

(f) Whenever two random variables X and Y have a nonzero correlation coefficient, they are independent in the probability sense.

(State True or False)

2. Answer the following questions : 2×5=10

(a) Define absolute error.

(b) Define relative error.

(c) Define truncation error.

(d) Write any two drawbacks of Newton-Raphson method.

(e) Define partial pivoting and complete pivoting.

3. Answer any *four* of the following questions : 5×4=20

(a) Find the positive root of $x - \cos x = 0$ by bisection method.

(b) Write an algorithm to implement Gauss-Jordan method.

(c) The population of a country for various years in millions is provided. Estimate the population for the year 1982 :

Year x	1975	1985	1995	2005	2015
Population y	46	66	81	93	101

(d) Evaluate

$$\int_0^6 \frac{1}{1+x}\,dx$$

by using Simpson's one-third rule.

(e) For any events A and B, show that

$$P(A) = P(A \cap B) + P(A \cap B')$$

(f) Calculate mode of the following data :

Marks	10–20	20–30	30–40	40–50	50–60
f	5	20	25	15	5

4. Answer any *three* of the following questions : 8×3=24

(a) Obtain Newton's formula for backward interpolation.

(b) Given :

$$\frac{dy}{dx} = 1 + y^2; \quad y(0) = 0$$

Compute $y(0 \cdot 8)$ using Milne's method.

(c) Define binomial distribution. Find mean and variance for binomial distribution. 2+3+3=8

(d) Write short notes on regression and correlation. 4+4=8

(e) Write short notes on mathematical expectation and moments. 4+4=8

★★★