2019

COMPUTER SCIENCE

(Major)

Paper : 5.2

(Computer-oriented Numerical Analysis and Statistical Technique)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following as directed : 1×7=7

(a) Absolute error is independent of units used.

(State True or False)

(b) The convergence of which of the following methods is sensitive to starting value?

(i) False position

(ii) Gauss–Seidel method

(iii) Newton–Raphson method

(Choose the correct answer)

(c) $\sqrt{b_{yx} \times b_{xy}}$ = _____

(Fill up the blank)

(d) In secant method convergence is (Guaranteed/not guaranteed).

(Choose the correct answer)

(e) What will be the arithmetic mean of $1^2, 2^2, 3^2, ..., n^2$?

(f) If A and B are mutually exclusive then $P(A \cup B)$ = _____

(Fill up the blank)

(g) The variance of a Poisson distribution is 9 then its mean is

(i) 3

(ii) 9

(iii) 27

(iv) None of the above

(Choose the correct answer)

2. Answer any *four* of the following questions : 2×4=8

(a) Define Truncation Error.

(b) What is meant by rate of convergence?

(c) Give the statistical definition of probability.

(d) Define partial pivoting and complete pivoting.

(e) Write a short note on floating-point representation.

3. Answer any *three* of the following questions : 5×3=15

(a) Using Simpson's one-third rule find

$$\int_0^1 \frac{1}{1+x^2}\, dx$$

(b) Evaluate $\sqrt{12}$ to four decimal places by Newton's method.

(c) Find the line of regression of Y on X from the following data :

X :	6	2	10	4	8
Y :	9	11	5	8	7

(d) (i) State the conditional theorem of probability.

(ii) An urn contains 6 red and 4 black balls. Two balls are drawn without replacement. What is the probability that the second ball is red if it is known that the first is red? 1+4=5

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

4. Answer any *three* of the following questions : 10×3=30

(a) Solve by Gauss-Jordan method :

$$10x_1 + x_2 + x_3 = 12$$
$$x_1 + 10x_2 + x_3 = 12$$
$$x_1 + x_2 + 10x_3 = 12$$

(b) Write an algorithm to implement Runge-Kutta method.

(c) Obtain Milne's predictor corrector formula.

(d) Calculate mode from the following data :

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

(e) Define Poisson distribution. Find its mean and variance.

★ ★ ★