2017

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 : 1×6=6

(a) Truncation error is caused by approximating

(i) irrational numbers

(ii) fractions

(iii) rational numbers

(iv) exact mathematical procedure

(Choose the correct option)

(b) In the process of computing, the value of the function outside the range of given values of the variable is called

(i) interpolation

(ii) outerpolation

(iii) extrapolation

(iv) smoothing

(Choose the correct option)

(c) $V(2X+3) =$ ____.

(Fill in the blank)

(d) Standard deviation of binomial distribution is npq.

(State True or False)

(e) Which of the following after name for method of false position?

(i) Method of bisection

(ii) Method of cords

(iii) Newton's method

(iv) Regula-falsi method

(Choose the correct option)

(f) What will be the standard deviation of 4, 4, 4, 4, 4?

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

(a) What is meant by rate of convergence?

(b) Define mathematical definition of probability.

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

(d) Prove that

$$e^x = \left(\frac{\Delta^2}{E}\right) e^x \cdot \frac{Ee^x}{\Delta^2 e^x}$$

the interval of differencing being h.

(e) Define relative error.

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

(a) Write an algorithm for bisection method.

(b) For any two events A and B, prove that

$$P(A \cup B) = P(A) + P(B) - P(AB)$$

(c) Using Simpson's three-eight rule, find

$$\int_0^6 \frac{dx}{1+x^2}$$

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

(e) Find Karl Pearson correlation coefficient of X and Y for the following data :

X	2	3	4	5	6
Y	4	3	2	8	10

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

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

(b) Show that mean and variance are equal in Poisson distribution.

(c) Use Runge-Kutta 4th order method to solve $y' = xy$ for $x = 1{\cdot}4$ initially $x = 1$, $y = 2$ (take $h = 0{\cdot}2$) and $f(x, y) = xy$.

(d) Define mathematical expectation. A discrete random variable takes only the values -2, 0, 2 with $p(-2) = p(2) = \frac{1}{8}$, then show that $E(X^2) = \frac{1}{4}$.

(e) Solve by Gauss-Jordan reduction method

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

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