BCA (Honours) 3rd Semester Examination, 2022

Subject : Computer Application

Course : BCA-304

(Mathematics-III)

Time: 4 Hours **Full Marks: 80**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer Q. No. 1 *and* any four *questions from the rest.*

1. Answer *any eight* questions: 2×8=16

(a) Define conditional probability.

(b) If A and B are two mutually exclusive events, then prove that $P(A \cup B)$ $P(A)$ $P(B)$.

(c) If the mean of first n natural numbers is 15, then find n.

(d) What do you mean by Bivariate distribution?

(e) What are the assumptions of t-test?

(f) What do you mean by Chi-square test of goodness of fit?

(g) Round-off the following numbers correct up to 4 significant figures:

(i) 2456·782

(ii) 0·000243468 1+1

(h) Prove that difference of a constant function is zero, i.e., $\Delta C = 0$.

(i) Prove that $\Delta \cdot \nabla = \Delta - \nabla$.

(j) Define interpolation.

(k) State Newton's Forward and Newton's Backward interpolation formula.

(l) Write down the difference between interpolation and extrapolation.

Answer *any four* questions: 16×4=64

2. (a) There are two boxes. The first box contains 4 white, 6 red balls and the second box contains 3 white, 7 red balls. Two balls are drawn, one from each box. Find the probability that—

(i) both the balls are red.

(ii) first ball is white and the second ball is red.

(iii) one ball is white and the other ball is red.

(iv) both the balls are of same colour.

(b) Define the following:
Probability, Random experiment, Mutually exclusive events, Event space. 8+8

3. (a) A discrete random variable X assumes a set of values $X = x_i, i = 0, 1, 2, 3, 4, 5$ with the corresponding probability of occurance $\frac{K}{3^i}$. Find the value of K. Also find $P(X \leq 2)$ and $P(X > 3)$.

(b) Write short note on Normal distribution and Poission distribution. 6+(5+5)

4. (a) Calculate the mean and median from the following table:

Class interval	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	5	22	63	74	30	6

(b) Out of two regression lines given by $x + 2y = 5$ and $2x + 3y = 8$ which one is the regression line of x on y? Find also the values of $\bar{x}, \bar{y}, r$ and σ_y, given $\sigma_x = 12$.

(c) Briefly explain Chi-square distribution. 6+6+4

5. (a) Evaluate $\int_1^2 \frac{dx}{x}$, taking 4 sub-intervals, correct up to five decimal places by

(i) Simpson's one-third rule and

(ii) Trapezoidal rule.

Also find the Absolute and Relative errors.

(b) Find the positive roots of the equation $x^3 - 3x + 1{\cdot}06 = 0$, by method of bisection, correct to three decimal places. 8+8

6. (a) Briefly discuss on Newton-Raphson method.

(b) Find the root of $x^3 - 8x - 4 = 0$, which lies between 3 and 4, by Newton-Raphson method, correct to four decimal places.

(c) Using Regula-Falsi method, find a root of $x^3 + 2x - 2 = 0$, correct up to three significant figures. 4+6+6

7. (a) Compute $f(0 \cdot 5)$ and $f(2 \cdot 8)$ from the following table:

x:	0	1	2	3
$f(x)$:	1	2	11	34

(b) Write down the difference between Newton's Forward and Newton's Backward Interpolation formula.

(c) Solve the system, by Gauss-Seidel method,

$20x_1 + 5x_2 - 2x_3 = 14$

$3x_1 + 10x_2 + x_3 = 17$

$x_1 - 4x_2 + 10x_3 = 23$

Correct up to three significant figures or correct up to four-decimal places. 6+4+6