2021

B.C.A

[HONOURS]

Paper : BCA-301

(Mathematics)

Full Marks : 80 Time : 4 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

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

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

a) Find the mode of 2, 1, 3, 2, 5, 3, 2, 4, 2, 1, 6.

b) Define Absolute error and Relative Percentage error.

c) Write down the p.d.f. of Binomial distribution.

d) State Baye's theorem.

e) Find the mean of the distribution given by the

p.d.f. $f(x)=\begin{cases} x^2, & 0 \le x < 1 \\ 0, & \text{elsewhere} \end{cases}$

f) Round-off the following numbers to four significant figures:

i) 3.92542

ii) 40.358

iii) 0.98735

iv) 0.0058425

g) Define degree of Precision in numerical integration.

h) What is extrapolation?

i) Write down the p.d.f. of Normal distribution.

j) If x = 3y – 6 and 2y = 3x – 8 are regression equation of x on y and y on x respectively. Find the correlation coefficient between x and y.

k) What are the advantages of Lagrange interpolation formula over Newton's forward interpolation formula?

l) Define conditional probability.

2. a) Define Poisson distribution and find its mean and variance.

b) Person A speaks truth 60% cases, and person B speaks truth in 80% cases, what is the

percentage of cases they likely to contradict each other while narrating some incident?

c) Prove that for any two events A and B $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

8+5+3=16

3. a) Calculate the mean, median and mode of the following frequency distribution:

Height (inch)	56-60	61-65	66-70	71-75
No. of Persons	15	40	30	5

b) The second order moment of a random variable X is minimum when taken about mean.

10+6=16

4. a) Calculate the arithmetic mean and standard deviation of the following frequency distribution:

Class interval:	0-9	10-19	20-29	30-39	40-49	50-59
Frequency:	15	20	25	24	12	34

b) Calculate the median and mode of the following frequency distribution:

Height(inch):	60-64	65-69	70-74	75-79	80-84	85-89
No. of Persons:	8	28	118	66	16	8

8+8

5. Write an algorithm to find the solution of system of 3 linear equations in 3 unknowns by Gauss-Seidel iteration method. Use this method to solve the

$$4x_1 - x_2 - x_3 = -7$$
$$x_1 - 5x_2 + x_3 = -10$$
$$x_1 + 2x_2 + 6x_3 = 9$$

8+8

6. Develop an algorithm to evaluate the integral $\int_a^b f(x)\,dx$ by trapezoidal rule and hence evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ taking 8 sub-interval. 10+6

7. a) Develop an algorithm to solve initial value problem by 2nd order R-K method.

b) Use 2nd order R-K method to calculate Y(0.2) from the initial value problem $\frac{dy}{dx} = x + y^2$, y(0)=1 (taking h=1). 8+8

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