

# END TERM EXAMINATION

FIRST SEMESTER [BCA] DECEMBER 2024

Paper Code: BCA-107

Subject: Mathematical Foundation for Computer Science

Time: 3 Hours

Maximum Marks: 60

Note: Attempt all questions as directed. Internal choice is indicated.

Q1 Attempt Any Four of the following questions. (4x5=20)

- a) What do you understand by Mode of Binomial Distribution, explain briefly?
- b) Construct the divided difference table from the given values of  $x$  and  $y$  given below:

X	1	2	4	7	12
Y	22	30	82	106	216

- c) What is the difference between PMF and PDF?
- d) What is the probability of getting a sum 9 from three throws of a dice?
- e) If the mean and variance of a binomial distribution are respectively 9 and 6, find the distribution.
- f) Determine the expectation of the random variable  $X$  having the following probability distribution.

X	1	2	3	4
Y	0.15	0.10	0.55	0.20

- g) What is the Lagrange's formula to find  $y$ , if three sets of values  $(x_0, y_0)$ ,  $(x_1, y_1)$  and  $(x_2, y_2)$  are given?
- h) Define Simpson's 1/3 rule for Integration also write its formula?

- Q2 a) Three persons A, B and C have applied for a job in a private company. The chance of their selections is in the ratio 1 : 2 : 4. The probabilities that A, B and C can introduce changes to improve the profits of the company are 0.8, 0.5 and 0.3, respectively. If the change does not take place, find the probability that it is due to the appointment of C. (5)
- b) The following table represents a probability distribution as follows: (5)

X	0	1	2	3	4
P(X)	$K^2$	$K^2 + 2k$	$2K^2 + k$	$13K^2 - 2k$	$8K^2 - k$

Find the value of  $K$  and list the distribution.

OR

- Q3 a) How do you identify binomial distribution? A fair coin is tossed 10 times, what are the probability of getting exactly 6 heads and at least six heads. (5)
- b) What is the difference between a binomial distribution and normal distribution? (5)
- Q4 a) Define Newton Raphson Method. For the initial value  $x_0 = 1$ , approximate the root of  $f(x) = x^2 - 5x + 1$ , using Newton Raphson Method. (5)
- b) What is the difference between forward and backward difference operator? When to use forward and backward interpolation? (5)

OR

P.T.O.

P-1/2

Q5 a) Find the polynomial by using Lagrange's formula and hence find  $f(3)$  for (5)

x	0	1	2	3
f(x)	2	3	12	147

b) Find the approximate value of the root of the equation  $3x - \sqrt{1 + \sin x} = 0$  up to 6<sup>th</sup> iteration. (5)

Q6 Solve the following system of equations using Gauss elimination method. (10)

$$\begin{aligned} 2x + y + 4z &= 12 \\ 8x - 3y + 2z &= 23 \\ 4x + 11y - z &= 33 \end{aligned}$$

OR

Q7 Solve the following system of equations using Gauss elimination method. (10)

$$\begin{aligned} x + 2y + 3z &= 14 \\ 2x + 5y + 2z &= 18 \\ 3x + y + 5z &= 20 \end{aligned}$$

$$3x + y + 5z = 20$$

Q8 a) Define Numerical Differentiation. Where is the numerical differentiation used? (5)

b) Find Solution using Trapezoidal rule (5)

x	2	3	4	5	6	7	8	9	10
f(x)	0.333	0.25	0.20	0.166	0.143	0.125	0.111	0.10	0.091

OR

Q9 The velocity  $V$  of a particle at a distance  $S$  from a point on its path is given by

S(m)	0	10	20	30	40	50	60
V(m / s)	47	58	64	65	61	52	38

Estimate the time taken to travel 60m using Simpson's 1/3 rule. (10)

\*\*\*\*\*

P-2/2