

(Please write your Exam Roll No.)

Exam Roll No.

END TERM EXAMINATION

SECOND SEMESTER [BCA] JUNE 2024

Paper Code: BCA-102

Subject: Applied Mathematics

(BATCH 2021 ONWARDS)

Time: 3 Hours

Maximum Marks: 60

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

Q1 Attempt **any four** of the following:

(4x5=20)

a) If A and B are two events such that $P(A) = \frac{7}{13}$, $P(B) = \frac{9}{13}$ and $P(A \cap B) = \frac{4}{13}$. Find $P(A/B)$.

b) In an MBA exam, the probability of E passing is $\frac{1}{2}$, the probability of F passing is $\frac{1}{3}$, and the probability of neither E or F passing is $\frac{1}{4}$.

c) Find the probability of E and F passing the exam.

d) Evaluate $\sqrt{29}$ by Newton - Raphson method.

e) A random variable X has the following distribution.

X	0	1	2	3	4	5	6	7	8
P(X)	A	3a	5a	7a	9a	11a	13a	15a	17a

i) Determine the value of a.

ii) Find $P(2 \leq X \leq 4)$

f) A person requires 10, 12 and 12 units chemicals A, B, and C respectively for his garden. A liquid product contains 5, 2 and 1 units of A, B, and C respectively per jar. A dry product contains 1, 2 and 4 units of A, B, C per carton. If the liquid product sells whose cost price is Rs. 3 per jar and the dry product cost for Rs. 2 per carton, how many of each should be purchased, in order to minimize the cost and meet the requirements? Formulate the LPP

g) If the probability of a defective bolt is 0.2. Find the mean and standard deviation.

UNIT-I

- Q2 a) If X follows a binomial distribution with parameter $n=8$ and $p=\frac{1}{2}$ then, find $P(|X-4| \leq 2)$ (5)
- b) Five cards are drawn successfully with replacement from a well-shuffled deck of 52 cards, what is the probability that i) All five cards are spades? ii) Only three cards are spades (5)

- Q3 a) In a sample of 1000 items, the mean weight is 45 kg with a standard deviation of 15 kg. Assuming the distribution to be normal, find the number of items weighting between 40 and 60 kgs. (5)
- b) A die is thrown of random. What is the expectation of the number on it. Also find $E(X^2)$. (5)

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UNIT-II

- Q4 a) Obtain the missing values in the following table. (5)
- | | | | | | | | |
|-------|-------|------|-------|-------|------|-------|-------|
| X: | 0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 |
| F(x): | 0.135 | ---- | 0.111 | 0.100 | ---- | 0.082 | 0.074 |

- b) Find a real root of the equation $x^3 - 9x + 1 = 0$ by bisection method for the value between $x = 2$ and $x = 4$ upto 8 iterations (5)

- Q5 a) Estimate by Newton's method of interpolation, the expectation of life at 32 from the following data (5)

Age (years)	10	15	20	25	30	35
Expectation of life (years)	35.3	32.4	29.2	26.1	23.2	20.5

- b) Find the root equation $x^3 - x - 1 = 0$ by Regula- Falsi method correctly upto 3 decimal place and upto fifth iteration. (5)

UNIT-III

- Q6 a) By Gauss - elimination method, solve (5)

$$5x - y - 2z = 142 ; x - 3y - z = -30 ; 2x - y - 3z = 5$$

- b) A curve passing through the following points. (Simpson's rule) (5)

x	0	1	2	3	4	5	6
y	0.146	0.161	0.176	0.190	0.204	0.217	0.230

Find the area of the curve between $x = 0$ to $x = 6$

- Q7 a) Solve using the LU decomposition method (5)

$$x + 2y + 3z = 14 ; 2x + 5y + 2z = 18 ; 3x + y + 5z = 20$$

- b) Solve the following set of equations by Gauss-Jacobi method (5)

$$27x + 6y - y = 85 ; 6x + 15y + 2z = 72 ; x + y + 54z = 110$$

UNIT-IV

- Q8 a) Solve the following LPP by using Simplex method

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

Subject to the constraints

$$2x + 3x_2 \leq 8 ; 2x + 5x_2 \leq 10 ; 3x + 2x_2 + 4x_3 \leq 15 \quad x_1, x_2, x_3 \geq 0 \quad (7)$$

- b) Write the steps used in solving an LPP by Graphical method. (3)

- Q9 a) Solve the following assignment problem and also determine the minimal cost of assignment.

		Jobs					(7)
		J ₁	J ₂	J ₃	J ₄	J ₅	
Persons	P ₁	12	5	5	4	10	
	P ₂	11	9	10	4	9	
	P ₃	9	7	8	4	6	
	P ₄	11	12	11	8	12	
	P ₅	5	7	10	4	6	

- b) Define any three methods for finding the initial feasible solution for the transportation problem. (3)