

END TERM EXAMINATION

FIRST SEMESTER (BCA) DECEMBER-2025

Paper Code: BCA-107T

Subject: Mathematical Foundation
for Computer Science

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 questions (4x5=20)
- a) An urn contains 7 white, 5 black and 3 red balls. Two balls are drawn at random. Find the probability that
- (i) One ball is red and other is black.
- (ii) One ball is white.
- b) Determine the real root of the equation $e^{3x} - 3x^2 = 0$ by Bolzano method.
- c) Solve the following system of linear equations by Gauss elimination method.
- $$6x + 3y + 2z = 6; \quad 6x + 4y + 3z = 0 \quad \text{and} \quad 20x + 15y + 12z = 0$$
- d) Find $f'(5)$ for the following pairs of values for x and f(x):
- | | | | | | | |
|--------|---|---|----|---|---|---|
| x : | 0 | 1 | 2 | 3 | 4 | 5 |
| f(x) : | 4 | 8 | 15 | 7 | 6 | 2 |
- e) If the heights of 500 students are normally distributed with mean 68 inches and standard deviation 3 inches. How many students have heights if:
- (i) Between 65 and 71 inches
- Given $P(Z \leq 1.33) = 0.4082$ and $P(Z \leq 1) = 0.3413$
- f) Use of Newton Raphson method to find a root for the function $f(x) = x^2 - 2$. [3 Iterations]
- g) Suppose X has a binomial distribution $B(6, \frac{1}{2})$. Show that $X=3$ is the most likely outcome.
- h) Find a polynomial of n degree for the given dataset by using NDDI method:
- | | | | | | |
|--------|-------|----|---|---|------|
| x : | -4 | -1 | 0 | 2 | 5 |
| f(x) : | 1.245 | 33 | 5 | 9 | 1335 |

UNIT-1

- Q2 A factory has three machines (A, B & C) that produce bolts, with production percentages of 25%, 35% and 40% respectively. The defective rates are 5%, 4% and 2% for machines A, B and C. A bolt is chosen at random and is found to be defective. Find the probability that the defective bolt was produced by machine B? (10)
- Q3 (a) An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accident involving a scooter driver, car driver and truck driver is 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a truck driver? (6)
- (b) Determine the binomial distribution for which mean is 4 and variance is 3. (4)

P.12

P.T.O.

UNIT-II

Q4 Find a polynomial of the least degree for the given data: $f(1) = 3$, $f(2) = 9$, $f(4) = 15$ and $f(7) = 20$. Hence evaluate $f(5)$. (10)

Q5 Interpolate the value of $f(x)$ when $x=4$ for the given dataset:-

x:	2	5	7	9
f(x):	180	150	120	90

Use Lagrange's interpolation method. (10)

UNIT-III

Q6 Solve the following set of equations by using Gauss Seidel method: (10)

$$x_1 + x_2 + x_3 = 9 \quad ; \quad 2x_1 - 3x_2 + 4x_3 = 13 \quad ; \quad 3x_1 + 4x_2 + 5x_3 = 40$$

Q7 Solve the given system of linear equations by using Gauss Jacobi method:- (10)

$$2x + y + z = 6; \quad x + 3y - z = 0; \quad -x + y + 2z = 3$$

UNIT-IV

Q8 Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's $\frac{1}{3}$ rule when $h=0.25$. (10)

Q9 Use trapezoidal rule to integrate the following function $f(x) = 1/(x+1)^2$ between 2 and 3 by dividing the limits into 4 equal subintervals. (10)

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