



**Faculty of Science / Engineering**  
**End Semester Examination May 2025**  
**CA3CO20 Mathematics -III**

<b>Programme</b>	<b>:</b>	BCA / BCA-MCA (Integrated)	<b>Branch/Specialisation</b>	<b>:</b>	-
<b>Duration</b>	<b>:</b>	3 hours	<b>Maximum Marks</b>	<b>:</b>	60

**Note:** All questions are compulsory. Internal choices, if any, are indicated. Assume suitable data if necessary. Notations and symbols have their usual meaning.

**Section 1 (Answer all question(s))**

**Marks CO BL**  
**1 1 1**

**Q1.** The order of convergence in Newton-Raphson method is-

Rubric	Marks
2	1

- ☒ 2                      ☐ 1  
☐ 3                      ☐ 4

**Q2.** In finding the root of an equation  $f(x)=0$ , the following values were obtained,  $f(1.8) = -1.3024$ ,  $f(2.0) = 4.0$  next approximation by regula falsi method is-

Rubric	Marks
1.8491	1

- ☐ 1.8761                      ☐ 1.8553  
☒ 1.8491                      ☐ 1.8752

**Q3.** Let  $k$  be a constant then  $E(k)$ , where  $E$  is shifting operator-

**1 1 1**

- ☐ 0                      ☒  $k$   
☐  $k+1$                       ☐ None of these

**Q4.** The  $n$ th divided difference of a polynomial of degree  $n$  is a-

**1 1 1**

Rubric	Marks
constant	1

- ☐ 0                      ☒ Constant  
☐ Variable                      ☐ None of these

**Q5.** The Trapezoidal rule integrates exactly polynomial of order-

**1 1 1**

Rubric	Marks
1	1

- ☒ 1                      ☐ 2  
☐ 3                      ☐ 4

**Q6.** As soon as a new value of a variable is found by iteration, it is used immediately in the following equations, this method is called- 1 1 1

Rubric	Marks
Gauss-Seidal method	1

- ☐ Gauss-Jordan method
 ☒ Gauss-Seidal method  
☐ Jacobi's method
 ☐ None of these

**Q7.** A real valued function defined on a discrete sample space is called- 1 1 1

Rubric	Marks
discrete random variable	1

- ☒ Discrete random variable
 ☐ Continuous random variable  
☐ Probability density function
 ☐ None of these

**Q8.** The probability of getting 4 heads in 6 tosses of a fair coin is- 1 2 2

Rubric	Marks
15/64	1

- ☒ 15/64
 ☐ 12/64  
☐ 11/64
 ☐ None of these

**Q9.** Which is correct for normal distribution? 1 1 2

Rubric	Marks
mean deviation = 4/5 standard deviation	1

- ☐ mean deviation= standard deviation
 ☒ mean deviation= 4/5 standard deviation  
☐ mean deviation= 1/2 standard deviation
 ☐ None of these

**Q10.** If  $f(x) = ce^{-cx}$ ,  $c > 0$  represent exponential distribution curve then variance of this distribution is- 1 1 1

Rubric	Marks
option 2 is correct	1

- ☐  $\frac{1}{c}$ 
☒  $1/c^2$   
☐  $2/c^2$ 
☐ None of these

## Section 2 (Answer all question(s))

Marks CO BL

**Q11.** Define relative and absolute error in approximation. 2 1 1

Rubric	Marks
Definition of relative error and absolute error	2

**Q12.** Find the real root of the equation correct to three decimal places using Newton-Raphson method ,  $f(x) = x^3 - 2x - 5 = 0$ . 3 3 3

Rubric	Marks
find initial value and two iterations	3

- Q13. (a)** Apply Gauss-Seidal iteration method to solve the following equations (three iteration only)  
 $20x + y - 2z = 17$ ,  $3x + 20y - z = -18$ ,  $2x - 3y + 20z = 25$

5 3 3

Rubric	Marks
compute three iteration and final answer	5

(OR)

- (b)** Solve the following equations by Gauss-elimination method:  
 $2x + 4y + z = 3$ ,  $3x + 2y - 2z = -2$ ,  $x - y + z = 6$

Rubric	Marks
reduce the equation to upper triangular and find x, y, and z values	5

### Section 3 (Answer all question(s))

Marks CO BL  
3 3 3

- Q14.** Evaluate the following-  
 $\Delta \frac{1}{1+x^2}$

Rubric	Marks
use formula of oprator	3

- Q15. (a)** Find the missing values in the following table by using difference operator-

7 4 5

x	45	50	55	60	65
y	3	-	2	-	-2.4

Rubric	Marks
take missing term, make difference table, use difference operator form an equation then find missing term	7

(OR)

- (b)** Evaluate  $f(8)$  using Lagrange's interpolation formula for the following table:

x	0	1	2	5
y	2	3	12	147

Rubric	Marks
using formula of lagranges interpolation find the value of f (8) )	7

### Section 4 (Answer all question(s))

Marks CO BL  
3 4 5

- Q16.** Evaluate by  $\int_0^4 e^x dx$  Simpson's rule using data  $e = 2.72$ ,  $e^2 = 7.39$ ,  $e^3 = 20.09$ ,  $e^4 = 54.60$  and compare with the actual value.

Rubric	Marks
write formula and calculate	3

**Q17. (a)** Using Euler's method solve the differential equation in six steps:

7 4 5

$$\frac{dy}{dx} = x + 2y, y = 0 \text{ when } x = 0, h = 0.2$$

Rubric	Marks
formula and iterations to obtain y	7

(OR)

**(b)** Apply Runge Kutta method of fourth order to solve:

$$5 \frac{dy}{dx} = x^2 + y^2, y(0) = 1 \text{ and find } y \text{ in the interval } 0 \leq x \leq 0.2, h = 0.1$$

Rubric	Marks
apply formula and use proper iteration to obtain y	7

### Section 5 (Answer all question(s))

Marks CO BL

**Q18.** Evaluate  $E(X)$  and  $E(X^2)$  and variance for the following data:

4 3 2

x	0	1	2	5
f	2	3	5	7

Rubric	Marks
calculate $E(X)$ and calculate $(E(X^2))$	4

**Q19. (a)** Assuming half the population of a town consumes fairness cream and that 100 investigators each take 10 individuals to see whether they are consumers, how many investigators would you expect to report that three people or less were consumers?

6 4 3

Rubric	Marks
use binomial distribution find probability using $x=0,1,2,3$	6

(OR)

**(b)** Fit Poisson distribution to the following and calculate total probability of following data-

Deaths	Frequency
0	122
1	60
2	15
3	25
4	10

Rubric	Marks
using the formula for poisson distribution for expected frequency and fit the distribution	6

### Section 6 (Answer all question(s))

Marks CO BL

**Q20.** Evaluate mean, variance and standard deviation of exponential distribution

4 1 3

Rubric	Marks
Derivation for mean, variance and SD	4

**Q21. (a)** In a normal distribution 31% of the items are under 45 and 8% are above 64. Find the mean and standard deviation. Given that if  $f(t) = \frac{1}{\sqrt{2\pi}} \int_0^t e^{-x^2/2} dx$ ,  $f(0.5) = 0.19$ ,  $f(1.4) = 0.42$

645

Rubric	Marks
using given probability find area of distribution and find mean and standard deviation	6

(OR)

**(b)** Assume that you usually get two phone calls per hour. Calculate the probability that a phone call will come within the next hour. Data is exponentially distributed.

Rubric	Marks
find parameter lambda or theta and use probability formula for exponential distribution	6

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