

(6)

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- (b) Draw the trend by semi-average method using the given data : (CO5)

Year	Production (in Tons)
1998	253
1999	260
2000	255
2001	266
2002	259
2003	264

- (c) Calculate 3 yearly moving averages or trend values for the following data : (CO5)

Year	Value
1998	3
1999	5
2000	7
2001	10
2002	12
2003	14
2004	15
2005	16

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Roll No. ....

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B. C. A. (FOURTH SEMESTER)

END SEMESTER

EXAMINATION, June, 2023

COMPUTER BASED NUMERICAL AND  
STATISTICAL TECHNIQUES

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among  
(a), (b) and (c) in each main question.(iii) Total marks in each main question are  
**twenty.**

(iv) Each sub-question carries 10 marks.

1. (a) Describe absolute and relative and percentage errors. Find the absolute, percentage and relative errors if  $x$  is rounded-off to three decimal digits. Given  $x = 0.005998$ . (CO1)

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(b) Find a real root of the equation  $x^3 - 2x - 5 = 0$  by the method of false position up to three places of decimal. (CO1)

(c) Find a real root correct upto four decimal places of the equation  $2x - \log_{10} x - 7 = 0$  using iteration method. (CO)

2. (a) Solve the following system of linear equations : (CO2)

$$2x + 4y + 6z = -4$$

$$x + 5y + 3z = 10$$

$$x + 3y + 2z = 5$$

using Gauss Elimination method.

(b) Using Newton forward difference formula, find a cubic polynomial which takes the following data : (CO2)

$x$	$f(x)$
0	1
1	0
2	1
3	10

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(c) Find  $f(10)$  using the following data : (CO2)

$x$	$f(x)$
5	12
6	13
9	14
11	16

3. (a) Find  $f'(1.1)$  from the following data : (CO3)

$x$	$f(x)$
1.0	0
1.2	0.1280
1.4	0.5440
1.6	1.2960
1.8	2.4320
2.0	4.000

(b) Solve the integral (CO3)

$$\int_0^1 \frac{1}{1+x^2} dx$$

using Simpson's 1/3 rule. Also solve it using analytical method and find the error.

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- (c) Find the solution of the differential equation : (CO3)

$$\frac{dy}{dx} = y - x$$

given  $y(0) = 2$  using Runge Kutta method at  $x = 0.2$ .

4. (a) Find the curve of best fit of the type  $y = ae^{bx}$  to the following data by the method of least squares : (CO4)

x	y
1	10
5	15
7	12
9	15
12	21

- (b) Define the following terms :

- Histogram
- Regression analysis and correlation (CO4)

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- (c) Calculate Karl Pearson's coefficient of correlation between X and Y from the following data : (CO4)

X	Y
65	67
66	68
67	65
67	68
68	72
69	72
70	69
72	71

5. (a) Describe the following components of Time Series : (CO5)
- Secular Trend or Long Term Movement (T)
  - Seasonal Variation or Seasonal Movement (S)
  - Cyclical Fluctuation or Cyclic Variation (C)
  - Residual, Irregular or Random Movement (I)

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