

**MASTER OF COMPUTER
APPLICATIONS**

(MCA) (REVISED)

Term-End Examination

June, 2026

**MCSE-004 : NUMERICAL AND STATISTICAL
COMPUTING**

Time : 3 Hours

Maximum Marks : 100

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **three** questions from the rest.*

(iii) *Use of calculator is allowed.*

1. (a) Let $a = .345x^{10}$, $b = .245 \times 10^{-3}$ and $c = .432 \times 10^{-3}$. Using 3-digit decimal arithmetic with rounding prove that $(a + b) + c \neq a + (b + c)$. 5

- (b) Find out to how many decimal places the value $355/133$ is accurate as an approximation to π ? 5
- (c) Obtain the smallest positive root of $x^3 - 2x - 5 = 0$, correct upto 2 decimal places. 5
- (d) Compute the square root of a , using Newton's method. How does the error behave ? 5
- (e) Estimate the missing term in the following data using Newton's forward difference method. Assume that data represents a valid polynomial of degree 2. 5

x	$f(x)$
1	3
2	7
3	?
4	21
5	31

- (f) Find the polynomial of degree ≤ 2 with the properties $P(1) = 5$, $P(1.5) = -3$, $P(3) = 0$. 5
- (g) If a bank receives on an average $\lambda = 6$ bad cheques per day, what is the probability that it receives 4 bad cheques on any given day. 5
- (h) Apply Runge-Kutta fourth order method to find an approximate value of y when $x = .2$ given that $y' = x + y$ with $y(0) = 1$ and $h = 0.2$. 5
2. (a) Find the smallest positive root of $x^7 + 9x^5 - 13x - 17 = 0$, using Newton-Raphson method. 10
- (b) Use Gauss elimination to solve : 10
- $$10x_1 - 7x_2 = 7$$
- $$-3x_1 + 2.099x_2 + 6x_3 = 3.901$$
- $$5x_1 - x_2 + 5x_3 = 6$$
- correct to six places of significant digits.

3. (a) From the following data estimate the value of $f(2.25)$ using forward difference formula : 10

x	$f(x)$
0	1.0
0.5	3.625
1.0	7.000
1.5	11.875
2.0	19.00
2.5	29.125

- (b) Calculate the value of the integral

$$\int_0^1 \frac{dx}{1+x} \text{ using Simpson } 3/8 \text{ rule with}$$

$$h = 1/3. \quad 10$$

4. (a) A survey was conducted to relate the time required to deliver a proper presentation on a topic, to the performance of the student with the scores he receives as shown below : 10

Hour (x)	Score (y)
0.5	57

0.75	64
1.00	59
1.25	68
1.50	74
1.75	76
2.00	79
2.25	83
2.50	85
2.75	86
3.00	88

- (i) Find the regression equation that will predict a student's score if we know how many hours the student studied.
- (ii) If a student had studied 0.85 hrs, what is the student's predicted score ?
- (b) Calculate the forward differences for the following set of data : 10

x	y
1	2.105
2	2.808

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3	3.614
4	4.604
5	5.857
6	7.451
7	9.467
8	11.985

5. Write short notes on any *four* of the following : $4 \times 5 = 20$

- (a) Uniform Random Variable
- (b) Inverse Transformation
- (c) Least Square Estimation
- (d) Residual Analysis
- (e) Goodness of Fit

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