

# DHANAMANJURI UNIVERSITY

Examination- 2026 (June)

Name of Programme : B.A./B.Sc. Mathematics  
 Semester : 4<sup>th</sup>  
 Paper Type : SEC  
 Paper Code : SMA-008  
 Paper Title : Computer Algebra Systems and R Software

Full Marks : 30

Pass Marks : 10

Duration: 2 Hours

*The figures in the margin indicate full marks for the questions.*

*Answers the following questions:*

1. Choose and rewrite the correct answer for each of the following questions:

1 × 4 = 4

a) Mathematica code for decimal value of  $\pi$  upto 10 decimal places

~~i) N[Pi, 10]~~

ii) N[pi, 10]

iii) N(Pi, 10)

iv) N(pi, 10)

b) Mathematica code for defining function  $f(x) = x^2 + 3x + 2$

i) f[x]=x^2 + 3x +2

~~ii) f[x\_] :=x^2 + 3x +2~~

iii) f(x\_)=x^2 + 3x +2

iv) f[x\_] =x^2 + 3x +2

c) Mathematica code for getting matrix form of transpose of a matrix A

i) MatrixForm [transpose[A]]

ii) Matrixform [Transpose[A]]

iii) Matrixform [transpose[A]]

~~iv) MatrixForm [Transpose[A]]~~

d) The general syntax for plot command in mathematica is

i) plot[f[x], {x, xmin, xmax}]

ii) Plot(f[x], {x, xmin, xmax})

~~iii) Plot[f[x], {x, xmin, xmax}]~~

iv) Plot[f[x], x, xmin, xmax]

2. Write very short answer for each of the following questions:

1 × 6 = 6

- Write mathematica code to solve the equation  $2x + 5 = 11$ .
- Write mathematica code to plot the function  $\sin x + \cos x$  with domain  $[-\pi, \pi]$
- Write mathematica code to find determinant of the matrix  $A$ .
- Write mathematica code find rank of the matrix  $A$ .
- Write the code to perform the following operation in R:  
 $2 \times 3, 5^2$ .
- Write the correct code in R to find the sum of 5, 10 and 15

3. Write short answer for each of the following:

3 × 2 = 6

- Write the mathematica code to define the piecewise function and display output when  $x = 3$

$$f(x) = \begin{cases} x^2, & x < 0 \\ x + 1, & x \geq 0 \end{cases}$$

- Write the syntax to calculate median of the following data on R  
3, 7, 9, 13, 45, 26, 28, 65, 32, 55, 43, 74

4. Answer each of the following questions:

4 × 2 = 8

- Write the correct syntax in mathematica to solve the system of equations

$$\begin{aligned} 2x + y - z &= 8 \\ -3x - y + 2z &= -11 \\ -2x + y + 2z &= -3 \end{aligned}$$

- Write the mathematica syntax to plot in 3D with axeslabel, plotlabel, plotlegend of the following surface  
 $x^3 + y^3, -4 \leq x \leq 4, -4 \leq y \leq 4, .$

5. Answer **any one** of the following questions:

6 × 1 = 6

- Answer the following questions:

- Write the mathematica code to plot the following surfaces in 3D with axeslabel, plotlabel, plotlegends  $x^2 + y^2, x^2 - y^2$  where  $-3 \leq x \leq 3, -3 \leq y \leq 3$ .
- Write the mathematica code to find the minor 11 and

minor 23 of the following matrix  $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

b) Answer the following questions:

i) Write the syntax in R to create scatter plot and regression line of the following data:  $x = (1, 2, 3, 4, 5)$ ,  
 $y = (2, 4, 6, 8, 10)$

ii) Write the syntax in R to create histogram of the following data:

22, 34, 23, 45, 56, 34, 22, 38, 34, 23, 45, 56, 34, 38, 34,  
23, 22, 45, 56, 34, 23, 22, 45, 56.

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