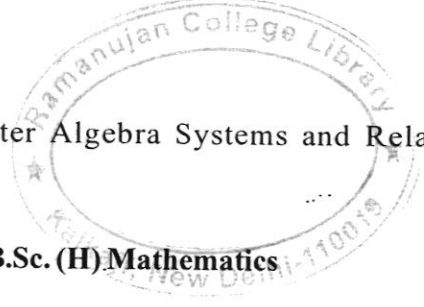


[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4628 E
Unique Paper Code : 32353401
Name of the Paper : SEC 2-Computer Algebra Systems and Related Softwares
Name of the Course : CBCS-LOCF-B.Sc. (H) Mathematics
Semester : IV



Duration : 2 Hours

Maximum Marks : 38

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. This question paper has four questions in all.
3. All questions are compulsory.
4. Use anyone of the CAS := **Mathematica/Maple/Maxima/any other** to answer the questions

Q1. Attempt both parts (i) and (ii).

- (i) Fill in the blanks 1 × 5 = 5
- a. The line numbers assigns to the input as
 - b. You can obtain information about a specific command by typing.....
 - c. The command to calculate π to 100 decimal places is
 - d. Lines are terminated by to suppress the output
 - e. The command to calculate the binomial coefficient $\binom{7}{2}$ is
- (ii) Explain any **FIVE** of the following 'R' commands in short : 1 × 5 = 5
- a. qqnorm()
 - b. read.csv()

P.T.O.

- c. ls()
- d. rm()
- e. as.character()
- f. tail()

Q 2. Write a short note on any four from the following: 2 × 4 = 8

- (i) How to include exclusions and gridlines in a plot in any CAS. Also explain the difference between them.
- (ii) How to put a logarithmic scale on horizontal axis in a plot of 2^x in any CAS.
- (iii) How to sketch a contour plot in any of the CAS.
- (iv) How to plot 3-dimensional surface in any CAS. Explain it by an example.
- (v) How to form a new matrix from two existing matrices of same order by stacking them on top of each other in any CAS.
- (vi) Explain the rules for defining a function in any CAS.

Q3. Do any four from the following:

2 × 4 = 8

- (i) Write the command for sketching the curve
 $y = (x - 1)^2$, $-2 \leq x \leq 2$, with colour of the curve blue
- (ii) Write the command for plotting the graph of the following:
 $y = e^x \cos x$, $z = e^x \sin x$, $0 \leq x \leq 5$.

(iii) $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 3 & 5 & 1 \end{bmatrix}$

Write commands for generating:

- a. Eigen values and Eigen vectors of Matrix A
- b. Diagonalise the matrix

(iv) Write the output of the following commands in the statistical software 'R'

```
>Garden=c(47,19,50,46,9,4)
>Hedgerow=c(10,3,0,16,3,0)
>Parkland=c(40,5,10,8,0,6)
>Pasture= c(2,0,7,4,0,0)
>data=c(Garden, Hedgerow, Parkland, Pasture, Woodland)
>bird=matrix(data,ncol=5,dimnames=list(c('Blackbird','Chaffinch','Great
Tit','House Sparrow','Robin','Song Thrush'), c('Garden', 'Hedgerow', 'Parkland',
'Pasture'))))
>bird
```

(v) Write command for solving the system of equations:

$$x + 2y + 3z = 2; \quad x - y + 3z = 0; \quad 2x + 3y - 4z = 2$$

Q4. Attempt any three parts from the following:

(4X3=12)

(i) Write code of the following in software- R:

a. Make a list "L1" in software R, containing following vectors:

$$V1 = \{p, q, r, s\}, \quad V2 = \{2, 3, 4, 5\} \text{ and } V3 = \{1.5, 3.5, 8.5\}.$$

b. Write code to extract V2 from L1

c. Find square root of the mean of V2.

d. Add V4 = {3, 7, 5, 11} at third position in the list L1.

(ii) Consider the following dataframe object 'x':

	C1	C2	C3	C4	C5
R1	8	15	53	28	1
R2	23	7	35	55	9
R3	7	9	1	6	17
R4	11	14	56	3	32
R5	9	2	12	45	5
R6	12	18	9	3	18

Write code of the following in software- R:

a. Find the column means and column sums of 'x'.

b. Find the minimum and maximum values of the dataframe 'x'.

c. Create a scatter chart of 'x'.

(iii) Explain difference between the following in software-R

a. **as.data.frame()** and **data.frame()** commands.

b. matrix and data fame.

c. **order()** and **rank()** commands.

d. vector and list.

(iv) Write possible R commands for the following questions:

	C1	C2	C3	C4	C5
R1	12	5	35	8	12
R2	13	27	32	5	5
R3	21	10	11	16	19
R4	5	11	16	10	23
R5	13	2	12	42	5
R6	10	14	8	20	30

- a. Create the above matrix 'z'.
- b. Extract second column of 'z'.
- c. Make Histogram of row "R2".
- d. Convert this matrix into dataframe.
- e. Find standard deviation of vector "R3" of the converted dataframe