Roll No……..….. **Total No. of Printed Pages: 2**
Total No. of Questions: [09]

B.Sc. (Hons.) Math (Semester –4th)
LATEX AND R
Subject Code: BMATS1-405
Paper ID: [19131220]

Time: 03 Hours **Maximum Marks: 60**

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A **(2 marks each)**

Q1. Attempt the following:

a. Write a syntax for $\frac{y^3}{5} + \frac{z^2}{2} = w^2$ in LaTeX.
b. Write a syntax for $f(y) = 10$ in LaTeX.
c. Write a syntax for $\int_0^{\pi} cosx\, dx = 12$
d. Explain the following
\subsection{}, \subsubsection{}.
e. Write a syntax in LaTex for $2^{2^2} = 2^4 = 4^2$.
f. What command can be used for a line break within a paragraph?
g. What is the difference between text mode and math mode in LaTeX?
h. What is the difference between an ordered and an unordered factor in R?
i. What is the difference between a list and a data frame in R?
j. Examine the following R code and answer the question:
s = list(a=c(2,3,5),b="str",c=TRUE)
a=s[1][1]
b=s[[1]][1]. What are the values of **a** and **b**.

Section – B **(5 marks each)**

Q2. Write down the complete syntax to create a LaTeX document that includes a title, author, and date including packages used with examples.

Q3. Using rep() and seq() as needed, create the vectors

i. 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5

ii. 0 0 0 0 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4

Q4. Write a syntax for $f(x) = \{-z^2,\ if\ z < 0;\ \beta + z,\ if\ 0 \leq z \leq 1\ z^2,\quad otherwise$ in LaTeX.

Q5. Write a LATEX code for the matrix [1 2 3 5 6 9 8 1 2].

Q6. Write an R script to create a 3x3 matrix and calculate its transpose. Perform matrix multiplication with another 3x3 matrix.

Section – C **(10 marks each)**

Q7. Write the syntax in LaTeX for the following

$$3^n = 3\ x\ 3\ x \ldots x 3^{\underbrace{\quad}_{n\ terms}}$$

$$k.x = x + x + \ldots + x_{\underbrace{\quad}_{k\ terms}}$$

Q8. Explain the following

(i) \textrm{…}
(ii) \textmd{…}
(iii) \hspace{…}
(iv) \vspace{…}
(v) \emph{…}

Q9. Convert the following table of data into a data frame in R:

First Name	Last Name	Age	Gender
Gagan	Deep	25	M
Samridhi	Singla	25	F
Rizwan	Khan	30	M
Ritika	Sharma	30	F
Sushma	Singh	20	F