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B.Sc. (Hons.) Mathematics (Semester: 4th)
LATEX AND R
Subject Code: vc
Paper ID: 19131220

Time Allowed: 3 hrs.

Maximum Marks: 60

Instruction to Candidates:

1. **Section-A** is Compulsory.
2. Attempt any **four** questions from **Section-B**.
3. Attempt any **two** questions from **Section-C**.

(Section-A)

(2 marks each)

Q1. Attempt the followings :

- (a) Fill in the blanks: (i) The boldfaced text in LaTeX is produced by command. (ii) The output of $\$ a\times b\$$ in LaTeX is
- (b) (i) The symbol ∞ can be produced in LaTeX using the command
(ii) The combination of symbols $\backslash;$ is used in LaTeX tobetween the words.
- (c) (i) Write the difference between the commands $\backslash\textbf{dots}$ and $\backslash\textbf{ddots}$.
(ii) Write the difference between the commands $\backslash\textbf{equationarray}$ and $\backslash\textbf{equationarray*}$.
- (d) How to give space while typing mathematical expressions in LaTeX ?

$$\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}.$$

- (e) Write a set of commands in LaTeX that will produce the matrix:
- (f) Write the input command for the following equation in LaTeX environment:

$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}.$$

- (g) Give the command in LaTeX to obtain the expression $\left(\frac{a+b}{x+y}\right)^{\frac{1}{3}}$.
- (h) Explain in detail about data frame and arrays with example R code.
- (i) What is the use of legend() function in R.
- (j) Create a simple matrix with 3X3 size in R.

(Section-B)

(5 marks each)

- Q2. (i) How do you start a new line in a paragraph in LaTeX? How do you make two lines in LaTeX? How do you insert a page break in LaTeX?
(ii) How do you create a new environment in LaTeX? What is paragraph mode in LaTeX?
- Q3. (i) What is the structure of LaTeX? How do you change text size in LaTeX explain with suitable example?

- (ii) How do you add color in LaTeX? How do you change the font and size in LaTeX explain with suitable example?
- Q4. (i) How do you justify a paragraph in LaTeX? How do you subscript and superscript at the same time in LaTeX?
- (ii) How do you name a matrix in LaTeX? How do you write Greek text in LaTeX explain with suitable example?
- Q5. (i) What is a vector in R? Explain operations on vectors.
- (ii) Create a 3-dimensional array in R.
- Q6. What are the different forms of data types and how to test the data type in R? Give one example for each. Write expression in R (i) $\log_{10} 2$ (ii) 24×53

(Section-C)

(10 marks each)

- Q7. (i) How do you create a multiple choice question in LaTeX?
- (ii) Define Forbidden Characters with example. How many mathematical modes are there in LaTeX? Explain in details.
- Q8. (i) Given 3 linear equations $x + 2y + 3z = 9$; $2x - y + 3z = 8$; $3x + 0y - z = 3$. Solve the linear equations and find x, y, z values using appropriate R function.
- (ii) (a) Write R function to check whether the given number is prime or not.
- (b) Write any 3 math functions in R.
- Q9. (i) Explain how to format the following formulas in LaTeX.
- (a) $\cos^2 \theta + \sin^2 \theta = 1$ (b) $\sqrt{2} \approx 1.414$
- (ii) Explain how to format the following formula in LaTeX. $x = r \cos \phi \sin \theta$,
 $y = r \sin \phi \sin \theta$, $z = r \cos \theta$.