

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 2556

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Unique Paper Code : 2353010015

Name of the Paper : Research Methodology

Name of the Course : **Bachelor of Science (Honours Course) / Bachelor of Arts / Bachelor of Science (Programme) – DSE**

Semester : VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt all the **six** questions, selecting any **two** parts from each question.
3. Parts of the question are to be attempted together.
4. All the **six** questions carry equal marks.

1. (a) Complete the following sentences, that describe the rules that must be observed for avoiding errors and for the betterment of a mathematical writing.

(i) Begin sentences with words, not _____.

(ii) Adopt a _____ notation.

(iii) Use a balance of _____ and _____ while writing mathematical sentences or statements.

(iv) Write words fully, without _____ .

P.T.O.

- (v) Write sentences in _____ style, not _____ style.
 - (vi) Use math symbols within math expressions, not as _____ between math expressions and words.
 - (b) List out the basic techniques that successful mathematicians have found useful in discovering mathematics and that are central part of the mathematical thought process.
 - (c) What is the general sequence of components of a research/review paper. Explain each component in detail.
2. (a) Write short notes on the following terms, with reference to mathematical writing, giving an example in each case:
- (i) Parallelism
 - (ii) Otiose Symbols
 - (iii) Different kinds of ellipsis
- (b) What points should be kept in mind, while writing the ‘Introduction’ section of a research paper?
- (c) Explain the key factors that a researcher should consider, to choose an appropriate journal for publication of his/her research paper?
3. (a) Describe how mathematical expressions are written in LaTeX, explaining the LaTeX environments for producing, an in-text formula and a displayed formula. Give one example each, for a fraction, an integral, and matrix, to show how each of these is written using LaTeX commands.

- (b) Write a code in LaTeX software to obtain the following output :

1 Introduction

1.1 Importance of LaTeX

LaTeX is widely used for professional documents.

1. High-quality typesetting
2. Easy equations
3. Auto-numbering

$$x + y = 10 \quad (1)$$

$$x - y = 4 \quad (2)$$

- (c) What is cross-referencing in LaTeX? Explain the steps to add a figure, give it a label, and refer to it in the text
4. (a) What is the advantage of giving a presentation of the research work? Write a short note on poster presentation. Give the general format of a poster.
- (b) Make a Beamer presentation on the topic 'The Mathematical Research' with at least one bullet list and one equation.
- (c) Explain the use of the PSTricks commands `\begin{pspicture}`, `\pscircle`, and `\psline`, and describe how coordinates are used in PSTricks.
5. (a) Describe the following web resources for mathematics, with reference to research in Mathematics:
- (i) MAA
 - (ii) MathsSciNet
 - (iii) ArXiv

- (b) What is Impact Factor of a journal? Who introduced Impact Factor and when? Which database can be used to find the impact factor of a journal?
 - (c) Explain in detail, the journal metrics SJR and MCQ.
6. (a) Describe research ethics concerning :
- (i) the participants
 - (ii) the researchers.
- (b) Explain the key features of the databases 'MathSciNet and 'Scopus'. Write the official websites for accessing these databases.
- (c) What do you mean by plagiarism with reference to a mathematical writing? Name any plagiarism checker software. What can be the possible penalties, that a researcher might face in case, the publisher finds out the researcher's work to be plagiarized?