STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
(For candidates admitted during the academic year 2019 – 20 & thereafter)
SUBJECT CODE : 19MT/PC/RT34
M.Sc. DEGREE EXAMINATION, Dec 2020
BRANCH I – MATHEMATICS
THIRD SEMESTER

COURSE : CORE
PAPER : **RESEARCH METHODS AND TOOLS**
TIME : 90 minutes MAXIMUM MARKS : 50

THEORY

Answer ***ANY ONE*** question (1×10=10)

1. Write about data collection and analysis.
2. What are the salient features of report writing?

PRACTICAL

Answer ***ANY TWO*** of the questions (2×20 = 40)

3. Typeset the article given in Page 2 in LaTeX:
4. (a) Write the LaTeX-TikZ code to draw the graph given in Page 3.
   (b) Plot the surface $< 2\cos u \sin v, 2\sin u \ \sin v, 2\cos v >, 0 \leq u \leq 2\pi, 0 \leq v \leq \pi$ both in TikZ and Matlab. $(10 + 10)$
5. (a) Write a matlab function called **`diagright`** that takes as input a matrix and compute the sum of the elements in the upper triangular matrix.
   (b) Write a matlab script to create a 4×2 matrix of all zeros and store it in a variable. Then, replace the second row in the matrix with all 3's.
   (c) Obtain the derivative and integral of the polynomial $x^4 - 3x^2 + 7x + 1$ in matlab.
   (d) Write a matlab script to add the first 10 natural numbers but stop the program when the sum exceeds 20.
   (e) Write a matlab script to prompt the user to input a color code(single letter) and prints some message according to the color. $(5 \times 4 = 20)$

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An Introduction to Sets*

Name 1
His Instituition

Name2
His University

Abstract

This article discusses the basics of classical sets.

1 Introduction

The mathematical concept of a set can be used as the foundation for many branches of modern Mathematics.

Outline First let us define a set and discuss some of its properties[2]. The collection of all students in class, the collection of positive integers less that 100 forms a set.

2 The Concept of a Set

Definition 1. *The collection of well-defined objects forms a set[1].*

2.1 Examples:

$$A = \{x \mid x \in \mathbb{R} \text{ and } x^4 - 2x^2 + 1 = 0\}$$

2.2 Some More Examples:

- The set of even factors of 256
- The set of vowels in the word "education"

3 Properties

Theorem 1. *For the sets A, B, we have*

(i) $A \cap B = B \cap A$

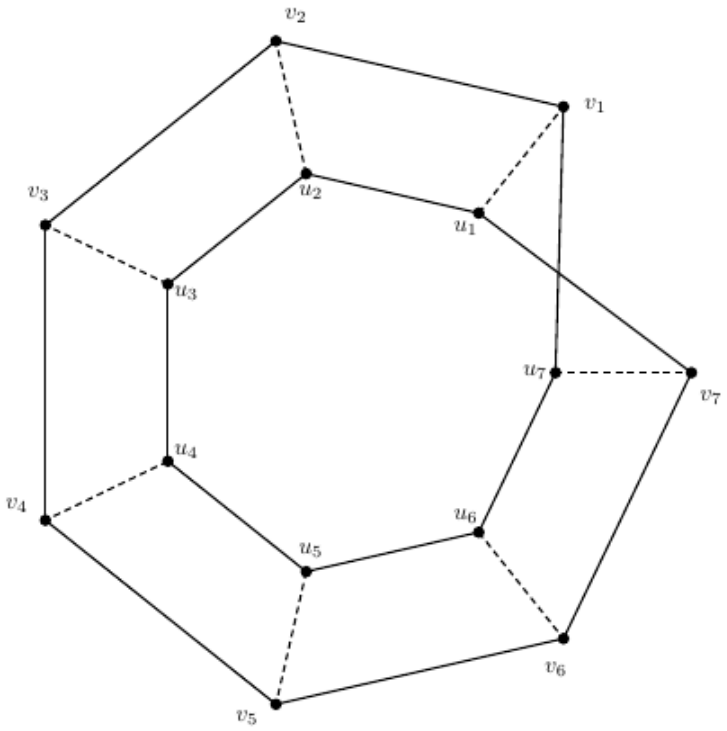
(ii) $A \cup B = B \Leftrightarrow A \subseteq B$

References

[1] Herstein, I.N. *Topics in Algebra*. Second Edition, New York : John Wiley, 2006.

[2] Naik, K.V. *Modern Algebra*. Chennai :Emerald, 1986

*Classical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