2-Year Master's Program in Mathematics (NEP-2020)
RESEARCH METHODOLOGY

Master's Mathematics (2nd Semester) Total Credits: 04
Course Code: MMTHDRM226 (15 hours per credit) Total Marks: 100
Continuous Assessment: Marks 30, Theory: Marks 70 Time Duration: 2½ hrs

Course Learning Outcomes(CLO's): After completion of this course, students shall have accquired

CLO1. The basic concepts of research methods & methodology
CLO2. The awareness about research ethics.
CLO3. The knowledge of research database and scientific documentation LaTex.
CLO4. The basics of mathematical software MATLAB.

UNIT-I
Meaning of research, objectives of research, motivation in research, types of research, identification of a research problem, research Methods vs Methodology. Scientific conduct: Intellectual honesty and research integrity, Plagiarism, conflicts of interest, violation of publication ethics, predatory publishers and journals.

UNIT-II
Research design and drafting of research plan for funding and research programe. Paper writing skills. Indexing database: citation databases, web of science, scopus, Mathscinet, SCI, ESCI etc, Impact factor, H-index, Google scholar. Use of plagiarism software's like Turnitin, Urkund and other open source software tools.

Unit III
Basics of MATLAB, Overview of features and workspace, Data types, Arrays: Initialization and definition, Array, functions, 2---D Arrays, Multidimensional Arrays, Processing Array elements, Array sorting, Matrices: Matrix Operations & Functions, Special Matrices. Decision Making using If---Else and Switch, Function definitions, Function arguments, Function returns, Embedded Functions, Files and I/O, Reading from a file, Writing to a file, Formatting output, For Loops, Do While Loop, Plots and Graphs, Plot Types, Plot Formatting, Multiple Plots, Plot Fits.

Unit IV
Installation of Kile and MikTeX, Simple typesetting, Spaces, Quotes, Dashes, Accents, Special symbols, Text positioning; Fonts: Type Style, Type Size, The Document: Document class, Font and Paper size, Page formats; Page style: Heading declarations, Page numbering, Formatting Lengths, Understanding Latex compilation Basic Syntax, Writing equations, Matrix, Tables, Page Layout – Titles, Abstract Chapters, Sections, References, Equation references, citation. List making environments Table of contents, Generating new commands, Figure handling numbering, List of figures, List of tables, Generating index, Packages: Geometry, Hyperref, amsmath, amssymb, algorithms, algorithmic graphic, color, tiles listing. Classes: article, book, report, beamer, slides.

CLO-PLO Mapping Matrix (Strength version)

CLO ↓ PLO →	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	Average CLO
MMTHDRM226.1	3	3	3	3	3	3	3	3	**3**
MMTHDRM226.2	3	3	3	3	2	3	3	3	**2.87**
MMTHDRM226.3	3	1	3	1	1	1	2	3	**1.88**
MMTHDRM226.4	3	2	3	1	2	3	1	3	**2.25**
Average PLO	**3**	**2.25**	**3**	**2**	**2**	**2.5**	**2.25**	**3**	**2.5**

Recommended Books

1. P. Chaddah (2018) Ethics in Competitive Research: Do not forget scooped; do not get plagiarized,
   ISBN: 978-9387480865.
2. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN: 978-939482-1-7.
3. Research Methodology: Methods and Techniques, Kothari, C.R., New Age Inter., 4th Ed. 2019.
4. E. Krishnan. LATEX Tutorials A PRIMER.Indian TEX Users Group, Trivandrum, India, 2003
5. William J. Palm III, Introduction to MATLAB for Engineers, McGraw-Hill Education, 3rd Edition, 2011
6. Lawerence F. Shampine, Solving Odes with MATLAB, McGraw-Hill Education, 1st Edition, 2003.