INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**MASTER OF TECHNOLOGY in CHEMICAL ENGINEERING**
SEMESTER	**1**
COURSE TITLE	**RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS**
COURSE CODE	**01CM0115**
COURSE CREDITS	**2**

Objective:

1 To study the fundamentals of research methodology and its application in diverse areas of science and engineering.

Course Outcomes: After completion of this course, student will be able to:

1 Formulate the research problems

2 Analyze research related information and experimental datasets

3 Understand the ethical aspects of research activities

4 Integrate the concepts of IPR and patents for developing better products

Pre-requisite of course: Knowledge of all core courses

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
2	0	0	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
1	**Research and Research Design** Scope and objectives of research problem, Characteristics of a good research problem, Possible errors in research problem selection, Approaches for solutions of research problems, data treatment, Formulation of Problem Statement, Literature review, Experimental/theoretical investigations, Sources and databases for relevant research papers, Importance of graphical abstract and visual information, table of contents, understanding the concept of novelty, bibliographyand reference tools	8
2	**Ethics and Research approach** Effective literature studies approach, Importance of Plagiarism check and authentication of research work, Research ethics and its guidelines, Journal selection, understanding of proof reading, Importance of research analysis tool andsoftware etc	6

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Contents : Unit	Topics	Contact Hours
3	**Data analysis & Interpretation** Understanding the relevance of technical writing, developing a research statement, statement of novelty, technical report, project proposal etc., Research paper planning and writing, developing a Research Proposal, Format of research proposal, Emerging areas of environmental research, Research presentation and assessment approaches	6
4	**Intellectual Property and Rights** Patents, Designs, Scope of Patent Rights, Copyright; Licensing and transfer of technology, Process of Patenting and Development, International patent organizations and their scopes, international cooperation on Intellectual Property, Procedure for grants of patents, Patenting under PCT, IPR of Biological Systems and Software, Case Studies	8
Total Hours		**28**

Textbook :

1 Research methodology: Methods and techniques. , Kothari, C. R., New Age International., 2004

References:

1 Handbook of research methodology: a compendium for scholars and researchers, Handbook of research methodology: a compendium for scholars and researchers, Alok, S., & Mishra, S. B, Educreation Publishing., 2017

2 Research methodology: A step-by-step guide for beginners, Research methodology: A step-by-step guide for beginners, Kumar, R. , Pearson Education, 2018

3 Research methodology: A practical and scientific approach, Research methodology: A practical and scientific approach, Bairagi, V., & Munot, M. V. , CRC Press, 2019

4 Research methodology: A handbook for beginners, Research methodology: A handbook for beginners, Devi, P. S., Notion Press., 2017

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

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Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacherin addition to conventional teaching method by white board, may also use any of tools such as collaborative learning, demonstration, role play, Quiz, brainstorming, MOOCs, Active Learning Assignments etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

3 Practical examination will be conducted at the end of semester for evaluation of performance of students inlaboratory.

4 Students will use supplementary resources such as online videos, Virtual Laboratory NPTEL videos, e-courses.

Supplementary Resources:

1 https://onlinecourses.swayam2.ac.in/ntr24_ed08/preview

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