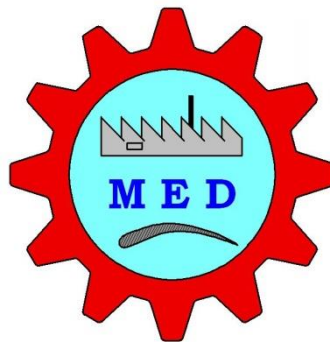


**M.Tech.: Nanotechnology
(2020 - 2022)**

**Scheme of Teaching and Examination &
Syllabus**



Department of Mechanical Engineering

The National Institute of Engineering, Mysuru

THE NATIONAL INSTITUTE OF ENGINEERING

VISION

NIE will be a globally acknowledged institution providing value based technological & educational services through best-in-class people and infrastructure.

DEPARTMENT OF MECHANICAL ENGINEERING

VISION

Moulding students of Mechanical Engineering with clear concepts and practical knowledge by imparting value-based education for overall development as competent engineers.

MISSION

The Mechanical Engineering Department is committed to:

- Provide a strong foundation in mechanical engineering to make our engineers globally competitive.
- Inculcate creativity and passion to develop innovative solutions to engineering problems.
- Creating centre's of Excellence to provide faculty and students with opportunities to strengthen their training research and leadership skills.
- Build relationships with globally acknowledged academic institutions and Industries in India & abroad to enhance our teaching and research proficiency.

GRADUATE ATTRIBUTES

1. Engineering Knowledge
2. Problem Analysis
3. Design/Development of Solutions
4. Conduct Investigations of complex problems
5. Modern tools usage
6. Engineer and Society
7. Environment and Sustainability
8. Ethics
9. Individual & Team work
10. Communication
11. Project management & Finance
12. Lifelong learning

PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)

- Graduates will have successful careers as engineers in the multidisciplinary field of Nanotechnology
- Graduates will be able to pursue advanced studies and involve in a process of lifelong learning.
- Graduates will address societal problems professionally, ethically with due attention to environmental issues.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

PSO 1: Able to understand and apply the knowledge gained during the course of the programme from Physics, Mathematics, Chemistry and Engineering and acquired the competence in Nanotechnology field.

PSO 2: Able to engage in research and life-long learning to provide technical solutions to interdisciplinary problems in science and technology, considering the temporal and societal context into account, able to apply ethical and management principles to work in a team as well as to lead a team.

PROGRAMME OUTCOMES (PO's)

At the completion of two year post-graduate program, the students of Nanotechnology, NIE are expected to acquire the abilities to:

PO1. Independently carry out research/investigation and development work to solve practical problems in Nanotechnology.

PO2. Write and present a substantial technical report/document.

PO3. Demonstrate a degree of mastery over Nanotechnology.

PO4. Employ modern engineering and nanotechnology concepts to cater the needs of the community.

PO5. Provide solutions to varied engineering and scientific problems up to molecular/atomic scales through the interpretation of data using modern sophisticated Instruments and computational tools.

BLUEPRINT OF SYLLABUS STRUCTURE AND QUESTION PAPER PATTERN

Blue Print of Syllabus Structure

1. Complete syllabus is prescribed in SIX/FIVE/THREE Modules as MODULE 1, MODULE 2, and MODULE 3 etc.
2. In each module there is one topic under the heading “**Self Learning Exercises**” (SLE). These are the topics to be learnt by the student on their own under the guidance of the course instructors. Course instructors will inform the students about the depth to which SLE components are to be studied. Thus there will be six modules in the complete syllabus which will carry questions with a weightage of 10% in SEE only. No questions will be asked on SLE components in CIE.

Blue Print of Question Paper

1. Question paper will have **SEVEN** full questions.

One full question each of 15 marks (Question No 1, 2, 3, 4, 5 and 6) will be set from each Module of the syllabus. Out of these six questions, two questions will have internal choice from the same Module. The Module from which choices are to be given is left to the discretion of the course instructor.

2. Question No 7 will be set for 10 marks only on those topics prescribed as “**Self Learning Exercises**”.

SCHEME OF TEACHING AND EXAMINATION I SEMESTER M. Tech.							
Sl. No.	Code	Subject	Dept./Board	Hrs/week			Credits
				L	T	P	
1	APM1C01	Applied Engineering Mathematics	Mathematics	4	0	0	4
2	MNT1C01	Quantum Mechanics	Mechanical/CNT	4	2	0	5
3	MNT1C02	Nano-Science & Nanomaterials	Mechanical/CNT	4	2	0	5
4	MNT1C03	Synthesis and Characterization of Nanomaterials	Mechanical/CNT	3	2	0	4
5	MNT1E1XX	Department Elective I	Mechanical/CNT	3	0	0	3
6	MNT1E2XX	Department Elective II	Mechanical/CNT	3	0	0	3
7	MNT1CRM	Research Methodology	Mechanical/CNT	2	0	0	2
8	MNT1L01	Laboratory-1 (Synthesis of Nanomaterials Lab)	Mechanical/CNT	0	0	2	1
Total				31			27

C - Core, E - Elective

Elective I – 3 Credits					
1	MNT1E101	Advanced Material Science	2	MNT1E102	Bio safety And Hazards of Nano Materials

Elective II – 3 Credits					
1	MNT1E201	Nanostructured Materials for Clean Energy Systems	2	MNT1E202	Nanotechnology in food and Agriculture

SCHEME OF TEACHING AND EXAMINATION II SEMESTER M. Tech.							
Sl. No.	Code	Subject	Dept./Board	Hrs/week			Credits
				L	T	P	
1	MNT2C01	Nanomaterials, Surface Interface and Catalysis	Mechanical/CNT	4	2	0	5
2	MNT2C02	Carbon Nanostructures and Applications	Mechanical/CNT	4	2	0	5
3	MNT2C03	Nano Electronics	Mechanical/CNT	4	0	0	4
4	MNT2C04	Nano sensors and Nanodevices	Mechanical/CNT	3	2	0	4
5	MNT2E3XX	Department Elective-3	Mechanical/CNT	3	0	0	3
6	MNT2E4XX	Department Elective-4	Mechanical/CNT	3	0	0	3
7	MNT2IXX	Industry Driven Elective	Mechanical/CNT	2	0	0	2
8	MNT2L01	Laboratory-2 (Characterization of Nanomaterials Lab)	Mechanical/CNT	0	0	2	1
Total				31			27

C - Core, E - Elective, IDE - Industry Driven Elective

Elective III – 3 Credits					
1	MNT2E301	Composite Materials and Applications	2	MNT2E302	Entrepreneur Development & Project Management

Elective IV – 3 Credits					
1	MNT2E401	Micro and Nano Fluidics	2	MNT2E402	Nanotechnology and drug delivery system

Industry Driven Elective – 2 Credits					
1	MNT2I01	Industrial Nanotechnology	2	MNT2I02	Nanotechnology in Health Care
3	MNT2I03	Materials and Processes for Industrial Applications			

SCHEME OF TEACHING AND EXAMINATION III SEMESTER M. Tech.						
Sl. No.	Subject Code	Subject	L	T	P	Cr.
1	MNT3OXX	Open Elective (MOOC)*	2	0	0	2
2	MNT3C01	Management (MOOC)*	3	0	0	3
3	MNT3C02	Seminar/Paper Presentation	0	0	0	1
4	MNT3C03	Internship**	0	0	0	5
5	MNT3C04	Project Phase-I	0	0	0	8
Total Credits						19

* No class room intervention in III semester.

** Student has to satisfy the necessary criteria for the award of internship credits.

Open Electives – 3 Credits					
1	MNT3O01	Imaging Techniques for Materials characterizations	2	MNT3O02	Advanced Nanocomposites

SCHEME OF TEACHING AND EXAMINATION IV SEMESTER M. Tech.						
Sl. No	Subject Code	Subject	L	T	P	Cr.
1	MNT4C01	Project- Phase-2	0	0	0	15
Total Credits						15

Subject	Credits
Core Courses	38
Elective Courses	12
Industry Driven Elective	02
Research Methodology	02
Seminars/Internship/Preliminary Project (III Semester)	19
Major Project work (IV Semester)	15
TOTAL	88