

**M.Tech: Industrial Automation & Robotics
(2021 - 2023)**

**Scheme of Teaching and Examination &
Syllabus**



**Department of Mechanical Engineering
The National Institute of Engineering, Mysuru**

BLUEPRINT OF SYLLABUS STRUCTURE AND QUESTION PAPER PATTERN

Blue Print of Syllabus Structure

1. For 4 credit courses complete syllabus is prescribed in SIX Modules as Module 1, Module 2,etc.
2. For 3 credit courses complete syllabus is prescribed in FIVE Modules as Module 1, Module 2,etc.
3. For 2 credit courses complete syllabus is prescribed in THREE Modules as Module 1, Module 2 andModule3.
4. 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. SLE 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. For 4 Credit Courses

- i. Maximum Marks in SEE is 100 and duration of examination is 3hours
- ii. Question paper will have **SIX** 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.
- iii. Question No 7 will be set for 10 marks only on those topics prescribed as “**Self Learning Exercises**”.

2. For 3 Credit Courses

- i. Maximum Marks in SEE is 100 and duration of examination is 3hours
- ii. Question paper will have **FIVE** full questions. One full question each of 18 marks (Question No 1, 2, 3, 4 and 5) will be set from each module of the syllabus. Out of these five 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.
- iii. Question No 6 will be set for 10 marks only on those topics prescribed as “**Self Learning Exercises**”.

3. For 2 Credit Courses

- i. Maximum Marks in SEE is 50 and duration of examination is 2hours
- ii. Question paper will have **Three** full questions. One full question each of 15 marks (Question No 1, 2 and 3) will be set from each module of the syllabus. Out of these three questions, one question will have internal choice from the same module. The module from which choice is to be given is left to the discretion of the course instructor.
- iii. Question No 4 will be set for 5 marks only on those topics prescribed as “**Self Learning Exercises**”.

CURRICULUM & SYLLABUS

NATIONAL INSTITUTE OF ENGINEERING**VISION**

NIE will be a globally acknowledged institution providing value-based technical and scientific education through best-in-class talent.

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 centers 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 & Teamwork
10. Communication
11. Project management & Finance
12. Lifelong learning

PROGRAMME EDUCATIONAL OBJECTIVES

1. Graduates will be successful as engineers in the industry and provide solutions to problems faced in the multi-disciplinary field of Automation & Robotics.
2. Graduates will have the ability to be an integral part of research programmes and involve in a process of lifelong learning.
3. Graduates will address problems in the society in a professional & ethical manner with due attention to environmental issues.

PROGRAMME OUTCOMES

At the completion of two year post-graduate program, the students of Industrial Automation & Robotics, NIE are expected to acquire the abilities to:

PO1. Independently carry out research/investigation and development work to solve practical problems in Industrial Automation & Robotics.

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

PO3. Demonstrate a degree of mastery over Industrial Automation & Robotics.

PO4. Employ Artificial Intelligence and robotics tool to cater into industrial automation needs in both discrete and process plants.

PO5. Provide solutions to varied engineering problems through the interpretation of data using modern computational tools.

PROGRAM SPECIFIC OUTCOMES

PSO1: Post-Graduation in Industrial Automation & Robotics prepares the students by providing training in the key interdisciplinary areas such as Drives, PLC, SCADA, Artificial intelligence, Big data analytics, Vision sensor system, Mechatronics, Modeling-simulation, Industrial Robotics and Mobile robotics with hands-on experience.

PSO 2: Interaction and collaborations with outside industries and institutes to achieve good academic track records to enhance research and entrepreneurship skills.

SCHEME OF TEACHING AND EXAMINATION
Course Structure: I Semester

Sl. No.	Subject Code	Subject	Dept/ Board	Contact Hrs. / Week			Credits
				L	T	P	
01	APM1C01	Applied Mathematics	Mathematics	4	0	0	4
02	IAR1C01	Robotics for Industrial Automation	Mechanical	4	2	0	5
03	IAR1C02	Industrial Automation	Mechanical	4	0	2	5
04	IAR1C03	Drives and Control Systems for Automation	Mechanical	3	2	0	4
05	IAR1E1XX	Elective-I	Mechanical	3	0	0	3
06	IAR1E2XX	Elective -II	Mechanical	3	0	0	3
07	IAR1CRM	Research Methodology	Mechanical	2	0	0	2
08	IAR1L01	Laboratory – 1 (Drives and Controls)	Mechanical	0	0	2	1
Total				31			27

C -Core

E -Elective

L -Laboratory

Sl.No	Code	Elective – I	Sl.No	Elective – II
1	IAR1E101	Modeling, Simulation and Analysis of Manufacturing Systems.	1	IAR1E201 Computer Aided Production and Operation Management
2	IAR1E103	Automatic Control Systems	2	IAR1E202 Entrepreneurship Development
3	IAR1E104	Mathematical Approach to Robotic Manipulators	3	IAR1E203 Artificial Intelligence and Expert Systems in Automation

SCHEME OF TEACHING AND EXAMINATION**Course Structure: II Semester**

Sl. No.	Subject Code	Subject	Dept/ Board	Contact Hrs. / Week			Credits
				L	T	P	
01	IAR2C01	Computer Aided Engineering	Mechanical	3	2	0	4
02	IAR2C02	Sensors Applications in Manufacturing	Mechanical	3	2	0	4
03	IAR2C03	Big Data Analytics for Automation	Computer Science	4	2	0	5
04	IAR2C04	Microprocessors and Micro- Controllers	Electronics & Communication	4	0	2	5
05	IAR2E3XX	Elective - III	Mechanical	3	0	0	3
06	IAR2E4XX	Elective - IV	Mechanical	3	0	0	3
07	IAR2IXX	Industry Driven Elective	Industry	2	0	0	2
08	IAR2L01	Laboratory – 2 (Automation Laboratory)	Mechanical	0	0	2	1
Total				32			27

*C-Core**E-Elective**I- Industry Driven Elective**L -Laboratory*

Sl.No	Code	Elective - III	Sl.No	Elective - IV	
1	IAR2E302	Computer Vision and Image Processing	1	IAR2E401	Automotive Electronics
2	IAR2E303	Product Design & Development	2	IAR2E402	Additive Manufacturing
3	IAR2E304	Industrial Internet of Things	3	IAR2E404	Humanoid Robotics

Sl.No	Code	Industry Driven Elective
1	IAR2I01	Advanced Embedded Systems
2	IAR2I02	Application of Labview in Automation
3	IAR2I03	Python Programming for Automation

SCHEME OF TEACHING AND EXAMINATION**Course Structure: III Semester**

Sl. No.	Subject Code	Subject	Dept./Board	L	T	P	Credits
01	IAR3MXX	MOOC-Elective (Management Stream) 12 weeks course	SWAYAM	-	-	-	3
02	IAR3MOXX	Open-MOOC-Elective (Any stream) 8 weeks course	SWAYAM	-	-	-	2
03	IAR3C02	Seminar/Paper presentation	Mechanical	0	0	0	1
04	IAR3C03	Internship (Industrial training for 8 weeks duration, at the end of training , students are required to submit a report and present a seminar)	Mechanical	0	0	0	5
05	IAR3C05	Project Phase-I (Students have to initiate the project work and at the end of the semester should present a progress seminar)	Mechanical	0	0	0	8
Total Credits							19

SCHEME OF TEACHING AND EXAMINATION**Course Structure: IV Semester**

Sl. No.	Subject Code	Subject	L	T	P	Credits
01	IAR4C01	Project –Phase2 (Students have to submit the final project report at the end of the semester which will be evaluated followed by a seminar presentation and Viva-voce Examination)	0	0	0	15
Total number of Credits						15

Credit Structure

Subject	Credits
Core Courses	36
Elective Courses	12
MOOC Elective	05
Industry Driven Elective	02
Research Methodology	02
Seminars , Internship & Preliminary Project (III Semester)	14
Lab Components(1&2)	02
Major Project work (IV Semester)	15
TOTAL NUMBER OF CREDITS	88

Legend:

- 1) L – Lecturers Hrs/Week
- 2) T – Tutorials Hrs/Week
- 3) P – Practical Hrs/Week
- 4) SLE – Self Learning Exercise