Maharashtra Institute of Technology

(An Autonomous Institute)

Proposed Honors* in major Disciplines Bachelor of Mechanical Engineering

Agricultural Engineering

Plastic and Polymer Engineering
(With effect from A.Y. 2022-23)

Honours* in Robotics and Automation

Year & Semester	Course Code	Course	L	T	P	MSE-1	MSE-II	CIE	TA	ESE	PR	Total Marks	TH / TU	PR	Total Credit
SY IV	MED-901	Fundamentals of Automation	04	--	--	15	15	10	10	50	--	100	04	--	04
	MED-971	Lab- Fundamentals of Automation	--	--	02	--	--	--	25	--	--	25	--	01	01
		Total	04	-	02			125			--	125	04	01	05
													Total Credits=05		
TY V	MED-902	Fundamentals of Robotics	04	--	--	15	15	10	10	50	--	100	04	--	04
		Total	04	-	-			100			--	100	04	--	04
													Total Credits=04		
TY VI	MED-903	Automation System Design	04	--	--	15	15	10	10	50	--	100	04	--	04
	MED-972	Lab. Automation System Design	--	--	02	--	--	--	25	--	--	25	--	01	01
		Total	04	--	02			125			--	125	04	01	05
													Total Credits=05		
Final B. Tech. VII	MED-904	Robotics & Automation	04	--	--	15	15	10	10	50	--	100	04	--	04
		Total	04	--	--			100			--	100	04	--	04
													Total Credits=04		
Final B. Tech. VIII	MED973	Mini Project	--	--	04	--	--	--	25	--	25	50	--	02	02
		Total	--	-	04	--	--	--	25	--	25	50	--	02	02
													Total Credits=02		

Total Credit for Semester IV+V+VI+VII +VIII= 20

MSE- Mid Semester Exam, ESE- End Semester Examination, TH-Theory, OR- Oral, TA-Teacher Assessment. PR- Practical, Tut- Tutorial, CIE-Continuous Internal Evaluation

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Dean
Academics
Maharashtra Institute of Technology
Aurangabad.

Chairman Academic Council
MIT Aurangabad i
(An Autonomous Institute)

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

Department of Mechanical Engineering

Syllabus of SY B. Tech. (Honours* in Robotics and Automation) Semester-IV

Course Code: MED- 901 Fundamentals of Automation	MSE – I: 15 Marks
	MSE-II: 15 Marks
Teaching Scheme:	Continuous In-Semester Evaluation: 10 Marks
Theory: 04 hrs./week	
Credits: 4-0-0	Teacher's Assessment: 10
	End Semester Examination: 50
	Examination Duration: 2Hrs

Unit 1	Introduction Automation in Production System, Principles and Strategies of Automation, Basic Elements of an Automated System, Advanced Automation Functions, Levels of Automations. (06 Hrs)
Unit 2	Type of Automation, Automated Flow lines, Methods of Work-part Transport, Transfer Mechanism, Buffer Storage, Control Functions, and Automation for Machining Operations, Design and Fabrication Considerations. Automated Flow Lines: General Terminology, Partial Automation, Automated Flow. (06 Hrs)
Unit 3	Material handling and its function, Types of Material Handling Equipment, Analysis for Material Handling Systems, Design of the System, Conveyor Systems, Automated Guided Vehicle Systems. Automated Storage/Retrieval Systems. Automated Assembly Systems: Design for Automated Assembly, Types of Automated Assembly Systems, Part Feeding Devices. (06 Hrs)
Unit 4	Introduction to flexible manufacturing systems, Types of FMS, Components of FMS, Group Technology, (06 Hrs)
Unit 5	Automated Inspection and Testing Inspection and testing, Statistical Quality Control, Automated Inspection Principles and Methods, Sensor

		Technologies for Automated Inspection, Coordinate Measuring Machines, Machine Vision, Other optical Inspection Methods. (06 Hrs)			
Unit 6		Programmable Logic Controllers (PLCs)- Introduction to PLC, Logic Functions, Input & Output Modules, PLC Processors, PLC Instructions, Introduction to Programming a PLC. (06 Hrs)			
Reference / Text Books	Sr. No.	Title	Author	Publication	Edition
	1	Programmable Logic Controller	W. Bolton	Newnes	4th Edition
	2	Mechatronics	Robert H. Bishop	Tailor and Francis	1st Edition 2006
	3	Computer Based Industrial Control	Krishna kant,	TMH	2nd revised edition
	4	Automatic Control system	Hasan Sayeed	New India publications	1st edition

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Master Copy

Page **2** of **12**

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

Department of Mechanical Engineering

Syllabus of SY B. Tech. (Honours* in Robotics and Automation) Semester-IV

Course Code: MED971	Credits: 0-0-1
Course: Laboratory Fundamentals of Automation	Teacher's Assessment: 25 Marks
	Practical: Nil
Teaching Scheme:	
Practical: 2 Hrs/week	

List of practical	1. Study of automation system components.
	2. Study and demonstration of CNC machines.
	3. Study of various material handling systems.
	4. Study and demonstration of robot system.
	5. Study of FMS systems and its components.
	6. Study and demonstration of ASRS.
	7. Study of automated flow lines.
	8. Demonstration and study of PLC and its components.
	9. PLC programing for ON/OFF of a motor
	10. Case study of a typical automation system.

Maharashtra Institute of Technology, Aurangabad

<table>
<tr><td colspan="2" align="center">Maharashtra Institute of Technology, Aurangabad
(An Autonomous Institute)
Department of Mechanical Engineering
Syllabus of TY B. Tech. (Honours* in Robotics and Automation) Semester-V</td></tr>
<tr><td>Course Code: MED902
Course: Fundamentals of Robotics
Teaching Scheme:
Theory: 4 Hrs/week
Tutorial: 00 Hr/week</td><td>Credits: 4-0-0
Mid Semester Examination-I: 15 Marks
Mid Semester Examination-II: 15 Marks
Continuous Internal Evaluation:10 Marks
Teacher Assessment: 10 Marks
End Semester Examination: 50 Marks
End Semester Examination (Duration): 2 Hrs</td></tr>
<tr><td>Unit 1</td><td>Introduction Robot configurations, Robot Anatomy Basic Components of Robot Systems: Manipulators, end effectors, sensors, controllers etc. Mechanical System in Robotics: Robot motion analysis and control, Robot kinematic, position analysis.   (06 Hrs)</td></tr>
<tr><td>Unit 2</td><td>Electrical Drives for Robot Stepper motor, DC motors, AC motors, hydraulic and pneumatic systems, drive selection for robotics joints.   (06 Hrs)</td></tr>
<tr><td>Unit 3</td><td>Robotic grippers and Sensors Linkage activated mechanical grippers, adhesive grippers, magnetic grippers, collets, scoops, expansion bladders, etc.   (06 Hrs)</td></tr>
<tr><td>Unit 4</td><td>Sensors in Robotics: Position sensor, velocity sensor, proximity sensors, touch sensors, force sensors. Vision Sensor.   (06 Hrs)</td></tr>
<tr><td>Unit 5</td><td>Robot Programming methods – Teach Pendant, Joint Co-ordinates, Global co-ordinates, Tool co-ordinates, Workpiece co-ordinates, Lead through, Off-line programing, Applications of Robots Application of robots in Material Handling, process operations and Assembly and inspection.   (06 Hrs)</td></tr>
<tr><td>Unit 6</td><td>Collaborative Robots, Types of Cobots. Robot Implementation Issues Approach for implementing Robotics, Safety, Training and Maintenance Social Aspects of</td></tr>
</table>

Robotics. (06 Hrs)

	Sr. No	Title	Author	Publication	Edition
Reference / Text Books	1	Robotics Control, Sensing, Vision and Intelligence	Fu.K.S. Gonzalz.R.C., and Lee C.S.G	McGrawHill Book Co	1987
	2	Robotics for Engineers	Yoram Koren	McGrawHill Book Co	1992
	3	Robotics and Image Processing	Janakiraman.P.A	Tata McGrawHill	1995
	4	Autonomus Mobile Robot	Ronald Siegwart, Illah R. Nourbakhsh	MIT	

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Master Copy

Page **5** of **12**

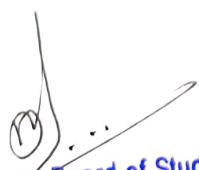**Maharashtra Institute of Technology, Aurangabad**

(An Autonomous Institute)

Department of Mechanical Engineering

Syllabus of TY B. Tech. (Honours* in Robotics and Automation) Semester-VI

Course Code: MED903	Credits: 4-0-0
Course: Automation System Design	Mid Semester Examination-I: 15 Marks
	Mid Semester Examination-II: 15 Marks
Teaching Scheme:	Continuous Internal Evaluation:10 Marks
Theory: 4 Hrs/week	Teacher Assessment: 10 Marks
Tutorial: 00 Hr/week	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Unit 1	Sensors and Transducers, Classification and types of sensors, Digital sensors – Proximity Sensors, Reed sensors, temperature switch, pressure switch, Selection of sensors and transducers, Analog sensors and ADC. (06 Hrs)
Unit 2	Pneumatic Actuators – linear, rotary, semi-rotary cylinders, Direction control valves, Flow Control Valves, Typical pneumatic system working, Comparison between Hydraulic and Pneumatic systems. (06 Hrs)
Unit 3	Selection of Motors, Basics of - Induction motors, Stepper motors, Servo motors, Variable frequency drives - Introduction. (06 Hrs)
Unit 4	Selection of Mechanical components Gears, bearing, chain, sprockets, shafts, belts conveyor and its types. (06 Hrs)
Unit 5	Selection of PLC and PLC programming basics – programming for typical latching circuit etc., Types of PLC programming methods. (06 Hrs)
Unit 6	Automation system design, developing automation system for a typical industrial application. Case study of automation system. (06 Hrs)

	Sr. No	Title	Author	Publication	Edition
Reference / Text Books	1	Programmable Logic Controller	W. Bolton	Newnes	4th Edition
	2	Mechatronics	Robert H. Bishop	Tailor and Francis	1st edition
	3	Process Control Instrumentation	Curtis Johnson	PHI.	2005

Master Copy

| 4 | SCADA | Stuart A Boyer | ISA. | 4th Eedition |

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Master Copy

Page **7** of **12**

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

Department of Mechanical Engineering

Syllabus of TY B. Tech. (Honours* in Robotics and Automation) Semester-VI

Course Code: MED972		Credits: 0-0-1
Course: Laboratory Automation System Design		Teacher's Assessment: 25 Marks
		Practical: Nil
Teaching Scheme:		
Practical: 2 Hrs/week		
List of practical	1. Sensor demonstration and study of sensor applications.	
	2. Actuators demonstration and study of actuator applications.	
	3. Study and demonstration of pneumatic systems.	
	4. Study and demonstration of hydraulic systems.	
	5. Demonstration and study of robot and its components.	
	6. Robot programing for given co-ordinates.	
	7. Study and demonstration of PLC and its components.	
	8. PLC programming – SR and RS blocks.	
	9. PLC programming – Latching.	
	10. Case study of a mechatronics system.	

Chairman Board of Studies
Mechanical Engineering
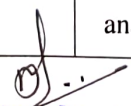MIT Aurangabad
(An Autonomous Institute)

Master Copy

Maharashtra Institute of Technology, Aurangabad	
(An Autonomous Institute)	
Department of Mechanical Engineering	
Syllabus of Final Year B. Tech. (Honours* in Robotics and Automation) Semester-VII	

Course Code: MED904	Credits: 4-0-0
Course: Automation and Robotics	Mid Semester Examination-I: 15 Marks
Teaching Scheme:	Mid Semester Examination-II: 15 Marks
Theory: 4 Hrs/week	Continuous Internal Evaluation:10 Marks
Tutorial: 00 Hr/week	Teacher Assessment: 10 Marks
	End Semester Examination: 50 Marks
	End Semester Examination (Duration): 2 Hrs

Unit 1	CAD/CAM, Product cycle and CAD CAM in it, CAD- 3D modeling and its types, CAM, and its technologies. (06 Hrs)
Unit 2	Finite Element Analysis, Types of analysis, FEA procedure, Computer Integrated Manufacturing, FMS and its types, FMS Components. (06 Hrs)
Unit 3	SCADA System, SCADA architecture, DCS, Micro Electrical Mechanical Systems, Applications of MEMS. (06 Hrs)
Unit 4	Industry 4.0-History of industrial revolutions, Components of I4.0, IoT and its architecture, applications of IoT - Energy sector, smart homes, and smart cities etc. (06 Hrs)
Unit 5	Digital Manufacturing Industry, role of digital manufacturing in optimizing production cost and time, difference between digitization and digitalization. (06 Hrs)
Unit 6	Cyber physical systems, Cloud computing, Additive manufacturing, Big data analytics etc. (06 Hrs)

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

	Sr. No	Title	Author	Publication	Edition
Reference / Text Books	1	CAD/CAM	M. P. Groower and E. W. Zimmer	Prentice hall of India	2014
	2	CAD/CAM	Zeid Ibrahim, R. Sivasubramanian	Tata McGraw Hill	
	3	The Internet of Things: Applications and Protocols	Oliver Hersent, David Boswarthick, Omar Elloumi	Wiley publications	1st edition 2012
	4	Mechatronics	Robert H. Bishop	Tailor and Francis	1st edition 2006

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

Department of Mechanical Engineering

Syllabus of Final Year B. Tech. (Honours* in Robotics and Automation) Semester-VIII

Course Code: MED973	Credits: 0-0-2
Course: Mini Project	Teacher's Assessment: 25 Marks
Teaching Scheme:	Practical: 25 Marks
Practical: 4 Hrs/week	

Prerequisite	Fundamentals of electrical drives, motors and controllers used in electrical drives

To carry out a min project and simple prototype in the area of interest based on the knowledge gained in Electrical vehicles from undergraduate and first semester. Every individual student will be assigned a faculty to guide them. There will be three major reviews which will be carried out as listed below.

Review #	Requirement	Mark Weightage	
		Internal	External
0	Area/Title selection	-	-
1	Literature review/Proposal for the Project	10%	-
2	Mathematical modelling /CircuitDesign	20%	-
3	Final simulation/Hardware presentation	20%	-
End Semester Exam	Final Viva-Voce and project demonstration	-	50%

The assessment of term work shall be done on the basis of the following.

- Continuous assessment
- Performing the experiments in the laboratory
- Oral examination conducted on the syllabus and term work mentioned above.

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Note:

1. No additional fees will be charged for students opting for Honours/ Minor Degree

2. All the courses in the Honours/ Minor will be conducted in offline mode.

3. Re-examination is not applicable in Honours and Minor Scheme. Student failing in any of the Minor or Honours courses, at any stage will be discontinued from the Scheme.

4. Examination Scheme and Passing rules will be as per the academic rules and regulations of B. Tech.

Chairman Board of Studies
Mechanical Engineering
MIT Aurangabad
(An Autonomous Institute)

Master Copy