

Course Code	18ME563	Course Title	Automation and Robotics	Semester	V
Credits	3	L – T – P –TL*	2 – 1 – 0 - 3	Teaching Hrs	42
Total Marks	100	CIE*	40	SEE*	60
*NOTE: L – Lecture; T – Tutorial; P – Practical; TL – Total; CIE – Continuous Internal Evaluation; SEE – Semester End Examination					
Course Learning Objectives: This course will enable students to; <ul style="list-style-type: none"> • Develop knowledge in different types robots and their working. • Exposed to the basics of sensors, manipulators, actuators and grippers. • Develop skills in knowing automation and material handling systems in industry. 					Teaching Hrs
<p style="text-align: center;">Module – 1</p> Introduction to Robotics: Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov’s laws of robotics . Sensors; Sensors, analog to digital converters, digital to analog converters, input/output devices for discrete data					10
<p style="text-align: center;">Module – 2</p> Power Sources: Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable speed arrangements – path determination. Micro machines: Micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.					8
<p style="text-align: center;">Module - 3</p> Manipulators, Grippers: Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors –various types of grippers. Robot Actuators: Position sensors – Potentiometers, resolvers, encoders, velocity sensors. Actuators - Pneumatic and Hydraulic Actuators, Electric Motors, Stepper motors, Servomotors, Power Transmission systems					8
<p style="text-align: center;">Module – 4</p> Introduction to Automation Basic elements of an automated system, advanced automation functions, levels of automation, process industries versus discrete manufacturing industries. Industrial Automation: List basic Devices in Automated Systems • Distinguish Different Controllers Employed In Automated Systems. Identify Safety in Industrial Automation					8
<p style="text-align: center;">Module - 5</p> Material handling and: Overview of Material Handling Systems, Principles and Design Consideration, Material Transport Systems, Storage Systems, Identification Technologies : Overview of Automatic Identification Methods.					8

Course outcomes: After a successful completion of the course, the student will be able to:

CO1:Identify the Joints, Links, Sensors, Control units,

CO2:Explain Manipulators, Actuators, Grippers and elements of Automation

CO3:Describe Material Handling Systems & automation.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

TEXT BOOKS:

1. Mikell P Groover. Weiss G.M., Nagel R.N., Odraj N.G., Industrial Robotics, McGraw-Hill , Singapore, 1996.
2. Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied 4. Publishers, Chennai, 1998.

REFERENCE BOOKS

1. Deb.S.R., Robotics technology and flexible Automation, John Wiley, USA 1992.
2. Asfahl C.R., Robots and manufacturing Automation, John Wiley, USA 1992.
3. Klafter R.D., Chimielewski T.A., Negin M., Robotic Engineering – An integrated approach, Prentice Hall of India, New Delhi, 1994.
4. Mc Kerrow P.J. Introduction to Robotics, Addison Wesley, USA, 1991. 5. Issac Asimov I Robot, Ballantine Books, New York, 1986.