Yeshwantrao Chavan College of Engineering

Department of Mechanical Engineering

M.Tech (Automation & Robotics)

Program Educational Outcomes (PEOs)

PEO-1: To impart in-depth knowledge to students in the current technologies in Robotics and Industrial Automation andequip them for research and development.
PEO-2: To develop analytical and problem solving capabilities and improve practical solutions related to modern manufacturing techniques.
PEO-3: To create technical ability in post graduate students by imparting hands-on experience on Robots, Advanced Manufacturing machines associated multidisciplinary fields.

Program Outcomes (POs)

At the end of program, student will able to
PO-1: Apply knowledge of Engineering Specialization for Research, development and design solutions of Engineering problems with consideration in health, safety, cultural, societal and environmental issues.
PO-2: Create, apply appropriate techniques and modern Engineering tools to complex Engineering activities in the field of Automation and Robotics with an understanding of its limitation.
PO-3:- Function effectively and ethically as an individual and as a member or leader in diverse and multidisciplinary teams.
PO-4: Develop proficiency in communication of technical and research work.
PO-5: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (PG)

Sem	Type	Sub. Code	Subject	CO	CO STATEMENTS
I	TH	25AR101	Robot Kinematics and Dynamics	1	Describe the fundamental concept of robot kinematics and dynamics
				2	Apply the basic concepts of robot kinematics and dynamics for solution of problems on planar and spatial robotic system
				3	Evaluate the robot through the kinematic (velocity and acceleration) and dynamic (torque and inertia) analysis.
				4	Analyze robotic manipulator
				5	Evaluate the dynamic variables of industrial manipulator
I	PR	25AR102	ab. : ROBOT KINEMATICS AND DYNAMICS	1	Describe the fundamental concept of robot kinematics and dynamics..
				2	Apply the basic concepts of robot kinematics for solution of problems on planar and spatial robotic system
				3	Simulate the robot through the kinematic (velocity and acceleration) and dynamic analysis
				4	Analyze jointed arm robotic manipulator analytically and graphically
				5	Evaluate the dynamic variables of industrial manipulator
I	TH	25AR103	INDUSTRIAL AUTOMATION	1	Describe the fundamental concepts of Automation in Production and Material Handling Systems.(L2)
				2	Summarizes the knowledge in Hydraulic and Pneumatic Systems used in Automated Manufacturing System.(L2)
				3	Summarizes the knowledge in Automated Manufacturing System, Cellular & Flexible Manufacturing System and evaluate the balanced line for Automated Manufacturing System.(L2, L3)
				4	Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body. Summarizes the knowledge in Inspection & Quality Control and apply the basic concepts for solution of problems on quality control. .(L2, L3)
I	TH	25AR104	Automatic Control System	1	Describe the mathematical representation of various control system and determine the transfer function of mechanical and electrical system.
				2	Evaluate the performance of control system using time response analysis and frequency response analysis.
				3	Analyse the working of various control system on the basis of stability

				4	Design and analysis of control system on the basis of performance
I	TH	25AR105	Computer Aided Design	1	Describe the fundamental concepts of CAD tools.
				2	Apply the basic concepts of 2D and 3D transformation for solving engineering problems.
				3	Analyze the importance of computer graphics for plotting curves.
				4	Evaluate the use of different data exchange formats as per the applications.
I	PR	25AR106	Computer Aided Design	1	Describe the fundamental concepts of statics and dynamics
				2	Apply the basic concepts of applied mechanics for solution of problems on planar force system
				3	Determine the properties of surface like centroid, moment of inertia, etc. for planar surfaces and mass moment of inertia for rigid body.
				4	Analyze pin jointed truss frame structure and beam structure analytically and graphically.
					Evaluate the dynamic variables of kinetics of particles and simple lifting machine
I	TH PE1	25AR111	Actuators and Drives	1	Demonstrate the fundamental concepts of various drive mechanism for robotics..
				2	Model the dc and ac drive systems.
				3	Analyze various hydraulic and pneumatic drives used in robotics
				4	Examine the different feedback control methods for dynamic conditions.
I	TH PE1	25AR112	MACHINE LEARNING	1	Describe the fundamental concepts of Artificial Intelligence.
				2	Apply the basic concepts of Planning and Reasoning required for machine learning.
				3	Evaluate the performance of supervised and unsupervised learning required for machines
				4	Adapting the knowledge of Natural Language Processing and its applications
I	TH PE1	25AR113	1 Digital Image Processing and	1	Express the basic knowledge of Image Formation and Coordinate Transformations
				2	Implement the knowledge of Image Processing
				3	Explain the Segmentation and Shape Clustering related to image processing

				4	Implement the ideas related Machine Learning techniques in Vision
					Execute the Object Modeling and Recognition Fundamental matrix
I	TH PE 2	25AR121	Industry 4.0	1	This course is designed to offer learners an introduction to Industry 4.0 and its applications
				2	Learners will gain deep insights into how smartness is being harnessed from data
				3	Learners will understand what needs to be done in order to overcome the challenges. 4
				4	To familiarize in Industry 4.0 in healthcare services.
I	TH PE2	25AR122	Sensor' s Applications in Manufacturing	1	Express the basic knowledge of sensors and transducers.
				2	Implement the knowledge of Sensors for mechanical systems or mechanical sensors
				3	Explain the Thermal sensors and Magnetic Sensors for testing
				4	Implement the ideas related Electrical sensors for testing
I	TH PE 2	25AR123	Microprocessors and Micro-Controllers	1	Express the basic knowledge of Microprocessors
				2	Implement the knowledge of ARM Instruction Set.
				3	Explain the Internet of Things
				4	Implement the ideas related AVR Microcontroller, Assembly language Programming
I	PR	25AR202	Robotics: Advanced Concepts and Analysis	**1**	Apply the basic concepts of robot kinematics and dynamics for robot simulation
				2	Simulate the robot in different environments
				3	Analyze various motion types and associated instructions
				4	Evaluate the robot programming and its virtual simulation in the robot simulation software
II	TH	25AR201	Robotics: Advanced Concepts and Analysis	1	Describe the fundamental concepts of robot programming
				2	Apply the basic concepts of robot kinematics and dynamics for robot simulation
				3	Apply knowledge of sensors and actuators for designing robots for different environments

				4	Analyze various motion types and associated instructions for robot programing
				5	Evaluate the robot control modes and efficient path planning
II	TH	25AR203	Mechatronics System: Design And Analysis	1	Summarize the key elements of mechatronic system and applications...
				2	Demonstrate the application of various sensors in mechatronics system.
				3	Interpret the role of various motors and their control mechatronic systems
				4	Illustrate the internal hardware structure of Mechatronic Systems and its applications in different domains
II	LAB	25AR204	Lab. Mechatronics System: Design And Analysis	1	Demonstrate the fundamental concepts and working of microprocessor and microcontrollers...
				2	Model the various dc and ac drive systems
				3	Analyze various hydraulic and pneumatic drives
				4	Analyze the application of PLC and PLC programming.
II	TH	25AR205	Aerial Robotics	1	Express the basic knowledge of Aerial robotics
				2	Implement the knowledge of quadrotors and basic mechanics in Aerial robotics
				3	Explain the Dynamics and 1-D Linear Control and select components of the related system
				4	Implement the ideas related to modeling and dynamic formulations associated to aerial robotics
				5	Execute the planning and 2-D Quadrotor Control, 3-D Quadrotor Control of Aerial Robotics
II	TH PEIII	25AR211	Artificial Intelligence In Automation	1	Examine the issues involved in knowledge bases, reasoning systems and planning..
				2	Design and evaluate intelligent expert models for perception and prediction from intelligent environment
				3	Apply AI frameworks and platforms to improve business, organizational, and technology outcomes
				4	Analyze the concept of neural networks for learning linear and non-linear activation functions
II	TH PEIII	25AR212	Modeling and Simulation of	1	Express the basic knowledge of mathematical modeling.
				2	Implement the knowledge of automatic controls

				3	Simulate the Closed & Open System 4.
				4	Implement the ideas related Control panel modeling
II	TH PE III	25AR213	Advanced Manufacturing Techniques and Applications	1	Express the basic knowledge of Flexible Manufacturing System
				2	Implement the knowledge of automated process planning
				3	Apply the Green and Agile manufacturing for FMS
				4	Implement the ideas related Rapid Prototyping
II	TH PE IV	25AR221	Industrial IOT	1	Express the interconnection and integration of the physical world and the cyber space
				2	Implement the knowledge of IoT based engineering applications.
				3	Explain the Internet Principles
				4	Implement the Python Programming and Raspberry PI
				5	Execute the Seven Generation of IoT Sensors to Appear
II	TH PE 4	25AR222	Additive Manufacturing	**1**	Express the CAD-CAM and its integration
				2	Implement the knowledge of Process Chain for Rapid Prototyping
				3	Explain the model slicing and contour data organization
				4	Implement the rapid prototyping machines
					Execute the rapid tooling and manufacturing
II	TH	25AR223	Product Design and Development	1	Evaluate the product life cycle..(L4)
				2	Analyze and select the materials and manufacturing processes for designed product.(L4)
				3	Evaluate the product for different design criteria like robust design, benchmarking, DFX ,etc and estimate the product costing.(L4)
				4	Illustrate the various prototyping methods and its economics. .(L3)
	Minor Project	25AR207	Minor project	1	Identify and define a practical engineering problem or research challenge in automation relating to contemporary advancements or industrial needs.

II				2	Apply theoretical knowledge to preliminary investigation, demonstrating initiative and creative problem-solving.
				3	Develop hands-on skills in design, modeling, through mini-project work, linking concepts to tangible outputs.
				4	Communicate project findings effectively via written reports and brief oral presentations to faculty.
				5	Exhibit teamwork, time management, and professional ethics during project execution
III	Project	25AR301	PROJECT PHASE -I	1	Demonstrate ability to identify, define, and articulate a engineering problem in Automation considering the latest trend and technology
				2	Undertake comprehensive literature review, critically analyzing existing work to establish research gaps relevant to the chosen project area.
				3	Formulate suitable objectives, methodologies, and work plan for the proposed project, with consideration for feasibility, timelines, and resource allocation.
				4	Present interim technical findings through written report and oral presentation, justifying choices made and explaining potential impact.
IV	Project	25AR401	PROJECT PHASE- II	1	Apply advanced engineering concepts, research methods, and analytical skills to implement and refine solutions addressing the project objectives.
				2	Conduct experiments, simulations, or modeling as required validating proposed solutions, systematically recording data and interpreting results to reach meaningful conclusions.
				3	Finalize, integrate, and optimize the engineered solution, product, or process, demonstrating technological innovation and sustainability considerations.
				4	Communicate comprehensive research findings, contributing to academic or industrial knowledge through thesis, publications, or presentations to expert panels.
				5	Evaluate the societal, ethical, and environmental implications of the project outcomes, recommending future work and broader applications in engineering.