



Koneru Lakshmaiah Education Foundation

(Category -1, Deemed to be University estd. u/s. 3 of the UGC Act, 1956)

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Department of Mechanical Engineering

Program: M.Tech-Robotics and Mechatronics

Academic Year :2020-2021

S.NO.	CourseCode	CourseTitle	CO No.	Description of the Course Outcome
1	18ME5101	FUNDAMENTALS OF MECHATRONICS	CO1	Apply the principles of mechatronics and automation for the development of productive and efficient manufacturing systems.
			CO2	Be proficient in the use of Data conversion devices and Microprocessors controllers and select suitable drives
			CO3	Be able to analyze mechanisms for industrial applications and Design and analyze Hydraulic systems
			CO4	Analyze the Pneumatic systems and understand PID controllers, CNC machines and Industrial Robotics.
2	18ME5102	ADVANCED ENGINEERING MATHEMATICS	CO1	Perform elementary operations on matrices including determination of rank and inverse, demonstrate mastery in using matrix algebra
			CO2	Interpret and apply differential calculus on problems involving rate of change
			CO3	Illustrate the applications of integral calculus in solving problems on area, volume, displacement, work
			CO4	Determine gradient, divergence and curl of vector point functions with their properties
3	18ME5103	SENSORS AND ACTUATORS	CO1	Identify appropriate sensor for a particular Mechatronic system.
			CO2	Understand micro electro mechanical system and its manufacturing methods
			CO3	Understand the hydraulic and pneumatic Actuation systems for selection of appropriate actuation method for a particular Mechatronic system.


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			CO4	Understand the electrical actuation systems for selection of appropriate actuation method for a particular Mechatronic system.
4	18ME5104	MODELING AND SIMULATION OF MECHATRONIC SYSTEMS	CO1	Build mathematical models mechatronic systems comprising of combinations of mechanical, electrical, pneumatic/hydraulic and thermal systems
			CO2	Analyze systems for their time response to a certain input using transfer function and /or state space approach
			CO3	Apply system identification techniques to synthesize system models
			CO4	Evaluate time and frequency response of systems and control system design
			CO5	Modeling and Simulation of Mechatronic Systems using MATLAB/Simulink
5	18ME5205	ROBOTICS AND ADVANCED CONCEPTS	CO1	Perform Velocity and Static analysis of Manipulators
			CO2	Formulation of equation of motions by computer simulations
			CO3	Apply the Planning and control methods for robots
			CO4	Modeling and controlling of flexible manipulators
6	18ME5206	CONTROL OF MECHATRONICS SYSTEMS	CO1	Understanding the basic concepts of Modeling, Testing in terms of time domain and frequency domain
			CO2	Analyze the basic designing concepts of Modern and optimal controllers such as state feedback and state observers.
			CO3	Analyze the basic designing concepts of Digital controller for digital systems
			CO4	Analyze the basic designing concepts of Non-linear controllers for non-linear systems
7	18ME5207	MECHATRONICS PRODUCT DESIGN	CO1	Identify appropriate sensors, identify appropriate actuation system for a given application.
			CO2	Identify appropriate microcontroller for a given application and to build a mathematical Model of system for evaluating open loop system performance and behavior.
			CO3	Suggest an appropriate closed loop control strategy to attain the desired system behavior.
			CO4	Suggest a Mechatronic product design for a given application and evaluate its performance.

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8	18ME5208	PRECISION ENGINEERING	CO1	To understand concept of accuracy, errors & its causes.
			CO2	To know about geometrical dimensioning and tolerance
			CO3	To understand concept of surface roughness and learn methods to improve surface finish.
			CO4	To understand precision engineering methods
9	18ME51A1	SIGNAL PROCESSING IN MECHATRONIC SYSTEMS	CO1	Analyze time signals, Discrete systems
			CO2	Analyze Frequency filters and phase systems
			CO3	Design FIR and IIR filter, bilinear transformation, and frequency transformations
			CO4	Apply DSP to speech, and Radar signal processing
10	18ME51A2	MEMS & NEMS	CO1	Introduction to MEMS and Microelectronic technologies used For MEMS
			CO2	Microsensors & MEMS applications in Biological, Chemical and Acoustic field.
			CO3	Introduction to MEMS based nanotechnology
			CO4	NEMS physics and NEMS architecture
11	20ME51A3	ROBOT VISION & IMAGE PROCESSING	CO1	Understand the importance of vision in robotics and mechatronics.
			CO2	Apply Knowledge of image acquisition techniques using cameras and sensors.
			CO3	Analyze the images by applying filters, enhancing quality, and reducing noise.
			CO4	Analyze the image segmentation to identify relevant regions of interest
12	18ME51B1	EMERGING SMART MATERIALS FOR MECHATRONIC APPLICATIONS	CO1	Study of Smart materials and their application for sensing and actuation, Mechatronics aspects
			CO2	Understand the principle of Piezoelectricity and piezoelectric materials, Constitutive equations, actuator types and Controls for precise positioning and scanning.
			CO3	Understand the Basics of Ionic polymer metal composites (IPMC), Conductivity, Carbon nanotubes, Dielectric elastomers, Design & control issues and Applications of EAP (electro active polymers).
			CO4	Understand the magnetic properties of materials, magnetostriction: constitutive equations, types, design & control of magnetostrictive actuators. Comparative analysis of different smart materials.
	20ME51B2	CONTROL SYSTEMS	CO1	Understand the control system concepts and their relevance in robotics.


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13		FOR ROBOTS	CO2	Apply differential equations and transfer functions to model dynamic systems.
			CO3	Apply PID and state-space techniques to design and implement feedback control
			CO4	Apply the robust control methods to handle uncertainties and disturbances in robotic systems.
14	18ME51B3	MICROPROCESSORS AND EMBEDDED SYSTEMS	CO1	Understand the fundamentals of embedded applications
			CO2	Architectural understanding of processors through interfacing (8086)
			CO3	Programming model of microcontroller(8051 family)
			CO4	Interfacing and programming applications using microcontrollers
15	18ME52C1	COMPUTATIONAL FLUID DYNAMICS	CO1	Understand the fundamentals of CFD and deriving governing equations
			CO2	Apply different CFD techniques to diffusion problems
			CO3	Solving convection-diffusion problems and N-S equations.
			CO4	Understand numerical grid generation and apply Lattice-Boltzmann methods to complex flows
16	18ME52C2	NONLINEAR OPTIMIZATION	CO1	Categorize convexity and non-convexity problems
			CO2	Apply goal programming methods to solve modals
			CO3	solve problems with positive coefficients using separable and geometric programming
			CO4	Implement search techniques to solve programming problems
17	20ME52C3	MOBILE ROBOTICS	CO1	Understand the mobile robot systems and their diverse applications.
			CO2	Analyze the kinematics and dynamics of wheeled and legged mobile robots.
			CO3	Apply the knowledge of localization techniques, including sensor-based and map-based methods.
			CO4	Apply SLAM algorithms for simultaneous mapping and localization.
	18ME52D1	INDUSTRIAL AUTOMATION	CO1	Apply principles of automation towards material handling and analyze their performance.
			CO2	Analyze performance of storage systems and product flow in different GT methods and cellular


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18				manufacturing.
			CO3	Application and analysis of transfer line without internal storage and describe Inspection Technology
			CO4	Describe different manufacturing supporting systems.
19	18ME52D2	FUZZY SETS AND ARTIFICIAL INTELLIGENCE	CO1	Understanding various concepts Fuzzy Logic System
			CO2	Application of fuzzy Sets in Management, Medical and Engineering Fields.
			CO3	Introduction to AI, Understand the basic concepts of Artificial Intelligence using various search Techniques
			CO4	Neuro Fuzzy Approaches and Applications of AI in various Domains
20	20ME52D3	ROBOT MANIPULATION AND GRASPING	CO1	Understand the robot kinematics and inverse kinematics for manipulator motion analysis.
			CO2	Apply dynamics principles to calculate forces and torques in robot manipulators
			CO3	Analyze the robot motion for planning smooth trajectories.
			CO4	Apply Knowledge of forward and inverse dynamics to calculate robot joint torques and accelerations.



Professor I/C Academics



HOD-ME
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