Shri. Shamrao Patil (Yadravkar) Educational & Charitable Trust's
Sharad Institute of Technology College of Engineering
Yadrav (Ichalkaranji)–416121, Dist. – Kolhapur
(An Autonomous Institute)
(Approved by AICTE, New Delhi, Recognized by Government of Maharashtra &
Affiliated to BATU University, Lonere)
NBA Accredited Programs, Accredited By NAAC 'A' Grade,ISO 9001:2015 Certified

Syllabus Structure of M.Tech.

(Mechatronics)

Department of Mechatronics Engineering

Semester: I & II

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Department: Department of Mechatronics Engineering   **Rev:** Course Structure/NEP/01/2024-25

Class: F.Y. M.Tech.   **Semester: I**

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs	CA-I	CA-II	MSE	ESE	Total	
24MMT1101	ELC	Research Methodology & IPR	3	-	-	3	10	10	30	50	100	3
24MMT1102	PCC	Fluid Power system and Factory Automation	3	-	-	3	10	10	30	50	100	3
24MMT1103	PCC	Mechatronics System Design	3	-	-	3	10	10	30	50	100	3
24MMT1104	PCC	Computer Control of Flexible Manufacturing Systems	3	-	-	3	10	10	30	50	100	3
24MMT1105	PCC	**Bridge Course** Principles of Mechanical Design /Fundamental of Electronics	2	-	-	2	25	25	--	--	50	Audit
24MMT1106	PEC	Elective – I	3	-	-	3	10	10	30	50	100	3
24MMT1107	PCC	Fluid Power system and Factory Automation Laboratory	-	-	2	2	15	15	-	20	50	1
24MMT1108	PCC	Mechatronics System Design Laboratory	-	-	2	2	15	15	-	20	50	1
24MMT1109	AEC	Effective Communication Skills	-	-	2	2	25	25	-	--	50	1
			17	0	6	23	130	130	150	290	700	18

Elective–I: One subject to be chosen from the following subjects.

Code	Course
24MMT1106A	Signal Conditioning and Data Acquisition System
24MMT1106B	Advanced Control System
24MMT1106C	Advanced Computer Programming
24MMT1106D	Digital Signal Processing and Machine Vision

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Department: Department of Mechatronics Engineering Rev: Course Structure /NEP/01/2024-25

Class: F.Y. M.Tech.   Semester: II

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs	CA-I	CA-II	MSE	ESE	Total	
24MMT1201	PCC	Robot Dynamics and Control	3	0	0	3	10	10	30	50	100	3
24MMT1202	PCC	Advanced Microcontrollers and Embedded System	3	0	0	3	10	10	30	50	100	3
24MMT1203	PCC	Industrial Automation	3	0	0	3	10	10	30	50	100	3
24MMT1204	ESC	Experimental Design, Data Analysis and Quality Control	3	0	0	3	10	10	30	50	100	3
24MMT1205	PEC	Elective – II	3	0	0	3	10	10	30	50	100	3
24MMT1206	HSSM	Industrial Management	1	-	-	1	25	25	-	-	50	Audit
24MMT1207	PCC	Advanced Microcontrollers and Embedded System Laboratory	-	-	2	2	25	25	-	-	50	1
24MMT1208	VSEC	Power Electronics and Drives laboratory	-	-	2	2	15	15	-	20	50	1
24MMT1209	AEC	Presentation skills	-	-	2	2	15	15	-	20	50	1
			16	0	6	22	130	10	150	290	700	18

Elective – II: One subject to be chosen from the following subjects.

Code	Course
24MMT1205A	Product Design and Development
24MMT1205B	Computer Integrated Manufacturing
24MMT1205C	Micro Electro-Mechanical Systems
24MMT1205D	Autotronics & Vehicle Intelligence

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Research Methodology & IPR

24MMT1101	ELC	Research Methodology& IPR	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA–I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Define research, explain and apply research terms, describe the research process and the principal activities, skills and ethics associated with the research process.
CO2	Explain the relationship between theory and research.
CO3	Describe and compare the major quantitative and qualitative research method.
CO4	Propose a research study and justify the theory as well as methodologicaldecisions including sampling and measurement.
CO5	Summarize the importance of research ethics and integrate it into researchprocess.
CO6	Construct an effective research proposal that will serve as the launching point for the further study.

Course Contents:

Unit 1: Research methodology an Introduction	[6]
Meaning, objectives and motivation of research, Types of research, research approaches, significance of research, and research methods vs. Methodology, research and scientific methods, Research process, Criteria of good research.	

Unit 2 Defining the research problem and research design	[6]
Selecting the problem, Techniques involved in defining the problem, meaning and need of research design, features of good design, important concepts relating to research design, different research designs, Basic concepts of experimental designs	

Unit 3 Sampling design	
Census and sample survey, Implications of sample design, Steps in sampling design, Criteria of selecting sampling procedure, Characteristics of good sample design, Different types of sample designs, Random sample from an infinite universe, Complex random sampling designs	[6]

Unit 4 Measurement and scaling techniques:	[6]
Measurement in research, measurement scales, Sources of error in measurement, Tests of sound measurement, Technique of developing measurement Tools, scaling, meaning of	

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

scaling, sale classification bases, Important scaling Techniques, scale construction Techniques	
Unit 5 Sampling fundamentals: Need of sampling, Important sampling distribution, central limit theorem, sampling theory, Sandler's A-Test, Concept of standard error, Estimation, Estimating the population mean , Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach Based on Bayesian Statistics	[7]
Unit 6 Interpretation and report writing: Meaning of interpretation, Why Interpretation, Techniques of interpretation, Precaution in interpretation, Significance of report writing, Different steps in writing report, Layout of research report, Types of reports, Oral presentation, Mechanism of writing research report, Precaution for writing research reports	[6]

Text Books:
1. C. R. Kothari, Research Methodology: Methods and Techniques New Age International,2013.
2. Deepak Chawla Neena Sondhi, —Research Methodology concepts and cases Vikas, New Delhi,2011.

Reference Books:

1. Panneerselvam R., "Research Methodology", PHI, New Delhi,2013.

2. Taylor, Bill, "Research Methodology", PHI, New Delhi,2006.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Fluid Power system and Factory Automation				
24MMT1102	PCC	Fluid Power system and Factory Automation	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks
	CA –II :10 Marks
	Mid Semester Exam: 30 Marks
	End Semester Exam: 50 Marks

Pre-Requisites:

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the importance and the scope of hydraulics and pneumatics in the modern industry.
CO2	Select and size the different components required to design a fluid power system.
CO3	Select a control system to control the operation of designed fluid power system.
CO4	Design and implement low-cost automation system.
CO5	Design a pneumatic equipment by selecting proper components
CO6	Explain use of PLC in sequencing operation for automation

Course Contents:

Unit 1: Hydraulic System	[6]
Hydraulic Power Generators - Selection and specification of pumps, pump characteristics.	
Unit 2: Actuators Linear and Rotary Actuators - selection, specification and characteristics. Pressure relief valves, direction and flow control valves, non-return and safety valves, actuation systems	[6]
Unit 3: Hydraulic Circuits Reciprocation, quick return, sequencing, synchronizing circuits, accumulator circuits, industrial circuits, press circuits, hydraulic milling machine, grinding, planning, copying, forklift, earth mover circuits, design and selection of components - safety and emergency mandrels.	[6]
Unit 4: Pneumatic System Pneumatic fundamentals, control elements, position and pressure sensing. Pneumatic logic circuits - switching circuits, fringe conditions modules and these integration, sequential	[6]

Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

circuits, cascade methods, mapping methods, step counter method - compound circuit design, combination circuit design.	
Unit 5: Pneumatic Circuits Pneumatic equipment - selection of components, design calculations, application, fault finding, hydro pneumatic circuits	[7]
Unit 6: various Controllers in industry Use of microprocessors/microcontrollers for sequencing - PLC, Low-cost automation - Robotic circuits.	[6]

Text Books:

1. Anthon H. Hehn, "Fluid Power Troubleshooting", 2nd Edition, Marcel Dekker.
2. S. R. Majumdar, "Pneumatic Systems: Principles and Maintenance", Tata McGraw Hill Publishing Company Limited,1999

Reference Books:

1. Antony Esposito, "Fluid power with Applications", Prentice Hall India, 7th Edition,2014.

2. Dudleyt, A. Pease and John J.Pippenger, "Basic Fluid Power", Prentice Hall,1987.

3. Andrew Parr, "Hydraulic and Pneumatics", Jaico Publishing House,1999.

4. Bolton. W. "Pneumatic and Hydraulic Systems", Butterworth - Heinemann,1997.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Mechatronics System Design				
24MMT1103	PCC	Mechatronics System Design	3-0-0	3Credits

Teaching Scheme	Examination Scheme
Lecture:3hrs/week	CA –I :10Marks CA–II:10Marks Mid Semester Exam: 30 Marks End Semester Exam:50Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the importance and the scope of rotational drives
CO2	Select and size the different components required to design a mechanical system.
CO3	Illustrate the real time interfacing
CO4	Explain the components of a data acquisition system
CO5	Design a data acquisition system
CO6	Design a Mechatronics system

Course Contents:

Unit 1:Rotational drives Pneumatic Motors: continuous and limited rotation-Hydraulic Motors: continuous and limited rotation-Brushless DC Motors-Motion convertors, Fixed ratio, invariant motion profile, variators, remotely controlled couplings Hydraulic Circuits and Pneumatic Circuits	[6]

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Unit 2: Mechanical Systems and Design Mechatronics approach-Control program control, adaptive control and distributed systems - Design process - Types of Design - Integrated product design - Mechanisms, load conditions, design and flexibility Structures, load conditions, flexibility and environmental isolation-Man machine interface, industrial design and ergonomics, information transfer from machine from machine to man and man to machine, safety.	[6]
Unit 3: Real time interfacing Introduction Elements of data acquisition and control Overview of I/O Process-Installation of I/O card and software - Installation of application software- Over framing.	[8]
Unit 4: Case studies on Data Acquisition Transducer calibration system for Automotive applications Strain Gauge weighing system – Solenoid force –Displacement calibration system - Rotary optical encoder - Inverted pendulum control - Controlling temperature of a hot/cold reservoir – Pick and place robot – Car park barriers	[6]
Unit 5: Case studies on Data Acquisition and Control Thermal cycle fatigue of a ceramic plate-pH control system-De-Icing Temperature Control System-Skip control of a CD Player-Autofocus Camera, exposure control	[6]
Unit 6: Case studies on design of Mechatronics products Motion control using D.C. Motor, A.C. Motor & Solenoids - Car engine management - Barcode reader	[6]

Text Books:
1. W. Bolton, Mechatronics-Electronic Control systems in Mechanical and Electrical Engineering-,2ndEdition, Addison Wesley Longmanl.td.,1999.
2. Devdas Shetty, Richard A. Kolk, Mechatronics System Design, PWS Publishing company,1997

Reference Books:
1. Bradley,D.Dawson,N.C. Burd and A.J.Loader, Mechatronics: Electronics in Products And rocesses,ChapmanandHail,London,1991.
2. Brian Morris, Automated Manufacturing Systems-Actuators, Controls, Sensors and Robotics, McGraw Hill International Edition,1995

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Computer Control of Flexible Manufacturing Systems				
24MMT1104	PCC	Computer Control of Flexible Manufacturing Systems	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the importance of Manufacturing Systems
CO2	Explain the role of automation in manufacturing
CO3	Implement FMS concept in a manufacturing environment
CO4	Differentiate between Group Technology and Cellular Manufacturing
CO5	Explain Different Quality programs in Manufacturing
CO6	Implement use of FMS concept in Process Planning

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Course Contents:

Unit- 1 Introduction to Manufacturing Systems Components, Classification Scheme, Single Station Automated Cells, Applications of Single Station Automated Cells, Fundamentals of Manual Assembly Lines, Analysis of Manual Assembly Lines, Line Balancing Algorithms, Considerations in Assembly Line Design	[3]
Unit- 2 Automated Production Lines Fundamentals, Applications, Analysis of Transfer Lines, Fundamentals of Automated Assembly Lines, Cellular Manufacturing Part Classifications and Coding, Applications of Group Technology, Quantitive analysis of Cellular Manufacturing.	[5]
Unit- 3 Flexible Manufacturing Systems Introduction, Components of FMS, Applications, Benefits, FMS planning and Implementation issues, Quantitive Analysis of FMS. Fundamentals of NC Technology, Computer Numerical Control, Distributed Numerical Control, Applications of NC, and NC part programming. Sample NC programs including step, groove, taper, and profile turning.	[4]
Unit- 4 Group Technology **Group Technology:** Part families, part classification and coding. Types of classification and coding system, Machine cell design: The composite part concept, types of cell design. Determining the best machine arrangement, benefits of group technology **Just In Time and Lean Production:** Lean Production and Waste in Manufacturing, just in time production system, **Quality Programs in Manufacturing:** Process Variability and Process capability, Statistical Process Control, Six Sigma, Taguchi Methods in Quality Engineering, ISO 9000. Coordinate Measuring Machine, Machine Vision, Non-contact, Non-Optical Inspection Techniques	[5]
Unit- 5 Automated Material Handling Function - types – analysis of material handling equipment's. Design of AGV systems. Automated storage: Storage system performance – AS/RS – carousel storage system – WIP storage – interfacing handling storage with manufacturing, Analysis of AS/RS, Industrial robots. Tool Management system-tool strategies-tool identification technologies and tool monitoring. Inspection stations-CMM and non-contact inspection	[4]
Unit- 6 Networking concepts LOSI, MAP, TOP, LAN, WAN, Communication interface, bus architecture, topologies, protocols. Manufacturing data base-Process planning, CAPP, ERP modules. Development and implementation of FMS: Planning phases, scheduling – integration – system configuration – simulation – FMS project development steps. – hardware and software development. Installation and implementation. Application and benefits of FMS, Quantitative analysis of FMS.	[3]

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Text Books:

1. Jha, N.K. "Handbook of flexible manufacturing systems", Academic Press Inc.,1991
2. Raouf, A. and Ben-Daya, M., Editors, "Flexible manufacturing systems: recent development", Elsevier Science,1995.
3. Reza A Maleki "Flexible Manufacturing system" Prentice Hall of Inc New Jersey,1991

Reference Books:

1. Mikell P. Groover, "Automation, Production Systems, and Computer Integrated Manufacturing"; Prentice Hall Publishing New Delhi; ISBN978-81-203-3418-2
2. Handbook of Cellular Manufacturing Systems; Editor: Shhrukh A. Rani; Publisher: Wiley Inter science; ISBN#:0-471-12139-8.
3. CAD / CAM / CIM by P. Radhakrishnan, S. Subramanyan, New Age International.
4. Computer Aided Manufacture by Chien Chang and Richard A Wysk, Prentice HALL

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Bridge Course: Principles of Mechanical Design				
24MMT1105	PCC	Principles of Mechanical Design	2-0-0	Audit

Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA –I :25 Marks CA –II :25 Marks

Pre-Requisites: Nil
Course Outcomes:
At the end of the course, the student will be able to:

CO1	Design simple machine parts and components.
CO2	Design basic procedure for the selection of machine components.
CO3	Design various joints, gears brakes, dynamometer etc.
CO4	Selection of Rolling Contact Bearings

Course Contents:

Unit 1: Simple stresses and strains: Concept of stress and strain (linear, lateral, shear and volumetric),Hook's law. Elastic constants and their relationship. Generalized Hook's law. Axial force diagram, stresses, strains and deformation in determinate and indeterminate homogeneous and composite bars under concentrated loads, self-weight and temperature changes.	[5]
Unit 2: Shear force and bending moment diagrams: Concept and definition of shear force and bending moment in beams due to concentrated load, UDL, uniformly varying loads and couples' indeterminate beams	[4]
Unit 3: Loads and stress in machine elements static, shock, impact and fluctuating loads, types of stresses, tensile, compressive, direct and torsional shear, bending stresses, combined effect of direct, bending and torsional stresses, Design of shaft sed on torsional and lateral rigidity, combined loadings. Design of keys, keyways and splines. Standard threads, stresses in threads, preloaded fasteners in tension, joints stiffness factor, gasket joints, controlling preload, fasteners in shear, power screws.	[3]
Unit 4 Design of springs Spring configurations, materials, design of helical compression extension torsion springs. Design of composite springs (in parallel, series, concentric). Design of Belleville Spring, washers. Design of leaf springs	[4]

Unit 5 Friction Clutches, Brakes and Dynamometer Pivot collar friction, types of friction clutches, design consideration plate, cone & centrifugal clutches. Types like band brake, shoe brake, band & block brake, Disc Brakes, absorption & transmission type dynamometers. Design consideration of various brakes.	[4]
Unit 6 Rolling Contact Bearings Types, Static and Dynamic load capacity, Strobeck's Equation, Concept of equivalent load, Load life Relationship, Selection of bearing from Manufacturer's Catalogue, Design for variable loads and Speeds, Bearings with Probability of Survival other than 90%, Lubrication and Mounting of bearing.	[4]

Text Books:

1. Ramamrutham S.: Strength of Materials, Dhanpat Rai & Sons,1991.
2. V.B. Bhandari, "Design of Machine Elements", Tata McGraw Hill Publishing CompanyLtd.,2ndEdition,2007
3. Beer and Johnston: Strength of Materials-CSB Publisher.

Reference Books:

1. Rao, J. S.& Dukkipati, R.V.: Mechanism &Machine Theory, New Age International Pvt. Ltd. Publishers.
2. Ramamurthy, V.: Mechanics of Machines, Narosa Publishing House.
3. Manufacturing Technology, P.N.Rao, Tata McGraw-Hill Publishing Limited ,II Edition,2002.
4. S.S. Rattan, "Theory of Machines", TataMcGrawHillPublishingCompanyLtd.,2nd Edition, 2007

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Bridge Course: Fundamental of Electronics				
24MMT1105	PCC	Fundamental of Electronics	2-0-0	Audit

Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA –I :25 Marks
	CA –II :25 Marks

Pre-Requisites: C Programming

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the language of electronics, elements and their functionality.
CO2	Illustrate Application of Electronic System Instrumentation system
CO3	Illustrate Analog and Digital systems and their applications.
CO4	Explain Power Circuits and Systems
CO5	Explain Control Systems

Head
Dept. of Mechatronics Engineering
SiT COE, Yadrav

Course Contents:

Unit 1: Role of various Engineering disciplines in Mechatronics Mechatronics Design elements, Scope and Applications of Mechatronics, Analog electronic components and devices, oscillators as signal generators, Power supplies and voltage regulators, Power Electronics- Devices	[5]
Unit 2: Industrial electronic circuits Digital Electronics –Arithmetic circuits, Multiplexers/Demultiplexers, Registers, Counters, Memories, few examples of transducers, Signal conditioning Circuits using Operational amplifiers, Noise Problems	[3]
Unit 3 Application of Electronic System Instrumentation system: Transducer, Strain Gauge, DMM, Oscilloscope Regulated power supply Remote control, Character Display, Clock, Counter, Measurements, Data Logging, Audio–Video system	[4]
Unit 4 Operation Amplifier (Op-amps) Ideal Op-amp, Differential amplifier: differential and common mode operation common mode rejection ratio (CMRR), Practical op-amp circuits: inverting amplifier, non -inverting amplifier, weighted summer, integrator, differentiator, large signal operation of op-amps, other applications of op-amps: instrumentation circuits, active filters, controlled sources, logarithmic amplifiers, waveform generators, Schmitt triggers, comparators	[4]
Unit 5 Power Circuits and Systems Class A large signal amplifiers, second-harmonic distortion, Transformer coupled audio power amplifier, Class B amplifier, Class AB operation, Power BJTs, Regulated power supplies, Series voltage regulator, four-layer diodes: p-n-p-n characteristics, Silicon controlled rectifier	[4]
Unit 6 Control Systems Components, Classification of Control Systems, Transfer functions, Time and Frequency response Analysis tools	[4]

Text Books:
1. Allen Motter shed, "Electronic Devices and Circuits", Prentice Hall International, Third Edition
2. M.D.Singh and J.G.Joshi, "Mechatronics–Principles and Applications", Prentice Hall India publication-EEE, Robert Boy lestad and Louis Nashelsky, "Electronic Devices and Circuit Theory" PHI; 8th Edition.200

Reference Books:
1. Thomas L. Floyd, "Electronic Devices" 8th Edition, Pearson Education, Inc., 2007
2. A.S. Sedra and K.C. Smith, "Microelectronic Circuits", 6th Edition, Oxford University Press, 2006

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Signal Conditioning and Data Acquisition System

24MMT1106A	PEC	Signal Conditioning and Data Acquisition System	3-0-0	3 Credits

Teaching Scheme:	Examination Scheme:
Lecture: -3 hrs./week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the Analog Signal Conditioning principles and circuits.
CO2	Interpret OP-AMP circuits used in instrumentation
CO3	Illustrate various types of Digitals to Analog converters.
CO4	Explain Analog to Digital converters.
CO5	Elaborate the Data Acquisition System.
CO6	Discuss applications and benefits of Data Acquisition System.

Course Contents:

Unit 1: Analog Signal Conditioning Introduction, Principles of Analog Signal Conditioning, Signal-Level Changing, linearization, Conversions, Zero adjustment, Span adjustment, Filtering and Impedance Matching, Passive Circuits, Divider Circuit, Bridge Circuits, RC Filters	[6]
Unit 2: Operational Amplifiers Characteristics, Op Amp Circuits in Instrumentation, Voltage Follower, Differential Amplifier, Instrumentation Amplifier, Active Filters, Voltage-to-Current Converter, Current-to-Voltage Converter, Linearization, Special Integrated Circuits (ICs).	[7]
Unit 3 : Digital-to-Analog Converters DACs Review of Digital Fundamentals, Busses and Tri-State Buffers, Converters, Comparators, Digital-toAnalog Converters (DAC),Serial, parallel, direct and indirect DACs, Hybrid and monolithic DACs, Interfacing of DACs to microprocessors and PCs	[8]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 4: Analog-to-Digital Converters (ADCs) Specifications– Characteristics. Types of ADCs- Serial, parallel, direct and indirect ADCs. Hybrid and monolithic ADCs. Sigma-delta ADCs. Interfacing of ADCs to microprocessors and PCs Sample and Hold, Multiplexer and De-multiplexer, decoder and encoder, Pulse modulations, Digital recorder, Programmable Logic Controller	[6]
Unit 5: Data Acquisition System Introduction, Analog and Digital Data Acquisition Systems. Block diagram, Components, Multiplexing, DeMultiplexing, Modulation, Display, Recording, Alarm, Programming, Voltage, Current, Frequency, Temperature, Displacement, Pressure measurement using Data Acquisition System (DAS)	[6]
Unit 6: Applications and Benefits of Data Acquisition System Benefits of Data Acquisition System, Application of Data Acquisition System in Power plant, Process control plant and Automation, Data Logger.	[6]
Text Books 1. User's Handbook of D/A and A/D Converters', E. R.Hnatek 2. 'Electronic Analog/ Digital converters',H.Schmid 3. 'Data Converters',G.B.Clayton	
Reference Books: 1. Acquisition & Conversion Handbook, -Datel, Intersil 2. Applications Reference Manual – Analog Devices1993	

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

24MMT1106B	PEC	Advanced Control System	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain different state model of a system, and have theknowledge to find its solution.
CO2	Elaborate nonlinear system models, and analyze itsstability.
CO3	Analyze the describing function analysis of various nonlinearsystems.
CO4	Design different systems and analyze its stability usingLyapuvstability analysis.
CO5	Analysis of controllability and observability of thedissimilar system.
CO6	Analize the various transforms

Course Contents:

Unit 1: Introduction Concept of state space-state space representation of system, solution of time invariant state equation- state transition matrix. Linear time varying system. Discrete system state space representation and solution	[6]
Unit 2: Non-linear system types of non-linearity, singular point, non-linear system stability analysis- phase plane technique, construction of phase trajectories, isocline method	[6]
Unit 3: Describing function analysis Basic concepts, derivation of describing functions for common non-linearity's Describing function analysis of non-linear systems, Conditions for stability, Stability of oscillations.	[7]
Unit 4: Lyapunov stability analysis Definition of stability, instability and asymptotic stability. Lyapunov stability theorems. Stability analysis of simple linear systems.	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 5: MIMO systems Controllability-Observability-Effect of pole-zero cancellation, Practical examples-controllable and uncontrollable systems-observable and unobservable systems. Optimal control system-definition- design using state variable feedback and error squared performance indices.	[7]
Unit 6: Z-Transform and digital control system Z-transfer function-block diagram- signal flow graph- discrete root locus.	[6]

Text Books:

1. C. D. Johnson, Process Control Instrumentation Technology, 7th ed., Prentice Hall of India, New Delhi, 2003

2. R K. Ogata "Discrete Time Control Systems", 1996, PHI. 3.R K. Ogata "Modern Control Engineering", 1996, PHI.

Reference Books:

1. R. C. Dorf and R. H. Bishop, Modern Control Systems, 8th ed., Pearson Education, Delhi, 2004

2. M. Gopal, "Modern Control System Theory", New Age International Publishers,2nd edition,1996

3. Madangopal "Digital control and state variables methods" 1997, PHI.

4. Modern control engineering –Katsuhiko Ogata, Pearson Edition.

Head
Dept. of Mechatronics Engineering
SIT COE Yadrav

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Advanced Computer Programming

24MMT1106C	PEC	Advanced Computer Programming	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop, debug and execute programs which use reading, writing and manipulating
CO2	Develop, debug and execute programs to perform memory access using Rits
CO3	Develop, debug and execute modular programs by writing and using Functions
CO4	Appreciate use of various header files and test and implement constant andMacro
CO5	Implement different data types under and Utilize memory effectively usingUnion
CO6	Develop, debug and execute programs to read and write data from secondarystorage devices

Course Contents:

Unit 1: Array and array Operations	
Insertion, Searching, Merging, Sorting,Deletion Introduction of String as array of characters Declaration and Initialization of String Two-Dimensional Array and its Operations: Insertion, Deletion, Matrix addition operation, Multi-Dimensional Arrays, sscanf() and sprintf() Functions Drawbacks of Linear Arrays	[6]
Unit 2: Introduction and Features of Pointers	[7]
Declaration of Pointer, Void Pointers Array of Pointers Pointers to Pointers	
Unit 3: Basics of Functions	
Built-in and user defined Functions, Using String, Math and other built-in functions Advantages of using Functions Working of a Function Declaring, Defining and calling user defined Functions- The return Statement Call by Value and call by Reference Function as an Argument Recursion	[6]

Head
Dept. of Mechatronics Engineering
SIT COE Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Advantages and Disadvantages of Recursion	
Unit 4: Introduction #define and #undefDirectives #include, #line Directive Predefined macros in ANSIC Standard I/O Predefined Streams instdio.h Predefined macros inctype.h	[7]
Unit 5: Introduction and Features of Structures Declaration and Initialization of Structures. Array of Structures Pointers to Structure Typedef Enumerated Data Type Union, Union of Structures	[6]
Unit 6: Introduction File Operations Opening a File, Reading a File iii.Closing a File Text Modes, Binary Modes File Functions fprintf() fscanf() iii.getc() iv.putc() seek()	[6]
Text Books: 1. Kamthane,A.N., Programming in 'C', Pearson,2012	

Reference Books:
 	
  1. Balaguruswami, E. Programming in ANSI C
 	
  2. Kanetkar, Yashavant Let us 'C' BPBpublications,2010	

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Digital Signal Processing and Machine Vision

24MMT1106D	PEC	Digital Signal Processing and Machine Vision	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lectures: 3hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Memorize the different types of signals and systems
CO2	Understand the significance of various digital filter structure
CO3	Apply the knowledge of multi-rate signal processing in the real time applications
CO4	Identify the segmentation and motion detection and estimation techniques
CO5	Illustrate image formation models and feature extraction for computer vision
CO6	Elaborate Data structures for Image Analysis

Course Contents:

Unit 1: Overview of DSP	
Characterization in time and frequency, FFT Algorithms, Digital filter design and structures: Basic FIR/IIR filter design &structures, design techniques of linearphase FIR filters, IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, and parallel all pass realization of IIR	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 2 Multi rate DSP Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in sub band coding	[7]
Unit 3 Linear prediction & optimum linear filters stationary random process, forward- backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.	[6]
Unit 4 Adaptive Filters Applications, Gradient Adaptive Lattice, Minimum mean square criterion, LMS algorithm, Recursive Least Square algorithm. Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation, Minimum- Variance Spectral Estimation, Eigen analysis Algorithms for Spectrum Estimation	[6]
Unit 5 Basic Concepts: Image functions The Dirac distribution and convolution, The Fourier transform Images as a stochastic process, Images as linear systems, Image digitization, Sampling-Quantization, Color images, Digital image properties, Metric and topological properties of digital images, Histograms, Visual perception of the image, Image quality, Noise in images Data structures for Image Analysis: Levels of image data representation Traditional image Matrices, Chains, Topological data structures, Relational structures, Hierarchical data structures Pyramids, Quad trees.	[6]
Unit 6 Data structures for Image Analysis Levels of image data representation Traditional image Matrices, Chains, Topological data structures, Relational structures, Hierarchical data structures Pyramids, Quad trees	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Text Books:

1. Ifeachor Jervis, Digital Signal Processing , Pearson Education

2. Gonzalez & Woods, Digital Image Processing , Pearson Publication.

Reference Books:

1. John G. Proakis and Dimitris G. Manolakis, Digital Signal Processing. Principles, algorithms, and applications, PHI, 1997.

2. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing Analysis and Machine Vision"

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Fluid Power system and Factory Automation Laboratory

24MMT1107	PCC	Fluid Power system and Factory Automation Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week	CA –I :15 Marks CA–II :15 Marks End Semester Examination: 20 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course students will be able to -

CO1	Design and implement fluid power systems
CO2	Explain the operation and troubleshooting of the fluid power system components
CO3	Design and implement PLC system

List of Experiments:

At least minimum 6 experiments should be performed from the following list.

1. Design of basic hydraulic circuits
2. Design of basic pneumatic circuits
3. Design of advanced hydraulic circuits
4. Design of advanced pneumatic circuits
5. Design of electro-hydraulic circuits
6. Design of electro-pneumatic circuits
7. Ladder logic programming for Programmable Logic Controller (PLC)
8. Control of fluid power systems using PLC
9. 9. Operation and troubleshooting of fluid Power system

Head
Dept. of Mechatronics Engineering
SIT COE.Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Text Books:

1. Saha, S.K., "Introduction to Robotics, 2nd Edition, McGraw-Hill Higher Education, New Delhi, 2014.

2. Richard D, Klafter, Thomason A ChmielOwski, Michel Nagin "Robotics Engg-an Integrated Approach" PHI 2005.

3. R.K. Mittal & I.J. Nagrath, "Robotics & Control" TMH-2007

4. "Hydraulics and Pneumatics", Shaikh and Khan, R.K. Publication.

5. "Fluid Power with Application", Esposito, Pearson Education, 7th Edition.

6. "Basic Hydraulic – Festo Manual"

7. "Basic Pneumatic – Festo Manual"

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. Issac Asimov I Robot, Ballantine Books, New York, 1986

5. "Hydraulic and Pneumatic",H.L.Stewart,Industrial Press. 7. "Industrial Hydraulic", I. J. Pipenger, Tata McGraw Hill.

6. "Power Hydraulics", Goodwin 1st Edition. 4. "Introduction to Hydraulic and Pneumatics",S. Ilango and V Soundararajan, Prentice Hall of India, 2nd Edition.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Mechatronics System Design Laboratory

24MMT1108	PCC	Mechatronics System Design Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week/batch	CA –I :15 Marks CA –II :15 Marks End Semester Examination:20 Marks

Pre-Requisites: Basic knowledge of Semiconductor Physics and Basic Electronics.

Course Outcomes: At the end of the course students will be able to -

CO1	Calibrate the Instruments
CO2	Verify P+I, P+D, P+I+D control actions.
CO3	Analyze control system

List of Experiments:

At least minimum 8 experiments should be performed from the following list.

1. Calibration of flow meters.
2. Calibration of Thermocouples/ RTD.
3. Study of Load Cells.
4. Vibration measurement using accelerometers.
5. Displacement measurement/ level measurement.
6. Verification of P, P+I, P+D, P+I+D control actions.
7. Study of XY position control systems.
8. Study of linear conveyor control system.
9. Study of rotary table positioning systems.
10. Study of different switches and relays.
11. Analysis of control system using software like MATLAB/SIMULINK or equivalent.
12. Study of A/D and D/A converters.
13. Study of Flip Flops and Timers.
14. Study of Application of Op – Amp circuits.
15. Study of Data acquisition system.
16. Study of Microcontrollers.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Text Books:

1. A course in Electrical, Electronics measurement and Instrumentation, A.K.Sawhney
2. Mechanical & Industrial measurements, Jain R.K., Khanna Publications, New Delhi.
3. Mechanical measurements & instrumentation, Rajput.R.K., S.K.Kataria and sons, New Delhi.
4. Electronic Instrumentation, H. S. Kalsi, MGH, 3rd Edition

Reference Books:

1. Electronic Instrumentation and Measurement Techniques, Welfrick Cooper.
2. Instrumentation for Engineers And Scientists , John Turner ,II Edition , Wiley
3. Electronic Instrumentation and Measurements, David A Bell, Third Edition, Oxford.
4. Instrumentation for Engineering Measurements, James W Dally, II Edition , Wiley India

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Effective Communication Skills				
24MMT1109	AEC	Effective Communication Skills	0-0-2	1Credits

Teaching Scheme	Examination Scheme
Lecture:2hrs/week	CA –I :25Marks CA–II:25arks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO 1	To demonstrate the ability to perform close and critical readings.
CO 2	To demonstrate the ability to distinguish opinions and beliefs from researched claimsand evidence and recognize that kinds of evidence will vary from subject to subject.
CO 3	To ask disciplinarily appropriate questions of the material and recognize when lines ofinquiry fall outside of disciplinary boundaries.
CO 4	To demonstrate the ability to consider critically the motives and methods ofscholarship and the relationship between them.
CO 5	To evaluate, credit, and synthesize sources

Under this student has to deliver on one of the advanced topics chosen in consultation with the guide after compiling the information from the latest literature and also internet. The concepts must be clearly understood and presented by the student. Prior to presentation, he/she shall carry out the detailed literature survey from Standard References such as International Journals and Periodicals, recently published reference Books etc. All modern methods of presentation should be used by the student. Ahard copy of the report (25 to 30 pages A4 size, 12 fonts, Times New Roman, single spacing both sides printed, preferably in IEEE format) should be submitted to the Department before delivering the seminar. A PDF copy of the report in soft form must be submitted to the guide along with other details ifany. Guide should guide concern student 2hrs /week/student for seminar. (Student is expected to submit seminar report in Latex/Microsoft word in the standard format style file available in the department.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Robot Dynamics and Control

24MMT1201	PCC	Robot Dynamics and Control	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Summarize fundamental and technical knowledge of Robotics.
CO2	Design computing of design criteria of robot elements
CO3	Apply knowledge of specifying the robot elements and selection of Robots
CO4	Analyze robots through Kinematic and Dynamic study & itsprogramming
CO5	Discuss effective practices in uses of robots, robot economics and novel advancements in this area.
CO6	Elaborate the robot dynamics

Course Contents:

Unit 1: Introduction to robotics Evolution of robots and robotics, Laws of robotics, Progressive advancement in robots, Robot anatomy: links, joint and joint notation scheme, degree of freedom, arm configuration, wrist configuration, End-effector and Grippers, Classification of robot, Human arm characteristics, Design and control issues, Manipulation and control, Sensors and vision, Programming robot, Future aspect.	[6]
Unit 2: Applications-Material handling, processing, Assembly and Inspection, safety considerations. End effectors, Classification, Mechanical, Magnetic, Vacuum, and Adhesive. Force analysis and Gripper design. Sensors in robot systems, non-optical and optical position sensors, Velocity and Acceleration, Range, Proximity, touch, Slip, Force, Torque sensors, Machine vision system	[6]
Unit 3: Image Components Image components, Representation, Hard ware, Picture coding, Object recognition and categorization - Software consideration, Vector operations – Translational transformations and Rotational transformations, Properties of -transformation.	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 4: Dynamic Modelling Dynamic modeling Lagrangian Mechanics, Dynamic modeling of two degree of freedom manipulator, Langrange-Euler Formulation, Newtion-Euler formulation, Comparison of Langrange-Euler Formulation and Newtion Euler formulation, Inverse dynamics	[6]
Unit 5: Matrices Homogeneous transformations and Manipulator, Robot kinematics, Forward solution, Inverse solution, Control system concepts, Analysis, control of joints, Adaptive and optimal control, Trajectory Planning.	[7]
Unit 6: -Robot Dynamics, Langragian formulation, D Alembert's principle, Robot programming Methods - Robot programming languages - VAL Language, Computer controller and Robot communication, Economics of Robots, Telechiricrobots	[6]
Text Books: 1. John J. Craig, Introduction to Robotics Mechanics and Control, Second Edition, Addison Wesly Longman Inc. International Student edition, 1999. 2. R. K. Mittal and I J Nagrath, Robotics and Control, McGraw Hill Education (India) Private Limited, 2017.	
Reference Books: 1. R. N Nazar, Theory of Applied Robotics: Kinematics, Dynamics, and Control, Springer; 2nd Ed. 2010.	

Head
Dept. of Mechatronics Engineering
SIT CCE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Advanced Microcontrollers and Embedded System

24MMT1202	PCC	Advanced Microcontrollers and Embedded System	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites:

Course Outcomes: At the end of the course, students will be able to:

CO1	Illustrate the basics of an embedded system
CO2	Illustrate Program in embedded system
CO3	Design, implement and test an embedded system
CO4	Discuss different peripheral interfaces to embedded systems
CO5	Apply knowledge gained in software-hardware integration in team-based projects.
CO6	Apply various tools in Embedded system

Course Contents:

Unit 1: Introduction to Embedded Systems Embedded Systems, Processor Embedded into a System, Embedded Hardware Units and Devices in a System, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems.	[6]
Unit 2 :8051 and Advanced Processor Architecture 8051 Architecture, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts, Introduction to Advanced Architectures, Real World Interfacing, Processor and Memory organization – Devices and Communication Buses for Devices Network: Serial and parallel Devices & ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Internet Enabled Systems, Wireless and Mobile System protocols	[6]
Unit 3: Embedded Programming Concepts Software programming in Assembly language and High-Level Language, Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object-oriented Programming, Embedded Programming in C++ & JAVA	[6]

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Unit 4: Real – Time Operating Systems OS Services, Process and Memory Management, Real– Time Operating Systems, Basic Design Using an RTOS, Task Scheduling Models, Interrupt Latency, Response of Task as Performance Metrics – RTOS Programming: Basic functions and Types of RTOSES, RTOS VxWorks, Windows CE	[6]
Unit 5 Embedded Software Development Process Introduction to Embedded Software Development Process and Tools, Host and Target Machines, Linking and Locating Software, Getting Embedded Software into the Target System, Issues in Hardware-Software	[7]
Unit 6: Embedded Software Tools Design and Co-Design – Testing, Simulation and Debugging Techniques and Tools: Testing on Host Machine, Simulators, Laboratory Tools	[6]

Text Books:
 	
   1. Embedded Systems, Raj Kamal, Second Edition TMH.
   2. Introduction to Embedded Systems, Shibu K.V, TMH	

Reference Books:

1. Embedded/Real-Time Systems, Dr. K.V.K.K. Prasad, dream TechpressThe 8051

2. Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.

3. The 8051 Microcontroller, Third Edition, Kenneth J Ayala, Thomson.

4. An Embedded Software Primer, David E. Simon, Pearson Education.

5. Micro Controllers, Ajay V Deshmukhi, TMH.

6. Microcontrollers, Raj kamal, Pearson Education

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)–416121, Dist. – Kolhapur

Industrial Automation				
24MMT1203	PCC	Industrial Automation	3-0-0	3Credits

Teaching Scheme	Examination Scheme
Lecture:3hrs/week	CA –I :10Marks CA–II:10Marks Mid Semester Exam: 30 Marks End Semester Exam:50Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Understand the effect of manufacturing automation strategies and derive production
CO2	To know various automation tools and methods in manufacturing industry
CO3	Analyze automated flow lines and assembly systems, and balance the line
CO4	Design automated material handling and storage systems for a typical production
CO5	Design a manufacturing cell
CO6	Develop CAPP systems for rotational and prismatic parts.

Course Contents:

Unit 1: Manufacturing Automation Automated Manufacturing Systems, Computerized Manufacturing Support Systems, Reasons for Automation, Automation Strategies-The USA Principle, Ten Strategies for Automation and Process Improvement, Automation Migration Strategy.	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 2: Automated Flow lines System Configurations, Work part Transfer Mechanisms, Storage Buffers, Control of Production Line, Analysis of Transfer Lines-Transfer Lines with No Internal Parts Storage, Transfer Lines with Internal Storage Buffers.	[6]
Unit 3: Assembly Workstations Work Transport Systems, Line Pacing, Coping with Product Variety, Analysis of Single Model Assembly Lines-Repositioning Losses, The Line Balancing Problem, Line Balancing Algorithms-Largest Candidate Rule, Kilbridge and Wester Method, Ranked Positional Weights Method.	[8]
Unit 4: Automated Assembly Systems System Configurations, Parts Delivery at Workstations, Applications, Quantitative Analysis of Assembly Systems- Parts Delivery System at Workstations, Multi-station Assembly machines, Single Station Assembly Machines, Partial Automation	[6]
Unit 5: Automatic Material Handling and Storage systems Design Considerations in Material Handling, Material Transport Equipment-Industrial Trucks, Automated Guided Vehicles, Monorails and Other Rail-Guided Vehicles, Conveyors, Cranes and Hoists, Analysis of Vehicle Based Systems, Conveyor Analysis, Automated Storage/Retrieval Systems, Carousel Storage Systems, Engineering Analysis of AS/RS and Carousel Systems control	[6]
Unit 6: Computer Integrated Manufacturing The Scope of CAD/CAM and CIM, Computerized elements of a CIM System, Components of CIM, Database for CIM, Planning, Scheduling and Analysis of CIM Systems.	[6]

Text Books:

1. W. Bolton, Mechatronics-Electronic Control systems in Mechanical and Electrical Engineering-,2ndEdition, Addison Wesley LongmanLtd.,1999.
2. Mikell P Groover, Automation, production Systems and Computer Integrated manufacturing, 3 rd Edition, Prentice Hall Inc., New Delhi,2007.

Reference Books:

1. Nanua Singh, System Approach to Computer Integrated Manufacturing, Wiley & Sons Inc.,1996
2. Brian Morris, Automated Manufacturing Systems-Actuators, Controls, Sensors and Robotics, McGraw Hill International Edition,1995

Head
Dept. of Mechatronics Engineering
SIT COE Yadrav

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Experimental Design, Data Analysis and Quality Control

24MMT1204	ESC	Experimental Design, Data Analysis and Quality Control	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA –I :10 Marks A –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Design formulate and solve Sampling Distributions
CO2	Develop and formulate and solve Sampling Distributions
CO3	Demonstrate One - and Two – Sample tests
CO4	Formulate statistical hypothesis, tests
CO5	Design ANOVA
CO6	Formulate Statistical Quality Control

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Course Contents:

Unit 1: Probability Theory and Sampling Distributions Basic probability, Theory along with examples.	[3]
Unit 2: Standard discrete and continuous distributions Binomial, Poisson, Normal, Exponential etc. Central Limit Theorem and its significance. Some sampling distributions like, t, F..	[5]
Unit 3: One - and Two - Sample estimation problems Introduction, statistical inference, classical methods of estimation, single sample : estimating the mean and variance, two samples: estimating the difference between two means and ratio of two variances.	[4]
Unit 4: One - and Two – Sample tests of hypotheses Introduction, testing a statistical hypothesis, tests on single sample and two samples concerning means and variances.	[5]
Unit 5: ANOVA One – way, Two – way with/without interactions, Latin Squares ANOVA technique. Principles of Design of Experiments, some standard designs such as CRD, RBD, LSD.	[4]
Unit 6: Statistical Quality Control Introduction, nature of control limits, purpose of control charts, control charts for variables, control charts for attributes.	[3]

Text Books:

1. Douglas C. Montgomery, Design and Analysis of Experiments (7 th Edition), Wiley Student Edition, 2009.
2. S. P. Gupta, Statistical Methods, S. Chand & Sons, 37 th revised edition, 2008

Reference Books:

1. William W. Hines, Douglas C. Montgomery, David M. Goldsman, Probability andStatistics for Engineering, (4 th Edition), Willey Student edition, 2006.

2. Ronald E, Walpole, Sharon L. Myers, Keying Ye, Probability and Statistics forEngineers and Scientists (8 th Edition), Pearson Prentice Hall, 2007

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Elective – II: Product Design and Development

24MMT1205A	PEC	Product Design and Development	3-0-0	Audit

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA-I :25 Marks CA–II :25 Marks

Pre-Requisites: Nil

Course Outcomes:
At the end of the course, the student will be able to:

CO1	Describe the characteristics used for product design and development.
CO2	Assess the customer requirements in product design.
CO3	Apply structural approach to concept generation, selection and testing.
CO4	Identify various aspects of design such as industrial design.
CO5	Design for manufacture, assembly, service and quality and product architecture.
CO6	Explain various principles and technologies used for the preparation of prototype

Course Contents:

Unit 1: Introduction	
Characteristics of successful product development, design and development of products, duration, and cost of product development, the challenges of product development. Development Processes and Organizations: Generic development process, concept development: the frontend process, adopting the generic product development process, the AMF development process, product development organizations, the AMF organization.	[5]
Unit 2: Product planning	
Product planning process, identify opportunities, evaluate and prioritize projects, allocate resources and plan timing, complete pre project planning, reflect all the results and the process Identifying customer needs: Gather raw data from customers, interpret raw data in terms of customer needs, organize the needs into a hierarchy, establish the relative importance of the needs and reflect on the results and the process.	[4]
Unit 3: Concept Generation, Selection and testing	
Activities of concept generation, need for systems level thinking, TRIZ and its comparison with brainstorming and lateral thinking, TRIZ tools Ideality and IFR, problem	[3]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

formulation and functional analysis, use of 40 principles to solve contradiction, use of S-curves and technology evolution trends. Concept selection: Overview of methodology, concept screening, and concept scoring. Pugh matrix and its application. Concept testing: Define the purpose of concept test, choose a survey population, choose a survey format, communicate the concept, measure customer response, interpret the result, reflect on the results and the process, Failure Mode Effect Analysis (DFMEA and PFMEA).	
Unit 4: Product architecture: Implications of the architecture, establishing the architecture, variety and supply chain considerations, platform planning, related system level design issues. Industrial design: Assessing the need for industrial design, the impact of industrial design, industrial design process, managing the industrial design process, assessing the quality of industrial design. Design for X (DFX)	[4]
Unit 5: Design for manufacturing Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors, design for assembly, service and quality.	[4]
Unit 6: Prototyping Prototyping basics, principles of prototyping, technologies, planning for prototypes Product development economics. Elements of economic analysis, base case financial mode, sensitive analysis, project trade-offs, influence of qualitative factors on project success, qualitative analysis.	[4]

Text Books:

1. Ramamrutham S.: Strength of Materials, Dhanpat Rai & Sons,1991.
2. V.B. Bhandari, "Design of Machine Elements", Tata McGraw Hill Publishing CompanyLtd.,2ndEdition,2007
3. Beer and Johnston: Strength of Materials-CSB Publisher.

Reference Books:

1. Rao, J. S.& Dukkipati, R.V.: Mechanism &Machine Theory, New Age International Pvt. Ltd. Publishers.
2. Ramamurthy, V.: Mechanics of Machines, Narosa Publishing House.
3. Manufacturing Technology, P.N.Rao, Tata McGraw-Hill Publishing Limited ,II Edition,2002.
4. S.S. Rattan, "Theory of Machines", TataMcGrawHillPublishingCompanyLtd.,2nd Edition, 2007

Head
Dept. of Mechatronics Engineering
SIT.COE,Yadrav

Elective – II: Computer Integrated Manufacturing

24MMT1205B	PEC	Computer Integrated Manufacturing	3-0-0	Audit

Teaching Scheme	Examination Scheme
Lecture: 2 hrs/week	CA –I :25 Marks CA –II :25 Marks

Pre-Requisites: C Programming

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop an understanding of computer-integrated manufacturing (CIM) and its impact on productivity, product cost, and quality.
CO2	Obtain an overview of computer technologies including computers, database and data collection, networks, machine control, etc.
CO3	Apply to factory management and factory floor operations
CO4	Describe the integration of manufacturing activities into a complete system
CO5	Describe of the basic areas of artificial intelligence including problem solving, knowledge representation, reasoning, decision making, planning, perception and action, and learning and their applications
CO6	Discuss Computer aided process planning systems

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Course Contents:

Unit 1: Introduction to Manufacturing systems CIM Technology, CIM models, FMS Concepts Definition of FMS – types of FMS, types of flexibility and performance measures, Different FMS layouts, advantages, disadvantages, components of FMS, manufacturing cell. Group technology-classification and coding, production flow analysis, machine cell design simple examples in design, machining centers and turning centers, handling systems, loading and unloading-fixtures and pallets, head indexers	[5]
Unit 2: Distributed numerical control DNC system – communication between DNC computer and machine control unit – hierarchical processing of data in DNC system – features of DNC system. Adaptive control in Machine control unit. Networking concepts, LOSI, MAP, TOP, LAN, WAN, Communication interface, bus architecture, topologies, and protocols. Manufacturing data base.	[3]
Unit 3: Automated material handling Function, types, analysis of material handling equipment. Design of AGV systems. Automated storage: Storage system performance, AS/RS, carousel storage system, WIP storage, Analysis of AS/RS, Industrial robots, Tool Management system-tool strategies- tool identification technologies and tool monitoring, Inspection stations	[4]
Unit 4: Development and implementation of FMS Planning phases, scheduling, integration, system configuration, simulation, FMS project development steps. Hardware and software development. Installation and implementation. Application and benefits of FMS, Quantitative analysis of FMS. Typical Case studies	[4]
Unit 5: Introduction to AI History, Definition of AI, Emulation of human cognitive process, knowledge search tradeoff, stored knowledge, semantic nets. An abstract view of modeling, elementary knowledge. Computational logic, analysis of compound statements using simple logic connectives, predicate logic, knowledge organization and manipulation, knowledge acquisition. Concepts of fifth generation computing, programming in AI environment, develops artificial intelligence system, natural language processing, neural networks	[4]
Unit 6: -Computer aided process planning systems Logical design of a process planning - Implementation considerations – manufacturing system components, production volume, Number of production families, Process Planning software -CAM-I, CAPP, MIPLAN, APPAS, AUTOPLAN and PRO, CPPP	[4]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Text Books:

1. Parrish D. J, "Flexible manufacturing", Butterworth – Heinemann Ltd, 1990
2. Groover M. P, "Automation, production systems and computer integrated manufacturing"
3. Shivanand H. K., Benal M. M and Koti V, "Flexible manufacturing system", New Age International (P) Limited. Publishers, 2006

Reference Books:

1. Kusiak A., "Intelligent manufacturing systems", Prentice Hall, Englewood Cliffs,NJ,1990

2. Considine D. M. &Considine G. D, "Standard handbook of industrial automation", Chapman and Hall, London, 1986

3. Ranky P. G, "The design and operation of FMS", IFS Pub, U. K, 1998

4. Joseph Talavage&Hannam, "Flexible Manufacturing Systems in Practice", Marcel Dekker Inc.

5. Kant Vajpayee, "Principles of Computer Integrated Manufacturing", Prentice Hall of India

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Elective – II: Micro Electro-Mechanical Systems

24MMT1205C	PEC	Micro Electro-Mechanical Systems	3-0-0	Audit

Teaching Scheme:	Examination Scheme:
Lecture: -3 hrs./week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Classify and compare MEMS for various applications
CO2	Summarize various materials used for MEMS and microsystems
CO3	Explain the working principle of MEMS and microsystems
CO4	Interpret various processing techniques for fabrication of MEMS
CO5	Demonstrate the working principles of transducers.
CO6	Illustrate the importance of MEMS packaging and reliability

Course Contents:

Unit 1: Introduction to MEMS History of MEMS development, Scaling of micromechanical devices, intrinsic characteristics of MEMS, Applications of MEMS in various industries, multidisciplinary nature of microsystem design and manufacture, Microsystems and microelectronics	[6]
Unit 2: Materials for MEMS and microsystems: Silicon compatible material systems, Piezoelectric crystals, Polymers, Shape memory alloys, Packaging materials, Important material properties and physical effects	[7]
Unit 3: Microsystems and their working principles: Microsensors, Micro actuation, MEMS with micro actuators, Microfluidics	[8]
Unit 4: Microfabrication: Photolithography, Physical vapor deposition, Chemical vapor deposition, Bulk micromanufacturing, Surface micromachining, LIGA process	[6]
Unit 5: Transducers: Electrostatic sensing and actuation, Thermal sensing and actuation, Piezoresistive sensors,	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Piezoelectric sensing and actuation, Magnetic actuation	
Unit 6: MEMS packaging and reliability: Key design and packaging considerations, Types of packaging solutions, Quality control and reliability	[6]

Text Books

1. 1. Tai-Ran Hsu, "MEMS and microsystems-Design and Manufacture," 1 st edition, Tata McGraw-Hill, 2002

2. Nadim Maluf, Kirt Williams, "An Introduction to Microelectromechanical Systems Engineering," 2 nd edition, Artech House Inc. 2004

3. Chang Liu, "Foundations of MEMS," 2 nd edition, Pearson Education Inc., 2012

Reference Books:

1. The MEMS Handbook – Introduction and Fundamentals, 2 nd edition, CRC Press, 2006
2. The MEMS Handbook – Design and Fabrication, 2 nd edition, CRC Press, 2006
3. Thomas M. Adams, Richard A. Layton, Introductory MEMS – Fabrication and Applications, Springer, 2010

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Autotronics & Vehicle Intelligence

24MMT1205D	PEC	Autotronics & Vehicle Intelligence	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture: 3 hrs/week	CA –I :10 Marks CA –II :10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Analyze and use various SI and CI Management systems
CO2	Discuss Comprehensive fundamental and technical knowledge of sensors and transducers used in auto vehicles and vehicle intelligence
CO3	Explain different Engine Management Systems
CO4	Designing a suitable controller for energy management in electric and hybrid vehicles
CO5	Acquire Knowledge on several vehicle safety systems
CO6	Acquire Knowledge on several intelligent vehicle system and safety systems

Course Contents:

Unit 1: Automotive Fundamentals & Fuel Supply System Engine Components – Drive train – suspension system, ABS, Steering System, Fuel Injection system - components, electronic fuel injection –Throttle body versus Port Injection - MPFI- CRDI. Fuel Ignition System – Electronic ignition system – operation – types – Battery, magneto ignition systems – Electronic spark timing control	[6]
Unit 2: Automotive Sensors Knock sensors, oxygen sensors, crankshaft angular position sensor, temperature sensor, speed sensor, Pressure sensor, Mass air flow sensor, Manifold Absolute Pressure Sensors, crash sensor, Coolant level sensors, Brake fluid level sensors – operation, types, characteristics, advantage and their applications	[6]
Unit 3: Engine Management system On-board diagnostics, Exhaust emission control, Catalytic Converters, New Developments in engine management, adaptive Cruise control	[7]

Dept. of Mechatronics Engineering
SIT COE, Yadrav

Unit 4: Control of Electric and hybrid vehicles	
Electric Vehicle - batteries electric motor and controller, regenerative braking – Control of hybrid vehicles – CNG electric hybrid vehicle – Hybrid Vehicle case studies	[6]
Unit 5: Automotive Safety Sensor applications	
Automatic Rain sensing/wiper activation system, drowsy-driver sensing system, Active Safety Sensor systems, Passive Sensor Safety system - Side Impact Sensing, front impact sensing system	[7]
Unit 6: Intelligent Vehicle System	
MEMS and Microsystems. Vision based autonomous road vehicles, Object detection, Collision warning and avoidance system – Tyre pressure warning system, security systems, Emergency Electronic braking. Intelligent Vehicle Systems – Unmanned ground vehicles, Vehicle Platooning.	[6]

Text Books:

1. C. D. Johnson, Process Control Instrumentation Technology, 7th ed., Prentice Hall of India, New Delhi, 2003

2. William B.Ribben, Understanding Automotive Electronic: An Engineering Perspective (2012), Elsevier Science

Reference Books:

1. Tom Denton, Automobile Electrical and Electronic systems (2013), Roulet edge, Taylor & Francis Group.

2. Gianfranco Pistoia, Electric and Hybrid Vehicles: Power Sources, Models, Sustainability, Infrastructure

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Industrial Management

24MMT1206	HSSM	Industrial Management	1-0-0	Audit

Teaching Scheme	Examination Scheme
Lecture: 1 hrs/week	CA–I :25 Marks CA –II :25 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO1	Recognize and appreciate the concept of Management, creating and enhancing a firm's
CO2	Relate the interdependence of the operations function with the other key functional areas of a firm
CO3	Explain Quality Assurance
CO4	Acquire Maintenance Function
CO5	Explain Management Information System

Course Contents:

Unit	
Unit 1: Classification and Importance of Operations Management Operations Management in corporate profitability & competitiveness; Operations strategy; Types & characteristics of manufacturing systems & service system	[6]
Unit 2: Operations Planning and Control: Forecasting for operations; Inventory planning & control; Materials requirement planning; planning production in aggregate terms; Operations scheduling	[7]
Unit 3: Quality Assurance The quality assurance system; choice of process and reliability; control of quality	[6]
Unit 4: Maintenance Function Preventive maintenance, Overhaul and replacement	[7]
Unit 5: Management Information System Need & structure of MIS; Data Processing Systems; Data Sources & Management	[6]

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Unit 6: Management Information System: Concept and evolution, Manpower planning, recruitment and selection, Motivating personnel, Leadership	[6]

Text Books:

1. Principles and Practice of Management by L.M. Prasad.
2. Introduction to Management by Plankett, W.R. and Attner, R.F., Kent Publishing Company

Reference Books:

1. Management Information Systems, Lauden and Lauden, PHI (1999).
2. Management Information Systems by Jerome kante
3. Management Information Systems by Davis Gordon

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Advanced Microcontrollers and Embedded System Laboratory

24MMT1207	PCC	Advanced Microcontrollers and Embedded System Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week	CA –I :25 Marks CA–II :25 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course students will be able to -

CO1	Program 8051 microcontroller to meet the requirements of the user.
CO2	Interface peripherals like switches, LEDs, stepper motor, Traffic lights controller, etc
CO3	Handle interrupts
CO4	Design a microcontroller development board to meet the requirements of the user

List of Experiments:

At least minimum 6 experiments should be performed from the following list.

1. Program for addition of BCD numbers.
2. Interface an LED array and 7-segmentdisplay
3. Interfacing of PIC18 with LCD
4. Interfacing of PIC18 with Keyboard Interfacing
5. Interfacing of PIC18 with temperature Sensor
6. Interfacing of PIC18 with DS1306RTC
7. Interfacing of PIC18 with DC Motor Control
8. Interfacing of PIC18 with Stepper Motor

Text Books:

1. Embedded Systems, Raj Kamal, Second Edition TMH.
2. Introduction to Embedded Systems, Shibu K.V, TMH

Reference Books:

1. Embedded/Real-Time Systems, Dr. K.V.K.K. Prasad, dream TechpressThe 8051
2. Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Pearson.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Power Electronics and Drives Laboratory

24MMT1208	VSEC	Power Electronics and Drives Laboratory	0-0-2	1 Credits

Teaching Scheme:	Evaluation Scheme:
Practical: 2 hours/week/batch	CA –I :15 Marks CA –II :15 Marks End Semester Examination:20 Marks

Pre-Requisites: Basic knowledge of Semiconductor Physics and Basic Electronics.
Course Outcomes: At the end of the course students will be able to -

CO1	Correlate theoretical and practical analysis of AC-AC, DC-AC converters
CO2	Analyze the characteristics of MOSFET, IGBT, SCR and SCR firing CKTs, these commutation techniques.
CO3	To perform the experiments on various converters

List of Experiments:

At least minimum 8 experiments should be performed from the following list.

1. Gate Pulse Generation using R, RC and UJT.
2. Characteristics of SCR and Triac
3. Characteristics of MOSFET and IGBT
4. AC to DC half-controlled converter
5. AC to DC fully controlled Converter
6. Step down and step up MOSFET based choppers
7. IGBT IGBT based three phase PWM inverter
8. AC Voltage controllerbased single phase PWM inverter
9. Switched mode power converter.

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Text Books:

1. Power Electronics: Converters, Applications, and Design - Ned Mohan, Tore M. Undeland, William P. Robbins, Wiley, ISBN: 978-0471226932.
2. Modern Power Electronics and AC Drives - Bimal K. Bose, Prentice Hall, ISBN: 978-0130167439.
3. Power Electronics: Devices, Circuits, and Applications - Muhammad H. Rashid, Pearson, ISBN: 978-0133125900.
4. Electric Motor Drives: Modeling, Analysis, and Control - R. Krishnan, Prentice Hall, ISBN: 978-0130910141.

Reference Books:

1. Electric Drives: Concepts and Applications - Vedam Subrahmanyam, McGraw-Hill Education, ISBN: 978-0074603707.
2. Control in Power Electronics: Selected Problems - Marian P. Kazmierkowski, Ramu Krishnan, Frede Blaabjerg, Academic Press, ISBN: 978-0124027725.
3. Introduction to Modern Power Electronics - Andrzej M. Trzynadlowski, Wiley, ISBN: 978-0470401033.
4. Power Electronics and Motor Drives: Advances and Trends - Bimal K. Bose (Editor), Academic Press, ISBN: 978-0120884056.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Presentation skills

24MMT1209	AEC	Presentation skills	0-0-2	1Credits

Teaching Scheme	Examination Scheme
Lecture:2hrs/week	CA –I :25Marks CA–II:25arks End Semester Examination:20 Marks

Pre-Requisites: Nil

Course Outcomes: At the end of the course, students will be able to:

CO 1	Develop confidence and clarity in public speaking.
CO 2	Design the structure and organization of presentations.
CO 3	Learn to engage and persuade an audience.
CO 4	Improve visual communication with effective use of slides and other aids.
CO 5	Evaluate, credit, and synthesize sources

This course on Presentation Skills is designed to equip participants with the essential tools for delivering effective and impactful presentations. It covers key areas such as understanding audience needs, structuring presentations, and designing visually appealing slides. Participants will learn verbal and non-verbal communication techniques to engage and persuade their audience, manage stage fright, and handle Q&A sessions confidently.

The course includes practical exercises, peer feedback, and final presentations to ensure hands-on learning and skill development. By the end, participants will be able to create and deliver professional presentations with clarity and confidence.

Under this student has to deliver on one of the advanced topics chosen in consultation with the guide after compiling the information from the latest literature and also internet. The concepts must be clearly understood and presented by the student.

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Prior to presentation, he/she shall carry out the detailed literature survey from Standard References such as International Journals and Periodicals, recently published reference Books etc. All modern methods of presentation should be used by the student.

A hard copy of the report (25 to 30 pages A4 size, 12 fonts, Times New Roman, single spacing both sides printed, preferably in IEEE format) should be submitted to the Department before delivering the seminar. A PDF copy of the report in soft form must be submitted to the guide along with other details if any.

Guide should guide concern student 2hrs /week/student for seminar. (Student is expected to submit seminar report in Latex/Microsoft word in the standard format style file available in the department.

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav

Sharad Institute of Technology, College of Engineering
Yadrav (Ichalkaranji)-416121, Dist. - Kolhapur
(An Autonomous Institute)
(Approved by AICTE, New Delhi, Recognized by Government of Maharashtra & Affiliated
to BATU University, Lonere)
NBA Accredited Programs, Accredited By NAAC 'A' Grade, ISO 9001:2015 Certified

Syllabus Structure of M. Tech.

(Mechatronics)

Department of Mechatronics Engineering

Semester: III & IV

Dept. of Mechatronics Engineering
SIT COE, ISUI Zv

Department: Department of Mechatronics Engineering   **Rev:** Course Structure/00/2024-25

Class: S.Y. M.Tech   **Semester:** III

Course Code	Type of Course	Course	Teaching Scheme				Evaluation Scheme					Credit
			L	T	P	Total	CA-I	CA-II	MSE	ESE	Total	
24MMT2301	MDM	Self-Learning Course-I	-	-	-	-	10	10	30	50	100	3
24MMT2302	IKS	Self-Learning Course-II	-	-	-	-	10	10	30	50	100	3
24MMT2303	ELC	Dissertation (Part-I)	-	-	-	-	25	25	-	50	100	12
			-	-	-	-	45	45	60	150	300	18

Self-Learning Course-I- Multidisciplinary Minor

24MMT2101A: Project Management: Planning, Execution, Evaluation and Control

24MMT2101B: Robotics

24MMT2101C: Computer Networks and Internet Protocol

Self-Learning Course-II- IKS

24MMT2102A: Indian Knowledge System (IKS): Conceptsand Applications in Engineering

24MMT2102B: Indian Knowledge System (IKS): Humanities and Social Sciences

24MMT2102C: Ancient Indian Management

Head
Dept. of Mechatronics Engineering
SIT COE,Yadrav

Department: Department of Mechatronics Engineering **Rev:** Course Structure/00/2024-25

Class: S.Y. M.Tech.　　　　　　　　　　　　　**Semester:** IV

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CA-I	CA-II	MSE	ESE	Total	
24MMT2401	ELC	Dissertation (Part-II)	-	-	-	-	25	25	-	100	150	18
		Total	-	-	-	-	25	25	-	100	150	18

Head
Dept. of Mechatronics Engineering
SIT COE, Yadrav