Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's
Sharad Institute of Technology College of Engineering
(An Autonomous Institute)
Yadrav (Ichalkaranji)-416121, Dist. – Kolhapur

Department of Mechanical Engineering

Third-Year Engineering

Teaching and Evaluation Scheme

and

Syllabus

as per New Education Policy 2020

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Abbreviations

L: Lecture

T: Tutorial

P: Practical

CA1- Continuous Assessment 1

CA2- Continuous Assessment 2

MSE: Mid Semester Exam

ESE: End Semester Exam

BSC: Basic Science Course

ESC: Engineering Science Course

PCC: Programme Core Course

PEC: Programme Elective Course

MDM: Multidisciplinary Minor

OE: Open Elective

VSEC: Vocational and Skill Enhancement Course

AEC: Ability Enhancement Course

IKS: Indian Knowledge System

VEC: Value Education Course

RM: Research Methodology

CEP: Common Engineering Project

FP: Field Project

CC: Co-curricular Courses

ELC: Experimental Learning Course

HSSM: Humanity Social Science and Management

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
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

Department: Mechanical Engineering **Rev:** Course Structure/ 00/ 2023-24

Class: T.Y. B. Tech. **Semester:** V

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme					Credit
			L	T	P	CA-I	CA-II	MSE	ESE	Total	
23ME3501	PCC	Design of Machine Elements -I	3	0	0	10	10	30	50	100	3
23ME3502	PCC	Machine Tool and Control	3	0	0	10	10	30	50	100	3
23ME3503	PCC	Heat Transfer	3	0	0	10	10	30	50	100	3
23ME3504	PEC	Program Elective Course-I	3	0	0	10	10	30	50	100	3
23ME3505	PCC	Heat transfer Laboratory	0	0	2	15	15	-	20	50	1
23ME3506	PCC	Design of Machine Element-I Laboratory	0	0	2	25	25	-	-	50	1
23ME3507	VSEC	CAD/CAM Laboratory	0	0	2	15	15	-	20	50	1
23ME3508	CEP	Mini Project-III	0	0	2	25	25	-	-	50	Audit
23ME3509	VSEC	Industrial/Field Training	0	0	0	0	0	-	50	50	Audit
23MEMDXX	MDM	Multidisciplinary Minor-III	3	0	0	10	10	30	50	100	3
23OEME33	OE	Open Elective III	3	0	0	10	10	30	50	100	3
23HSSM05	VEC	Language Skill-III	0	0	2	25	25	-	-	50	Audit
23HSSM06	VEC	Aptitude Skill-III	2	0	0	25	25	-	-	50	Audit
Total			**20**	**0**	**10**	**190**	**190**	**180**	**390**	**950**	**21**

Program Elective Course-I

Basket A (Thermal)	Basket B (Design)	Basket C (Production)
Renewable Energy Engineering (23ME3504A)	Dynamics of Machines (23ME3504B)	Additive Manufacturing and Reverse Engineering (23ME3504C)

Multidisciplinary Minor-III

Basket A (Production and Operation Management)	Basket B (Aerospace)	Basket C (Mechatronics)
Management Information System (23MEMDA3)	Aero Engine gas Turbine (23MEMDB3)	Sensor Technology-Physics, Fabrication and Circuits (23MEMDC3)

verified

Head
Mechanical Engineering Dept.
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

Department: Mechanical Engineering | **Rev:** Course Structure/ 00/ 2023-24

Class: T.Y. B. Tech. | **Semester:** VI

Course Code	Type of Course	Name of the course	Teaching Scheme			Evaluation scheme					Credit
			L	T	P	CA-I	CA-II	MSE	ESE	Total	
23ME3601	PCC	Design of Machine Elements -II	3	0	0	10	10	30	50	100	3
23ME3602	PCC	Finite Element Analysis	3	0	0	10	10	30	50	100	3
23ME3603	PCC	Refrigeration and Air Conditioning	3	0	0	10	10	30	50	100	3
23ME3604	PEC	Program Elective Course -II	3	0	0	10	10	30	50	100	3
23ME3605	PEC	Program Elective Course -III	3	0	0	10	10	30	50	100	3
23ME3606	VSEC	Design and Modeling of transmission system Laboratory	0	0	2	25	25	-	-	50	1
23ME3607	PCC	Refrigeration and Air Conditioning Laboratory	0	0	2	15	15	-	20	50	1
23ME3608	PCC	Finite Element Analysis Laboratory	0	0	2	15	15	-	20	50	1
23ME3609	ELC	Capstone Project-I	0	0	4	25	25	-	50	100	2
23MEMDX4	MDM	Multidisciplinary Minor-IV	3	0	0	10	10	30	50	100	3
23HSSM07	VEC	Language Skill-IV	0	0	2	25	25	-	-	50	Audit
23HSSM08	VEC	Aptitude Skill-IV	1	0	0	25	25	-	-	50	Audit
Total			**19**	**0**	**12**	**190**	**190**	**180**	**390**	**950**	**23**

Program Elective Course –II

Basket A (Thermal)	Basket B (Design)	Basket C (Production)
Power Plant Engineering (23ME3604A)	Design of Composite Materials (23ME3604B)	Automation in Manufacturing (23ME3604C)

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Program Elective Course –III

Basket A (Thermal)	**Basket B (Design)**	**Basket C (Production)**
Introduction to CFD (23ME3605A)	Reliability Engineering (23ME3605B)	Computer Integrated Manufacturing (23ME3605C)

Multidisciplinary Minor-IV

Basket 1 (Production and Operation Management)	**Basket 2 (Aerospace)**	**Basket 3 (Mechatronics)**
Strategic Management (23MEMDA4)	Introduction to Air Breathing Propulsion (23MEMDB4)	Mechatronics in Automotive Systems (23MEMDC4)

Honour's Degree in Robotics
List of Honour's Degree Courses (2025-26)

Sr. No.	**Subject Name**	**NPTEL URL**	**Sem**
1	Robotics	https://onlinecourses.nptel.ac.in/noc25_me166/preview	V
2	Industrial Robotics: Theories for Implementation	https://onlinecourses.nptel.ac.in/noc25_me161/preview	VI
3	Mechanism and Robot Kinematics	https://onlinecourses.nptel.ac.in/noc25_me164/preview	VI
4	Design of Mechatronics System	https://onlinecourses.nptel.ac.in/noc25_me179/preview	VII
5	Mechanics and Control of Robotic Manipulators	https://onlinecourses.nptel.ac.in/noc25_me105/preview	VII

List of Minor Degree Courses (2025-26)

Sr. No.	Subject Name	NPTEL URL	Sem
1	Basics of Mechanical Engineering- 3	https://onlinecourses.nptel.ac.in/noc25_me168/preview	V
2	Numerical Methods for Engineers	https://onlinecourses.nptel.ac.in/noc25_ge59/preview	VI
3	Fluid Mechanics.	https://onlinecourses.nptel.ac.in/noc25_ce107/preview	VI
4	Fundamentals of Manufacturing Processes	https://onlinecourses.nptel.ac.in/noc25_me119/preview	VII
5	Automation in Manufacturing	https://onlinecourses.nptel.ac.in/noc25_me154/preview	VII

Policy for Honors with Research

Semester	Requirement	Credits
VI, VII and VIII	**Research paper- I** publication on Capstone Project in UCG care/SCOPUS/ESCI/SCI indexed Journal	9
	Research paper- II publication on Capstone Project in UCG care/SCOPUS/ESCI/SCI indexed Journal	9
Total		**18**

T. Y. curriculum credit distribution:

Course Category	PCC	PEC	MDM	OE	VSEC	ELC	Total
Cumulative Sum of Credits	22	9	06	03	02	02	44
NEP Guideline	18-22	12	06	02	02	00	40-44

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV DEPT. OF MECHANICAL ENGINEERING sit

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Exit Policy

Exit Criteria after First Year (Certificate): UG Certification

Course after First Year Exit	L	P	Credits
Drafting and 3 D Modeling Software	2	1	3
Hands on Training in any Workshop (3Weeks) /Minor Project			3
		Total	6

Exit Criteria after Second Year: UG Diploma

Course after First Year Exit	L	P	Credits
CAM Programming	2	1	3
Internship in Mechanical Industry (3Weeks)/ Minor Project			3
		Total	6

Exit Criteria after Third Year: B. Vocational

Course after First Year Exit	L	P	Credits
Hands on Simulation software	2	1	3
Internship in Mechanical Industry (3Weeks)/Minor Project		3	3
		Total	6

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV DEPT. OF MECHANICAL ENGINEERING sit

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Design of Machine Elements -I

23ME3501	PCC	Design of Machine Elements I	3-0-0	3 Credits

Teaching Scheme	Evaluation 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: Basic Mechanical Engineering, Strength of Materials, Kinematics of Machines

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

CO1	Extend the knowledge of types of stresses, types of load, and theories of failure and factor of safety for the design of machine elements. (L2)
CO2	Analyze failure modes of simple machine elements for the applied load. (L4)
CO3	Determine the dimensions of shaft, keys and couplings for given transmitted power. (L5)
CO4	Determine stresses, deflections, and number of coils of springs under various loading conditions. (L5)
CO5	Apply design equations to evaluate the torque required and stresses induced in power screws. (L3)
CO6	Design against fluctuating loads. (L6)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2									2	2	
CO2	3	2									2	2	
CO3	3	2									2	2	
CO4	3	2									2	2	
CO5	3	2									2	2	
CO6	3	2									2	2	

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Course Contents:

Unit 1: Introduction and Role of Materials Introduction, General design procedures, Types of loads, types of stresses and use of design data book, Stress analysis, material selection, factor of safety, calculation of allowable stresses, theories of failure, aesthetic and ergonomic considerations in design.	[6]
Unit 2: Design of Simple Machine Elements Design of knuckle joint, Turn-buckle and bell crank lever	[6]
Unit 3: Design of shaft, Keys and Couplings Strength & deflection - ASME code for transmission shafting including axial loads (Problems not involving more than 2 transmitting elements.) Selection of keys, check for stresses. Introduction, classification, advantages, and applications of Couplings, design of Rigid & flexible coupling, Design of flexible coupling continued Bush and Pin type coupling.	[6]
Unit 4: Design of Springs Terminology, materials and specifications-Classification and Applications of Springs, Stress in springs, Wahl's correction factor, Deflection of springs, Design of helical compression springs subjected to uniform applied loads like I.C. engine valves, weighing balance, Problems on helical compression springs; Construction and application of Leaf springs	[6]
Unit 5: Design of Power Screws Power Screws: Types of threads used for power screw and their applications, torque analysis for square and trapezoidal threads, efficiency of screw, collar friction, overall efficiency, self-locking in power screws, stresses in the power screw, design of screw and nut, differential and compound screw, re-circulating ball screw. Design of screw jack: (Complete Design).	[6]
Unit 6: Design against Fluctuating Loads: Stress concentration, stress concentration factors, fluctuating stresses, fatigue failure, endurance limit, notch sensitivity, approximate estimation of endurance limit, design for finite life and infinite life under reversed stresses, Soderberg and Goodman diagrams.	[6]
Text Books: 1. V. B. Bhandari, "Design of Machine Elements", Tata McGraw Hill Publications, New Delhi, 2008. 2. R. L. Nortan, "Machine Design: An Integrated Approach", Pearson Education Singapore, 2001 3. Machine Design R.S. Khurmi & J.K. Gupta S. Chand publication. 4. Machine design S G Kulkarni McGraw Hill Education Publications 5. Introduction to Machine design V B Bhandari McGraw Hill Education Publications. 6. Design Of Machine Elements Vol I, Vol II J.B.K. Das , P.L. Srinivas Murthy Sapna publication 7. Machine Component Design William Orthwein Jaico publication	
Reference Books: 1. R. C. Juvinall, K. M. Marshek, " Fundamental of machine component design", John Wiley & Sons Inc., New York, 3rd edition, 2002. 2. J. Hamrock, B. Jacobson and Schmid Sr., " Fundamentals of Machine Elements", International	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Edition, New York, 2nd edition, 1999.
3. S. Hall, A. R. Holowenko, H. G .Langhlin, "Theory and Problems of Machine Design", Schaum's Outline Series, Tata McGraw Hill book Company, New York, 1982.
4. J. E. Shigley and C. Mischke, "Mechanical Engineering Design", Tata McGraw Hill Publications, 7th edition, 2004.
5. M. F. Spotts, "Design of Machine Elements", Prentice Hall of India, New Delhi.
6. Machine Design by Robert L.Norton, Tata Mc- Graw Hill Publication
7. Fundamentals of Machine Component Design by Junvinall Wiley India
8. Mechanical System Design by Anurag Dixit SCITECH publication
9. Design of Machine Element/Machine Design by Kannaiah SCITECH publication
10. Design of Machine Element by Spotts/Shoup/Hornberger/Jayram/Venketesh PiersonEducation
11. Machine Design by T H WentzellCengage Learning

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Machine Tool Control

23ME3502	PCC	Machine Tool Control	3-0-0	3 Credits

Teaching Scheme	Evaluation 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: Machine Tools

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

CO1	Explain the fundamental principles of machine control systems, their components, and their applications. (L2)
CO2	Develop mechanical and electrical analogies for translational and rotational systems(L3)
CO3	Apply PID controller tuning methods (Ziegler-Nichols, Cohen-Coon) to optimize controller performance. (L3)
CO4	Analyze the interfacing of sensors and actuators with control systems for real-time applications (L4)
CO5	Interpret the transient behavior of first and second order systems in response to standard inputs using transfer functions, and assess system performance based on damping ratio,
CO6	Analyze the working principles and applications of Programmable Logic Controllers (PLC) industrial automation (L4)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1											
CO2	3	2										3	
CO3	3	2										3	
CO4	3	2										3	
												3	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

CO5	3	3									3	
CO6	3	2									3	

Course Contents:

Unit 1: Introduction to Machine Control Systems: Introduction to automation and control systems. Types of machine control systems (open-loop, closed-loop).Components of a machine control system (sensors, actuators, controllers).Applications of machine control systems in various industries	[6]
Unit 2: Mathematical Modeling of Machine Control System: Differential Equations and Transfer Functions, Block Diagram Representation, Mechanical Translational Systems,Rotational System, Grounded Chair Representation, Electrical Elements, Analogous Systems, Force – Voltage Analog, Force – Current Analog	[6]
Unit 3: Feedback Control Systems: Basic feedback control concepts. Proportional (P), Integral (I), and Derivative (D) control. PID controller tuning methods (Ziegler-Nichols, Cohen-Coon).Stability analysis (Routh-Hurwitz criterion, Root locus)Steady-state error analysis	[6]
Unit 4: Sensors and Actuators: Types of sensors (position, velocity, force, temperature). Types of actuators (DC motors, stepper motors, servo motors, pneumatic/hydraulic actuators).Sensor and actuator interfacing. Selection criteria for sensors and actuator	[6]
Unit 5: Transient Response: General form of transfer function, response of systems (first and second order) to various input, damping ratio and natural frequency, transient response specifications.	[6]
Unit 6: Control System Components and Controllers, Control Elements: Motors, Valves, Relays, Programmable Logic Controllers (PLC) Supervisory Control and Data Acquisition (SCADA)	[6]
Text Books: 1. Radhakrishnan P. – Computer Numerical Control MachinesCovers CNC systems, servo control, and automation in machine tools. 2. Venkataraman K. – Motion Control of Machine Tools 3. HMT (Hindustan Machine Tools) – Mechatronic	
Reference Books: 1. Jayakumar V. & Ramesh Babu V. – Mechatronics and Machine Control Systems 2. Gopal K. Dubey – Fundamentals of Electrical Drives 3. M. Mahadevan & K. Balaveera Reddy – Design Data Handbook for Mechanical Engineering 4. Biswajit Mallick & Amitabha Bhattacharya – Advanced Machine Tool Design and Research	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Heat Transfer

23ME3503	PCC	Heat Transfer	3-0-0	3 Credits

Teaching Scheme:	**Evaluation 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: Thermal Engineering; Fluid Mechanics

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

CO1	Explain the basic laws of heat transfers (L2).
CO2	Solve one dimensional steady state heat conduction and unsteady state heat conduction problems (L3).
CO3	Determine effectiveness and efficiency of fins (L5).
CO4	Estimate heat transfer coefficient for free and forced convection heat transfer (L5).
CO5	Compare heat exchangers (L5)
CO6	Evaluate radiation view factors and solve radiation heat transfer problems (L5).

Course Outcomes	**Program Outcomes**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	PSO2
CO1	3	1										3	
CO2	3	2										3	
CO3	3	2										3	
CO4	3	2										3	
CO5	3	2										3	
CO6	3	2										3	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Course Contents:

Unit 1: Introduction to Heat and Mass Transfer Modes of heat transfer, basic laws of heat transfer, thermal conductivity and its variation with temperature for various engineering materials. **Introduction to mass transfer**: Modes of mass transfer, Fick's law of diffusion. Concept of Nano-fluids.	[6]
Unit 2: Steady state and unsteady state heat conduction One dimensional steady state heat conduction: heat conduction through plane wall, cylinder, sphere, critical radius of insulation for cylinder and sphere, the economic thickness of insulation. Unsteady state heat conduction: Lumped heat capacity analysis, Biot and Fourier number and their significance.	[6]
Unit 3: Heat Transfer through Extended Surfaces Boundary and initial conditions, types and applications of fins, heat transfer from rectangular and pin fins, fin effectiveness and efficiency, error estimation in temperature measurement in thermos-well.	[6]
Unit 4: Fundamentals of Convection Principles of convection, Classification of convection, convention heat transfer coefficient. dimensional analysis in free and forced convection, physical significance of the dimensionless numbers related to free and forced convection, empirical correlations for free convection and forced convection for heat transfer	[6]
Unit 5: Heat Exchangers and Phase Change Phenomenon Classification and types of heat exchangers, fouling factor, and overall heat transfer coefficient, heat exchanger analysis using LMTD and NTU methods for parallel and counter flow, design consideration of heat exchangers, compact heat exchangers **Nucleate and film boiling phenomenon**: drop wise and film wise condensation, Nusselt's theory of condensation nature of heat transfer in such phenomenon,	[6]
Unit 6: Radiation Fundamental concepts, Black body radiation, Planck's distribution law, Wien's displacement law and the Stefan-Boltzmann law, radiative properties of a surface, Radiation shape factor, Kirchhoff's law, Lambert's cosine law, Radiation shields, Gas radiation, Solar radiation,	[6]
Text Books: 1. "Engineering Heat and Mass Transfer", Mahesh M. Rathore, Laxmi Publications Pvt Limited, 2006N. P. Bali, A Text Book of Engineering Mathematics, Laxmi Publications, New Delhi. 2. "A Text Book on Heat Transfer", Dr. S. P. Sukhatme, Orient Longman, Hyderabad (2005) 3. P.K. Nag, "Heat Transfer", Tata McGraw Hill Publishing, 5th edition, 2008	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

4. Incropera and Dewitt, "Fundamentals of Heat and Mass Transfer", Wiley publications, 2nd edition, 2007
5. "Fundamentals of Heat and Mass Transfer", R. C. Sachdeva, Willey Eastern Ltd., 2012
6. "Heat and Mass Transfer", S. C. Arora and S. Domkoundwar, Dhanpat Rai and Sons, Delhi (2012)

Reference Books:

1. Yunus A. Cengel, "Heat Transfer: A Practical Approach", McGraw-Hill Higher Education, 2002.
2. J.P. Holman: "Heat Transfer"; McGraw-Hill, 1996
3. Latif M. Jiji, "Heat Conduction", Springer, 3rd edition, 2009.
4. H. Schlichting, K. Gersten, "Boundary Layer Theory" Springer, 8th edition, 2000.

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Renewable Energy Engineering

23ME3504A	PEC	Renewable Energy Engineering	3-0-0	3 Credits

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

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

CO1	Explain the different renewable energy sources (L2).
CO2	Identify the applications of solar energy (L3).
CO3	Develop on grid Solar Photovoltaic System (L3).
CO4	Classify wind mills (L2).
CO5	Compare different Renewable energy sources (L2).
CO6	Estimate Energy Utilization through Energy Audit Case Study (L5).

Course Outcomes	**Program Outcomes**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3												
CO2	3	2										3	
CO3	3	2										3	
CO4	3											3	
CO5	3	2										3	
CO6	3	2										3	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Course Contents:

Unit 1: Introduction of Renewable Energy and Solar Radiation Renewable Energy resources, Estimation of renewable energy reserves in India, Solar energy, Solar geometry, Attenuation of solar radiation in Earth's atmosphere, Measurement of solar radiation.	[6]
Unit 2: Solar Collectors and Solar Energy Applications **Flat Plate Solar Collectors**: Construction of collector, material, selection criteria for flat plate collectors, testing of collectors, Limitation of flat plate collectors, Introduction to ETC. **Concentrating type collectors**: Types of concentrators, advantages, paraboloid, parabolic trough, Heliostat concentrator, Selection of various materials used in concentrating systems, tracking. **Solar Energy Applications**: Air/Water heating, Space heating/cooling, solar drying, and solar still	[6]
Unit 3: Solar Photovoltaic System Operating Principle of Photovoltaic cell concepts, Photo-cell materials, Cell module array, Series and parallel connections, Maximum power point tracking, Design of standalone system with battery and AC or DC load (Descriptive Treatment), Applications	[6]
Unit 4: Wind Energy and Biomass Types of wind mills, Wind power availability, and wind power development in India. Evaluation of sites for bio-conversion and bio-mass, Bio-mass gasification with special reference to agricultural waste	[6]
Unit 5: Introduction to Other Renewable Energy Sources Tidal, Geo-thermal, OTEC; Mini/micro hydro-electric, Geo-thermal, Wave, Tidal System design, components and economics.	[6]
Unit 6: Energy Auditing Elements and concepts, Types of energy audits, Instruments used in energy auditing. Economic Analysis: Cash flows, time value of money, formulae relating present and future cash flows-single amount, uniform series	[6]
Texts books: 1. Chetansingh Solanki, Renewable Energy Technologies, Prentice Hall of India, 200	
References: 1. S. P. Sukhatme, Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw Hill Publications, New Delhi, 1992. 2. G. D. Rai, Solar Energy Utilization, Khanna Publisher, Delhi, 1992	

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Dynamics of Machines

23ME3504B	PEC	Dynamics of Machines	3-0-0	3 Credits

Teaching Scheme	Evaluation 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: Basic mechanical Engineering, Kinematics of Machines

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

CO1	Explain the gyroscopic couple and its effects on stability and control in vehicles, ships, and aircraft. (L5)
CO2	Apply analytical methods to evaluate the performance of governors in different operating conditions. (L3)
CO3	Determine position and magnitude of the balance mass using analytical and graphical methods. (L5)
CO4	Explain the principles governing different types of vibrations, including free, forced, damped, and undamped systems. (L2)
CO5	Determine natural frequencies, damping coefficients, and system responses using analytical and computational techniques. (L5)
CO6	Determine vibration amplitude, and transmissibility in forced vibration systems using analytical methods. (L5)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1										2	
CO2	3	1										2	
CO3	3	1										2	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

CO4	3	1										2	
CO5	3	1										2	
CO6	3	1										2	

Course Contents:

Unit 1: Angular Motion Gyroscopes – effect of precession – motion on the stability of moving vehicles such as motorcycle – motorcar – aero planes and ships. Static and Dynamic Force, Analysis of planar mechanisms.	[6]
Unit 2: Governers Watt, porter, spring loaded governors – Hartnell with auxiliary springs. Sensitiveness, isochronism and hunting.	[6]
Unit 3 Balancing Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples, examination of "V" multi cylinder in line and radial engines for primary and secondary balancing	[6]
Unit 4: Fundamentals of Vibrations Basic concepts and definitions, vibration measuring parameters- Displacement, Velocity and acceleration, Free and forced vibrations, Equivalent Springs. Types of damping.	[6]
Unit 5: Single degree of freedom systems Free vibrations with and without damping (Rectilinear, Torsional & Transverse), degree of damping. Logarithmic decrement, equivalent viscous damping, Coulomb damping.	[6]
Unit 6: Forced vibrations Forced vibrations with viscous damping, magnification factor, frequency response curves, vibration isolation and transmissibility, forced vibrations due to support excitation.	[6]
Text Books: 1. Theory of Machines by Rattan S.S. (Tata McGraw Hill) 2. Theory of Machines & Mechanisms by Shigley (Tata McGraw Hill) 3. Mechanical Vibrations by Grover G.K., Nemchand Publi. 4. Mechanism and Machine Theory by Rao, Dukkipati, New Age International.	
Reference Books: 1. Theory of Machines by Dr. V.P.Singh, Dhanpat Rai Publications. 2. Theory of Machines by Ballaney, Khanna Publications. 3. Theory of Machines by Jagdishlal, Metropolitan Publi. 4. Theory of Machines by R.K.Bansal (Laxmi Publications) 5. Mechanical Vibrations by S.S.Rao, Pearson Education Publi.	

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

6. Theory of vibrations with applications by W.T. Thomson (CBS Publications)
7. Mechanical vibrations by Tse, morse and Hinkle (PHI Publications)
8. Mechanical Vibrations by V.P. Singh, Dhanpat Rai Publications.
9. Solved vibrations in Mechanical Vibrations, Schaums Series
10. Mechanisms and Dynamics of machines by J. Srinivas (SciTech Publications)

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Additive Manufacturing and Reverse Engineering

23ME3504C	PEC	Additive Manufacturing and Reverse Engineering	3-0-0	3 Credits

Teaching Scheme	Evaluation Scheme
Lecture: 3 Hours/Week	CA-I:10 Marks CA-II:10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Manufacturing Processes, Engineering Material Sciences, engineering graphics, CAD

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

CO1	Explain the working principles and process parameters of additive manufacturing processes (L2)
CO2	Analyze the working principles, process parameters, and performance characteristics of liquid-based and solid-based additive manufacturing systems (L4)
CO3	Distinguish the requirements of powder-based additive manufacturing systems to assess their suitability for specific applications and part requirements. (L4)
CO4	Compare different post-processing techniques to select appropriate methods for improving the quality and usability of additive manufactured parts. (L4).
CO5	Examine the methodologies and abstraction levels involved in reverse engineering in analyzing existing product designs. (L3)
CO6	Classify scanning technologies and geometric modeling techniques determine appropriate methods for reconstructing complex physical objects (L4)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	2		2							3	2
CO2	3	2	3		2							3	2
CO3	3	2	3		2							3	2

DEPT. OF MECHANICAL ENGINEERING, YADRAV — SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

CO4	2	1	3		2							2	2
CO5	2	2	2		2							2	2
CO6	3	2	2		3							3	3

Course Contents:

Unit 1: Introduction to Additive Manufacturing Introduction to Additive Manufacturing (AM), Need - Development of AM systems – AM process chain - Impact of AM on Product Development, rapid tooling, Classification of AM processes-Benefits- Applications, materials for AM	[6]
Unit 2: Liquid Based And Solid Based Additive Manufacturing Systems Stereolithography Apparatus (SLA): Principle, pre-build process, part-building and post-build processes, photo polymerization of SL resins, part quality and process planning, recoating issues, materials, advantages, limitations and applications. Solid Ground Curing (SGC): working principle, process, strengths, weaknesses and applications. Fused deposition Modeling (FDM): Principle, details of processes, process variables, types, products, materials and applications.	[6]
Unit 3: Powder Based Additive Manufacturing Systems: Selective Laser Sintering (SLS): Principle, process, Indirect and direct SLS- powder structures, materials, post processing, surface deviation and accuracy, Applications. Laser Engineered Net Shaping (LENS): Processes, materials, products, advantages, limitations and applications– Case Studies.	[6]
Unit 4: Methods for Post-processing of Additive Manufacturing parts Support material removal, surface texture improvement, accuracy improvement,aesthetic improvement, preparation for use as a pattern, property enhancements using thermal techniques & non-thermal techniques, Part Cleaning and finishing, Process Strength &limitations.	[6]
Unit 5: Reverse Engineering Need of reverse engineering, Methodologies for Reverse Engineering, understanding of Reverse Engineering through example, reasons for reverse engineering, conceptual System Reasons for Reverse Engineering, Difficulties in Reverse Engineering, Levels of abstraction: Application level, functional level, structural level.	[6]
Unit 6: Tools and Techniques for reverse engineering Object scanning, Contact scanners, Non-contact scanners, destructive method, Point data processing, pre processing and post processing of captured data, geometric modeling techniques-wire, frame, surface and solid modeling.	[6]
Text Books: 1. Additive Manufacturing by C.P. Paul, A.N. Jinoop. 2. Additive Manufacturing by Hari Prasad, A.V. Suresh. 3. Rapid Prototyping and Engineering Applications, Frank W. Liou, CRC Press 4. Introduction to Rapid Prototyping, Amitav Ghosh, North West Publication, New Delhi. 5. Reverse Engineering, A.Ingale, Katherryn, McGraw hill, 1994	
Reference Books:	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

1. Rapid Manufacturing, Flham D.T &Dinjoy S.S Verlog London 2001.
2. Rapid Prototyping Materials, Gurumurthi, IISc Bangalore
3. Rapid Automated, Lament wood. Indus press New York.
4. Stereo Lithography and other RP &AM Technologies, Paul F. Jacobs: SME, NY1996.
5. Rapid Prototyping, Terry Wohlers Wohler's Report2000" Wohler's Association2000.

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Heat Transfer Laboratory

23ME3505	PCC	Heat Transfer Laboratory	0-0-2	1 Credit

Teaching Scheme:	**Evaluation Scheme:**
Lecture: - Practical: 2 hrs./week	CA-I: 15 Marks CA-II : 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Thermodynamics, Fluid Mechanics

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

CO1	Determine thermal conductivity of materials and combinations (L5)
CO2	Estimate heat transfer coefficients in natural and forced convection heat transfer and demonstrate heat pipe (L5)
CO3	Determine emissivity and Stefan Boltzmann constant (L5).

Course Outcomes	**Program Outcomes**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	2										3	
CO2	3	2										3	
CO3	3	2										3	

The Heat Transfer Laboratory experiments

1. Determination of thermal conductivity of insulating powder/ Metal rod.
2. Determination of thermal conductivity of material in Composite wall / Lagged pipe.
3. Determination of local and average heat transfer coefficient in Natural convection heat transfer from a vertical cylinder.
4. Determination of Heat Transfer Coefficient under forced convection to air from a heated pipe.
5. Determination of emissivity of a Nonblack surface.
6. Determination of Stefan Boltzmann Constant.
7. Determination of Critical Heat Flux.
8. Determination of overall heat transfer coefficient and effectiveness in a Heat Exchanger.
9. Study and Demonstration of Heat Pipe

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Design of Machine Element-I Laboratory

23ME3506	PCC	Design of Machine Element-I Laboratory	0-0-2	1 Credit

Teaching Scheme	Evaluation Scheme
Practical: 2 hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Basic mechanical Engineering, Strength of Materials, Kinematics of Machines

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

CO1	Select suitable material from design data book for the given component. (L3)
CO2	Design simple machine elements like Knuckle, turnbuckle, Lever, Shaft, Keys and Couplings and create 3D model of the same. (L6)
CO3	Design of helical compression springs. (L6)
CO4	Design of screw jack. (L6)
CO5	Design mechanical components to withstand fluctuating loads while considering stress concentrations, material properties, and fatigue life. (L6)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3						1				2	2	
CO2	3	2	3	1	2		2	3	1		2	2	2
CO3	3	2									2	2	
CO4	3	2									2	2	
CO5	3	2									2	2	

The Machine Design-I Laboratory Lab consists of list of experiment as follows

1. The term work shall consist of two design projects based on design, Drawing of the following.
1. Knuckle joint or turn buckle.
2. Rigid or flexible flange coupling.
Each design project draft through CAD software, consist of assembly drawings with a part list and

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING DEPT. OF MECHANICAL ENGINEERING YADRAV

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

overall dimensions and other drawings of individual components.

Assignment based on the following.

1. Selection of materials for various engineering applications showing their IS codes, composition and properties
2. Problems on design of helical Springs subjected to static load.
3. Problems on design of power screws.
4. Problems on fluctuating loads and fatigue life.

Text Books:

1. V. B. Bhandari, "Design of Machine Elements", Tata McGraw Hill Publications, New Delhi, 2008.
2. R. L. Nortan, " Machine Design: An Integrated Approach", Pearson Education Singapore, 2001
3. Machine Design R.S. Khurmi & J.K. Gupta S. Chand publication.
4. Machine design S G Kulkarni McGraw Hill Education Publications
5. Introduction to Machine design V B Bhandari McGraw Hill Education Publications.
6. Design Of Machine Elements Vol I, Vol II J.B.K. Das , P.L. Srinivas Murthy Sapna publication
7. Machine Component Design William Orthwein Jaico publication

Reference Books:

1. R. C. Juvinall, K. M. Marshek, " Fundamental of machine component design", John Wiley & Sons Inc., New York, 3rd edition, 2002.
2. J. Hamrock, B. Jacobson and Schmid Sr., " Fundamentals of Machine Elements", International Edition, New York, 2nd edition, 1999.
3. S. Hall, A. R. Holowenko, H. G .Langhlin, "Theory and Problems of Machine Design", Schaum's Outline Series, Tata McGraw Hill book Company, New York, 1982.
4. J. E. Shigley and C. Mischke, "Mechanical Engineering Design", Tata McGraw Hill Publications, 7th edition, 2004.
5. M. F. Spotts, "Design of Machine Elements", Prentice Hall of India, New Delhi.
6. Machine Design by Robert L.Norton, Tata Mc- Graw Hill Publication
7. Fundamentals of Machine Component Design by Junvinall Wiley India
8. Mechanical System Design by Anurag Dixit SCITECH publication
9. Design of Machine Element/Machine Design by Kannaiah SCITECH publication
10. Design of Machine Element by Spotts/Shoup/Hornberger/Jayram/Venketesh PiersonEducation
11. Machine Design by T H WentzellCengage Learning

Design Data Handbook:

1. Design Data Hand Book, K. Lingaiah, McGraw Hill, 2nd Ed.
2. Data Hand Book, K. Mahadevan and Balaveera Reddy, CBSPublication
3. Design Data Hand Book, H.G. Patil, I. K. International Publisher, 2010.
4. Design data PSG College of Technology Coimbatore

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

CAD/CAM Laboratory

23ME3507	VSEC	CAD/CAM Laboratory	0-0-2	1 Credit

Teaching Scheme:	**Evaluation Scheme:**
Practical: 2 hrs./week	CA-I: 15 Marks CA-II : 15 Marks Practical and Oral Exam: 20 Marks

Pre-Requisites: Engineering graphics; machine drawing and CAD

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

CO1	Extend knowledge of machine drawing and computer aided drafting (CAD) for part modeling (L2)
CO2	Construct CAD part models, assembly model and drafting of machine elements using CAD software (L3)
CO3	Make use of CAM software to develop part program for turning and milling operations (L3).

Course Outcomes	**Program Outcomes**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	1			3			1			2	1	2
CO2	3	2			3			1			2	1	2
CO3	3	2			3			1			2	1	2

The CAD/CAM Laboratory consists of following experiments

1. Part modeling of machine elements using CAD software.
2. Assembly modeling of engineering products using CAD software.
3. Drafting of Parts and Assembly of engineering assembly using CAD software.
4. Develop CAM programs for CNC Turning operations using CAM software (for two jobs).
5. Develop CAM programs for VMC Milling operations using CAM software (for two jobs).

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Mini Project-III

23ME3508	CEP	Mini Project III-Hackathon	0-0-2	Audit

Teaching Scheme	Evaluation Scheme
Practical: 2 hrs/week	CA-I: - 25 Marks CA-II: -25 Marks

Pre-Requisites: Mini Project, Mini Project II

About Hackathon

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms where students will solve real world challenges. This Course focuses on the selection of methods/engineering tools/analytical techniques for problem solving.

Through this course, students will gain the understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills and responsibility

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

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the methods /tools used to develop the solution
CO4	Design / simulate the model/ project work
CO5	Describe the solution with help of a project report and presentation
CO6	Conclude the outcomes of project.

Course Contents:

Week 1: Survey Design-1 • Ensure case study group students have made necessary communication and done a preparatory visit.	[2]

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

• Watch the lecture on survey design and study the notes. • Prepare a questionnaire and try it out with your group members as mock.	
Week 2: Survey Design-2 • Review survey questionnaire prepared by case study groups. • Decide sampling strategy. • Prepare a detailed schedule for fieldwork	[2]
Week 3: Fieldwork • Data Collection: Collect quantitative data (e.g., statistics, usage metrics) and qualitative data (e.g., user stories, testimonials). • Use data collection tools like questionnaires, observation checklists, and digital analytics. • Ensure data accuracy and reliability through proper sampling and recording methods.	[2]
Week 4: Trails and Experimentation-1 • Initial Setup and Configuration • Concept Validation • Feasibility Testing	[2]
Week 5: Trails and Experimentation-2 • Prototyping • Functionality Testing	[2]
Week 6: Trails and Experimentation-3 • Bug Identification and Fixing • Integration Testing • Security Testing • 75% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 7 : Results • Coordinator has to check and verify below points in term of result: • Functional Performance • Accuracy and Precision • Efficiency • Safety	[2]
Week 8: Validation • Coordinator has to check and verify below points in term of validation: • Testing and Verification • Compliance with Standards	[2]
Week 9: Integration Testing • Validate that the hardware integrates seamlessly with other systems or components as intended • Perform compatibility tests with software, other hardware, and network systems.	[2]
Week 10: Documentation and Reporting • Maintain comprehensive documentation of design, development, testing, and validation processes • Provide detailed reports on test results, issues found, and corrective actions taken.	[2]

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Week 11: Final Presentation • 100% Presentation has to be conducted by mentor/guide based on above activity. • Prototype/Final Software solution is mandatory at the time of final presentation along with report	[2]
Week 12: Exhibition • Mini project exhibition will be schedule with interdepartmental evaluation.	[2]

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Industrial/Field Training

23ME3509	VSEC	Industrial/Field Training	0-0-0	Audit

Teaching Scheme	**Evaluation Scheme**
	End Semester Exam: 50 Marks

Pre-Requisites: Basic knowledge of all courses

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

CO1	Develop technical skill in real industrial situations.
CO2	Develop interpersonal communication skills.
CO3	Discuss activities and functions of the industry in which the Internship/training has done.

Course Outcomes	**Program Outcomes**												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
CO1	3	3	3	2	1		1	1	2	2	2	3	1
CO2	3	3	3	2	1		1	1	2	2	2	3	1
CO3	3	3	3	2	1		1	1	2	2	2	3	1

Course Contents:

Course Description:

Internship / Training is educational and career development opportunity, providing practical experience in a field or discipline. At the end of the **Fourth semester**, every student should undergo practical training in an industry / professional organization / Research laboratory with the prior approval of the HoD/TPO/Principal of the college and submit the report along with the completion certification from the Industry/ Organization. The report will be evaluated during the **Fifth** semester by the department.

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Guideline for Students:-

1. Arrive at work as per schedule, ready to work and stay for the agreed upon time.
2. Present yourself in a professional manner at all times, including being appropriately dressed at workplace.
3. Communicate any concerns with your supervisor and the internship/Training coordinator in a timely manner and respectfully.
4. Demonstrate enthusiasm and interest in what you are doing, ask questions and take the initiative as appropriate.
5. Complete and submit assigned tasks by designated timelines. Meet all deadlines.

Student's Diary/ Daily Log

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches and drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor.

Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the SITCOE immediately after the completion of the training. It will be evaluated on the basis of the following criteria:

- Regularity in maintenance of the diary.
- Adequacy and quality of information recorded.
- Drawings, sketches and data recorded.
- Thought process and recording techniques used.
- Organization of the information.

Internship Report

After completing the internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the training period. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The competent authority should sign the training report. The Internship report should be evaluated on the basis of following criteria:

i. Originality.
ii. Adequacy and purposeful write-up.

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING DEPT. OF MECHANICAL ENGINEERING YADRAV

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

iii.	Organization, format, drawings, sketches, style, language etc.
iv.	Variety and relevance of learning experience.
v.	Practical applications, relationships with basic theory and concepts taught in the course.

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING, YADRAV
DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.

SIT COE,Yadrav

Management Information System

23MEMDA3	MDM	Management Information System	3-0-0	3 Credits

Teaching Scheme	Evaluation 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: Operation research and management

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

CO1	Explain the role, scope, and impact of MIS in business organizations. (L2)
CO2	Explain the classifications and dimensions of information and systems. (L2)
CO3	Apply decision-making frameworks to hypothetical or real business situations. (L3)
CO4	Apply principles of information quality management in the development of MIS. (L3)
CO5	Apply MIS principles to optimize operations in different departments of an organization. (L3)
CO6	Apply ERP concepts to align business processes such as SCM and CRM. (L3)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2									1	2	1	
CO2	2									1	2	1	
CO3	3									2	2	1	
CO4	3									2	2	1	
CO5	3									2	2	1	
CO6	3									2	2	1	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Course Contents:

Unit 1: Introduction to Management Information System Management Information System (MIS)- concept and definition, Role of MIS, Impact of the Management Information System, Nature and scope of MIS, Characteristics of MIS, Types of MIS, Challenges of MIS.	[6]
Unit 2: Information Systems and Organization Concepts Introduction, Information- A definition, classification of information, information quality, dimensions of information, System- A definition, Kinds of systems, elements of system, information system, Organization- A concept, and impact of information system on Organization.	[6]
Unit 3: Decision Making Process Introduction, Decision-Making- A concept, Simons Model of Decision Making, Programmed and Non- Programmed decisions, Decision Support Systems, Characteristics and components of Decision Support System.	[6]
Unit 4: Development of Management Information System (MIS) Development of long range plans of the MIS, Implementation of the Management Information System, Management of Information Quality in the MIS, Organization for Development of MIS, Features contributing to Success and Failures.	[6]
Unit 5: Applications of MIS in Manufacturing and Service Sector Introduction, Personal Management (PM), Financial Management (FM), Production Management (PM), Raw materials Management (RMM), MIS applications in Service Industry.	[6]
Unit 6: Introduction to Enterprise Management Systems Enterprise Management System (EMS), Enterprise Resource Planning (ERP) system, Benefits of the ERP, ERP Implementation, Supply Chain Management, Customer Relationship Management.	[6]

Text Books:

1. Management Information Systems, Effy OZ, Thomson Leaning/Vikas Publications, Edition 5, Revised edition 2018.
2. Management Information Systems, James A. O'Brein, George M. Marakas, Ramesh Behl Tata McGraw-Hill, 11th Edition 2019

Reference Books:

1. Management Information System, W.S Jawadekar, Tata Mc Graw Hill Publication, 6th Edition 2020.
2. MIS: Management Perspective, D.P. Goyal, Macmillan Business Books, 4th Edition 2014.
3. MIS and Corporate Communications, Raj K. Wadwha, Jimmy Dawar, P. Bhaskara Rao, Kanishka Publishers.
4. MIS: Managing the digital firm, Kenneth C. Landon, Jane P. Landon, Pearson Education 13th edition 2014.
5. Management Information System, David Kroenke, Tata Mc Graw Hill Publication, 2nd edition, 1992

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Aero Engine Gas Turbine

23MEMDB3	MDM	Aero Engine Gas Turbine	3-0-0	3 Credits

Teaching Scheme	Evaluation 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: Engineering Thermodynamics, Fluid Mechanics

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

CO1	Explain the working principles of gas turbine engines and their components. (L2)
CO2	Apply control volume analysis to different components of a gas turbine engine.(L3)
CO3	Compare fan driven by Low Pressure Turbine (LPT) and the compressor driven by the High Pressure Turbine (HPT) (L2)
CO4	Classify various cooling techniques used in gas turbine engines (L2)
CO5	List characteristics of turboprop engines.(L4)
CO6	Identify recent advancements in aircraft engine technology. (L3)

Course Outcomes	Program Outcomes												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	1										1	
CO2	3	2										1	
CO3	3	2										1	
CO4	3											1	
CO5	3	2										1	

CO6	3											1	

Course Contents:

Unit 1: Fundamentals of Gas Turbine Engines and Aero engine Performance Introduction to gas turbine engines used in Aero engines; Mechanical creation of thrust by all components; fundamentals of Propulsive efficiency; Thermal efficiency; Propeller efficiency; Overall efficiency; Takeoff thrust; Specific fuel consumption; Total Equivalent Horsepower.	[6]
Unit 2: Control Volume Analysis and Performance of Gas Turbine Components Control Volume analysis of Inlet Diffuser; Compressor; Combustion chamber; Turbine and Exhaust Nozzle; Adiabatic and Polytropic efficiencies for Compressors and Turbines; Shaft Energy Balance; Use of various components and their special needs in gas turbine engine.	[6]
Unit 3: Forward Fan Unmixed Two-Spool Engines Forward fan unmixed two-spool engines; The fan and low-pressure compressor on one shaft; Fan driven by the Low Pressure Turbine (LPT) and the compressor driven by the High Pressure Turbine (HPT); Discussions based of effect of various cycle parameters on performance of engine	[6]
Unit 4: Cooling and Materials for Gas Turbines Cooling techniques: film cooling; internal cooling, and impingement cooling; High-temperature materials and coatings; Thermal barrier coatings (TBC) and super alloys	[6]
Unit 5: Turbo-Prop Engines – Design, Performance, and Thermal Cycle Analysis Introduction to turbo prop engines; Advantages and disadvantages of turboprop engines; Thermal cycle analysis of single spool and two spool Turboprop Engines.	[6]
Unit 6: Recent Advancements in Aircraft Engine Technologies Recent advancements aircraft engines; Aft fan turbofan engine; Turbofan engine with intercooler and regeneration; Hybrid, Electric; and Hydrogen-Based Propulsion	[6]
Text Books: 1. "Introduction to Aircraft Gas Turbine Engines" by B. H. K. Narayana 2. "Principles of Jet Propulsion and Gas Turbines" by D. P. Mishra 3. Saeed Farokhi, Aircraft Propulsion, 2009, John Wiley & Sons, Inc. 4. Hill Philip, Peterson Carl, Mechanics and Thermodynamics of Propulsion, Second edition, Pearson	
Reference Books: 1. "Elements of Propulsion: Gas Turbines and Rockets" by J.D. Mattingly and H. von Ohain 2. "Aircraft Propulsion" by Saeed Farokhi 3. Roy Bhaskar, Aircraft Propulsion, 2008, Elsevier (India) 4. J. H. Horlock, Advanced gas turbine cycles,2003, Elsevier science Ltd. 5. "Aircraft Gas Turbine Engine Technology" by Irwin E. Treager	

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Sensor Technology: Physics, Fabrication and Circuits

23MEMDC3	MDM	Sensor Technology: Physics, Fabrication and Circuits	3-0-0	3 Credits

Teaching Scheme	**Evaluation Scheme**
Lecture: 3 Hours/Week	CA-I: 10 Marks CA-II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Fundamentals of Mechatronics.

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

CO1	Explain the different parameters involved in sensors. (L2)
CO2	Compare various types of capacitive sensors. (L2)
CO3	Classify the different types of thermal sensors. (L2)
CO4	Choose the appropriate sensor applications. (L3)
CO5	Select the feasible sensor fabrication technique. (L3)
CO6	Identify the different circuits involved in sensor systems. (L3)

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				2	2					1	3	2
CO2	3				2	2					1	3	2
CO3	3				2	2					1	3	2
CO4	3				2	2					1	3	2
CO5	3				2	2					1	3	2
CO6	3				2	2					1	3	2

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Course Contents:

Unit 1: Basics of Sensors Sensors and Transducers – Basics, Introduction to Sensors, Materials for Sensors, Multidisciplinary Aspects of Sensors, Introduction to Sensor Parameters, Sensor Parameters-II, Sensor Parameters-III, Sensor Parameters-IV, Sensor Parameters-V.	[6]
Unit 2: Physics of Sensors Introduction: Physics of Sensors, Capacitive Sensor Architecture, Different Types of Capacitive Sensors.	[4]
Unit 3: Physics of Thermal and Chemical Sensors Thermal Sensors Basics, Dynamic Condition of Thermal Sensors, Classification of Thermal Sensors, Chemical Sensor Basics, Electrochemical Sensors, Impedimetric Sensors.	[6]
Unit 4: Physics of Other Sensors Physics of Optical Sensors, Physics of Magnetic Sensors, Physics of Acoustic Sensors, Physics of Microfluidic Sensors, Various Sensor Geometries and Examples.	[6]
Unit 5: Sensor Fabrication and Characterization Techniques Microfabrication Technologies, Deposition Techniques, Physical Vapor Deposition, Chemical Vapor Deposition, Patterning Techniques, Lithography Techniques, Basics of Etching Techniques, Dry Etching Techniques, Optical and Electron Microscopy, Other Microscopy Techniques.	[8]
Unit 6: Sensor Systems and Circuits Sensor System: Basic Circuits, Amplifier Circuits, Instrumentation Amplifier, Filter Circuits.	[6]
Text Books: 1. Sensors and Transducers, I.R. Sinclair, Third Edition, Newnes Oxford, 2001. 2. Measurement Systems: Application & Design, E.A. Doebelin, McGraw Hill, 1990.	
Reference Books: 1. Design of Analog CMOS Integrated Circuits, B. Razavi, McGraw-Hill Int. Edition, 2001. 2. A. Paul, M. Bhattacharjee, R. Dahiya, Solid-State Sensors, Wiley+IEEE, 2023.	

SHARAD INSTITUTE OF TECHNOLOGY COLLEGE OF ENGINEERING YADRAV DEPT. OF MECHANICAL ENGINEERING

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Language Skill- III

23HSSM05	VEC	Language Skill- III	0-0-2	Audit

Teaching Scheme:	**Evaluation Scheme:**
Lecture: NA Tutorial: NA Practical: 2 hrs/week	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Language Skill and II

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

CO1	Develop a program to read input and return output.
CO2	Develop a program using data types, Strings and variables
CO3	Develop a program using Unary, Binary and Ternary operator
CO4	Develop a program using Conditional and Logical statements.

Mapping of CO's with PO's:

CO's\ PO's	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	2	1			1		1	1			1		
CO2	2	1			1		1	1			1		
CO3	2	1			1		1	1			1		
CO4	2	1			1		1	1			1		
Course Code	2	1			1		1	1			1		

1. **Write a Python program to print "Hello, World!"** o Objective: Understand basic syntax, indentation, and output.	[2]
2. **Write a program to demonstrate the use of different types of comments in Python.** o Objective: Single-line and multi-line comments.	[2]

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

3. **Write a Python program that declares different types of variables and displays their data types using the type() function.** o Objective: Variables, data types, and type identification.	[2]
4. **Write a program to demonstrate type casting and type conversion between int, float, and string.** o Objective: Type conversion, casting functions.	[2]
5. **Write a Python script to perform string operations such as slicing, concatenation, upper(), lower(), and len().** o Objective: String manipulation and built-in functions.	[2]
6. **Write a program to demonstrate the use of all arithmetic, logical, and bitwise operators.** o Objective: Operator functionality.	[2]
7. **Write a Python program to use membership and identity operators with examples.** o Objective: in, not in, is, is not.	[2]
8. **Write a Python program using a ternary operator to find the larger of two numbers.** o Objective: Conditional (inline) expressions.	[2]
9. **Write a program that takes user input for age and prints whether the person is a child, teenager, adult, or senior citizen using if-elif-else.** o Objective: Conditional statements and user input.	[2]
10. **Write a program to find the sum of the first 10 natural numbers using a while loop.** o Objective: Looping with while.	[2]
11. **Write a Python script to display the multiplication table of a number using a for loop.** o Objective: Looping with for and range().	[2]
12. **Write a program that uses break, continue, and pass statements in appropriate looping scenarios.** o Objective: Loop control statements.	[2]

Text Books:

1. Python Projects (Author: Laura Cassell, Alan Gauld) Wrox publication
2. murach's Python Programming. Aut.:Michael Urban, Joel Murach, murach's Publication.

Reference Books:

1. Fundamentals of Python (First Program) Cengage MINDTAP Publication 2nd Edition. Author: K.A. Kambert

Head
Mechanical Engineering Dept.
SIT COE,Yadrav

Aptitude Skill-III

(Verbal Ability)

23HSSM06	VEC	Aptitude Skills- III	1-0-0	Audit

Teaching Scheme:	**Evaluation Scheme:**
Lecture: 1 hr	CA-I: 25 Marks CA-II: 25 Marks

Pre-Requisites: Aptitude Skills-I and II

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

CO1	Solve the questions on ordering of words & Parts of Speech
CO2	Organize contents of Business Communications such as CV, emails and letters.
CO3	Solve the questions based on jumbled paragraphs and reading comprehension.
CO4	Solve the questions on spotting error and sentence correction.
CO5	Summarize proceedings of any event or conference.
CO6	Discuss about current and critical issues during group discussion.

CO PO Mapping:

CO's\ PO's	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PSO1**	**PSO2**
CO1							1		1		1		
CO2							1		1		1		
CO3							1		1		1		
CO4							1		1		1		
Course Code							1		1		1		

Head
Mechanical Engineering Dept.
SIT COE, Yadrav

Course Contents:

Unit 1	Parts of Speech, Punctuation Word Family (Using the same word as different Parts of Speech)	[2] [2]
Unit 2	Analogy, Letter Writing (Formal), E-Mail Writing, CV Writing	[2]
Unit 3	Reading Comprehension, Paragraph Jumbles	[2]
Unit 4	Spotting Errors (in different parts of sentence), Subject-Verb Agreement Sentence Correction, Sentence Completion	[2]
Unit 5	One Word Substitution, Narrating Events/Reports, Summary/Precis Writing	[2]
Unit 6	Dialogue writing Group Discussion, Interview Skills (Using formal notations & gestures etc.)	[2]

Text Books:

1. Raymond Murphy, Essential English Grammar with Answers, Murphy
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:

1. Rao and ,D,V,Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017
2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press;Second edition

Head
Mechanical Engineering Dept.
SIT COE,Yadrav