JHARKHAND Rai University
UGC RECOGNISED UNIVERSITY
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JHARKHAND RAI UNIVERSITY

MECHANICAL ENGINEERING

B.Tech

SYLLABUS 2018-2022

SEMESTER VI

Kamre | Ratu Road | Ranchi | Jharkhand

Web : www.jru.edu.in | **Email :** info@jru.edu.in

BATCH 2018-2022												
B.Tech in MECHANICAL ENGINEERING												
Choice Based Credit System												
SEMESTER VI												
S. No.	**CATEGORY**	**CODE**	**COURSE TITLE**	**Periods**			**Evaluation Scheme**				**Subject Total**	**Credit**
				L	**T**	**P**	**Assignment**	**TA**	**Total**	**ESE**		
1	Professional Core Courses	7PCCME307	Manufacturing Technology	4	0	0	20	10	30	70	100	4
2	Professional Core Courses	7PCCME308	Design of Machine Elements	3	1	0	20	10	30	70	100	4
3	Professional Elective Courses		Professional Elective	3	0	0	20	10	30	70	100	3
4	Professional Elective Courses		Professional Elective	3	0	0	20	10	30	70	100	3
5	Mandatory Courses	MC302	**Essence of Indian Knowledge Tradition	2	0	0	20	10	30	70	100	0
6	Humanities and Social Sciences including Management Courses	HSMC302	**Soft skills & interpersonal Communication	2	0	0	20	10	30	70	100	0
PRACTICAL /SESSIONAL												
1	Professional Core Courses	7PCCME309 P	Mechanical Engineering Laboratory-II	0	0	3			30	20	50	1.5
2	Project (or Summer Internship)	7PROJME310	Project II	0	0	2		75	75	25	100	3
									TOTAL		**750**	**18.5**

**** NOTE: Qualifying Non Credit Course**

Subject Code	Subject	L	T	P	C
7PCCME307	Manufacturing Technology	4	0	0	4

Course Objectives:

- To provide knowledge on machines and related tools for manufacturing various components.
- To understand the relationship between process and system in manufacturing domain.
- To identify the techniques for the quality assurance of the products and the optimality of the process in terms of resources and time management.
- To understand the basic principles, construction and working of engineering mechanical measurement science.
- To acquire proficiency in using, calibrating various measurement systems.
- To understand the problems in measurement system and develop the competency to resolve the problems.
- To know all the measuring instruments and to measure different parameters in day-today work.

Module I

Tooling for conventional and non-conventional machining processes: Mould and die design, Press tools, Cutting tools; Holding tools: Jigs and fixtures, principles, applications and design; press tools – configuration, design of die and punch; principles of forging die design.

Module II

Metrology: Dimensions, forms and surface measurements, Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometer; Metrology in tool wear and part quality including surface integrity, alignment and testing methods; tolerance analysis in manufacturing and assembly. Process metrology for emerging machining processes such as micro-scale machining, Inspection and work piece quality.

Module III

Assembly practices: Manufacturing and assembly, process planning, selective assembly, Material handling and devices.

Module IV

Linear programming, objective function and constraints, graphical method, Simplex and duplex algorithms, transportation assignment, Traveling Salesman problem; Network models: shortest route, minimal spanning tree, maximum flow model- Project networks: CPM and PERT, critical path scheduling; Production planning& control: Forecasting models, aggregate production planning, materials requirement planning. Inventory Models: Economic Order Quantity, quantity discount models, stochastic inventory models, practical inventory control models, JIT. Simple queuing theory models.

Course Outcomes: Upon completion of this course

- Students will be able to the tooling needed for manufacturing, the dimensional accuracy and tolerances of products, assembly of different components and the application of optimization methods in manufacturing.
- Understand different queuing situations and find the optimal solution using models for different situations.
- Identify the specific areas for a particular job execution in manufacturing business organization.
- Know the key areas having chance of waste occurrence and its reduction possibilities.
- Optimize resource utilization.
- Carryout cost estimation and analysis.
- Find their convenience to do the job.

Text Books:

- Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014.
- Taha H. A., Operations Research, 6thEdition, Prentice Hall of India, 2003.
- Shenoy G.V. and Shrivastava U.K., Operations Research for Management, Wiley Eastern, 1994.
- Gupta P K & Hira D.S. Operation Research Third Edition S.Chand & Company Ltd New Delhi.
- A text book of Mechanical Metrology by R K Rajput.

Reference Books:

- Rader, D. J. 2010, Deterministic Operations Research: Models and Methods in Linear Optimization, J. Wiley & Sons
- Taha, H. A. 2007, Operations Research, 8th edn, Pearson
- Taylor, B. W. III 2013, Introduction to Management Science, 11th edn, Prentice Hall
- Schrage, L. 1997, Optimization Modeling with LINDO, 5th edn, Thomson
- Winston, W. L. 2004, Operations Research: Applications and Algorithms, 4th edn, Thomson
- Williams, H. P. 2013, Model Building in Mathematical Programming, 5th edn, Wiley Hillier,F.S.andLieberm

Subject Code	Subject	L	T	P	C
7PCCME308	Design of Machine Elements	3	1	0	4

Course Objectives:

- To familiarize the various steps involved in the Design process.
- To understand the principles involved in evaluating the shape and dimensions of a complete to satisfy function and strength requirements.
- Students shall gain a thorough understanding of the different types of failure modes and criteria. They will be conversant with various failure theories and be able to judge which criterion is to be applied for a particular situation.
- Student shall gain design knowledge of the different types of elements used in the machine design process, for e.g. fasteners, shafts, couplings etc. and will be able to design these elements for each application.

Module I

Design considerations - limits, fits and standardization, Review of failure theories for static and dynamic loading (including fatigue failure).

Module II

Design of shafts under static and fatigue loadings, Analysis and design of sliding and rolling contact bearings.

Module III

Design of transmission elements: spur, helical, bevel and worm gears; belt and chain drives, Design of springs: helical compression, tension, torsional and leaf springs.

Module IV

Design of joints: threaded fasteners, pre-loaded bolts and welded joints, Analysis and applications of power screws and couplings, Analysis of clutches and brakes

Course Outcomes:

Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components.

- Ability to analyze the stress and strain of mechanical components and understand, identify and quantify failure modes for mechanical part.
- Ability to decide optimum design parameters for mechanical systems.
- Ability to design mechanical system for fluctuating loads.
- Acquire skill in preparing production drawing pertaining to various designs.
- Design gears of various types.
- Design gearboxes for machine tools.
- Design journal bearing and select antifriction bearing for state application.
- Design IC engine components and crane parts.

Text Books:

- Shigley, J.E. and Mischke, C.R., Mechanical Engineering Design, Fifth Edition, McGraw-Hill International;1989.
- Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan,1992.
- Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley,1994.
- Spottes, M.F., Design of Machine elements, Prentice-Hall India,1994.

Reference Books:

- R L Norton, Machine Design An Introduction, Pearson. 2. R G Budynas, and K J Nisbett, Shigley's Mechanical Engineering Design, McGraw-Hill.
- R C Juvinall, Fundamentals of Machine Component Design, 4/e, Wiley.
- P C Gope, Machine Design: Fundamentals and Applications, 1/e PHI.
- K Hoga, B Dondlinger, Vehicular Engine Design, Springer.

PROFESSIONAL ELECTIVE COURSES

Professional Elective Course (Select any two)					
Code	**Course Title**	**L**	**T**	**P**	**C**
7PECMEL321	Internal Combustion Engines	3	0	0	3
7PECMEL322	Mechatronic Systems	3	0	0	3
7PECMEL323	Microprocessors in Automation	3	0	0	3
7PECMEL324	Composite Materials	3	0	0	3
7PECMEL325	Computer Aided Design	3	0	0	3

Subject Code	Subject	L	T	P	C
7PECMEL321	Internal Combustion Engines	3	0	0	3

Course Objectives:

- To familiarize with the terminology associated with IC engines.
- To understand the basics of IC engines.
- To understand combustion, and various parameters and variables affecting it in various types of IC engines.
- To learn about various systems used in IC engines and the type of IC engine required for various applications.

Module I

Review of ideal cycles; Details of fuel-air cycles. Combustion in SI and CI engines Combustion stages, Combustion chambers and abnormal combustion.

Module II

Fuel supply systems in SI and CI engines, carburetors, Port fuel injection, direct injection and Common rail injection.

Module III

Ignition system, Lubrication system and Cooling system. Testing of IC engines. Engine emissions and control.

Module IV

Advanced IC Engine concepts.

Course Outcomes:

Students who have done this course will have a good idea of the basics of IC engines and how different parameters influence the operational characteristics of IC Engines.

- Engines classification and applications (propulsion, power production, cogeneration)Performance criteria, sizing and influence of atmospheric conditions.
- Gas exchange processes, supercharging and turbo charging. Formation, characteristics, vaporization and combustion of sprays.
- Combustion in Spark-Ignition and Compression-Ignition engines.
- Classical and alternative fuels

Text Books:

- Obert E. F, “Internal Combustion Engines and Air Pollution”, Harper and Row Publication Inc. NY, 1973.
- Heisler H, “Advanced Engine Technology”, Edward Arnold,1995.
- Heywood J. B, “Internal Combustion Engine Fundamentals”, McGraw Hill Book Co. NY,1989.
- Heldt P. M, “High Speed Combustion Engines”, Oxford & IBH publishing Co. India,1985.
- Stockel M W, Stockel T S and Johanson C, “Auto Fundamentals”, The Good heart, Wilcox Co. Inc., Illinois,1996.
- Ganeshan V., Internal Combustion Engines, Tata McGraw-Hill.
- Pulkrabek, W. W., Engineering fundamental of the I.C. Engine, PHI, India.
- Ganeshan V., Gas Turbines, Tata McGraw-Hill.

Reference Books:

- Obert E.F., Internal Combustion Engines & Air pollution, Hopper & Row Pub., New York.
- Heywood J. B., Internal Combustion Engines Fundamentals, McGraw Hill, New York

Subject Code	Subject	L	T	P	C
7PECMEL322	Mechatronic Systems	3	0	0	3

Course Objective:

- To develop a strong foundation in science and focus in mechanical, electronics, control, software, and computer engineering, and a solid command of the newest technologies.
- To be able to design, analyze, and test "intelligent" products and processes that incorporate appropriate computing tools, sensors, and actuators.
- To be able to work efficiently in multidisciplinary teams.

Course Contents:

Module I

Introduction: Definition of Mechanical Systems, Philosophy and approach; Systems and Design: Mechatronic approach, Integrated Product Design, Modeling, Analysis and Simulation, Man-Machine Interface;

Sensors and transducers: classification, Development in Transducer technology, Opto-electronics-Shaft encoders, CD Sensors, Vision System, etc.

Module II

Drives and Actuators: Hydraulic and Pneumatic drives, Electrical Actuators such as servo motor and Stepper motor, Drive circuits, open and closed loop control; Embedded Systems: Hardware Structure, Software Design and Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems.

Module III

Smart materials: Shape Memory Alloy, Piezoelectric and Magnetostrictive Actuators: Materials, Static and dynamic characteristics, illustrative examples for positioning, vibration isolation, etc.

Module IV

Micro-mechatronic systems: Micro sensors, Micro actuators; Micro-fabrication techniques

LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology.

Course Outcomes:

Upon completion of this course, students will get an overview of mechatronics applications and the use of micro-sensors and microprocessors.

- Understand the key inputs and outputs of any physical device, different sensors and transducers to measure the outputs, interfacing of the sensors and actuators to the computers.
- Be able to design different controllers to obtain the desired performance from the system.
- Be able to integrate mechanical, electronics, control and computer engineering in the design of mechatronics systems.

Text Books:

- Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.)
- Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education
- A Textbook of Mechatronics ,R.K.Rajput, S. Chand & Company Private Limited
- Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, Prentice Hall.

Reference Books:

- Isermann R., Mechatronics Systems: Fundamentals, Springer. 98
- Bradley, D. A., Dawson, D., Buru, N. C. and Loader, A. J., Mechatronics, Chapman and Hall.
- Bolton W., Mechatronics, Pearson Education

Subject Code	Subject	L	T	P	C
7PECMEL323	Microprocessors in Automation	3	0	0	3

Course Objectives:

- To introduce the basic concepts of Digital circuits, Microprocessor system and digital controller.
- To impart basic understanding of the internal organization of 8086 Microprocessor and 8051 microcontroller.
- To introduce the concepts of interfacing microprocessors with external devices.
- To develop Assembly language programming skills.

Module I

Number Systems, codes, digital electronics: Logic Gates, combinational Circuits design, Flip-flops, Sequential logic circuits design: Counters, Shift registers. Introduction to 8085 Functional Block Diagram, Registers, ALU, Bus systems, Timing and control signals.
Machine cycles, instruction cycle and timing states, instruction timing diagrams, Memory interfacing.

Module II

Assembly Language Programming: Addressing modes, Instruction set, simple programs in 8085.
Concept of Interrupt, Need for Interrupts, Interrupt structure, Multiple Interrupt requests and their handling, Programmable interrupt controller; interfacing peripherals: Programmable peripheral interface (8255).

Module III

Interfacing Analog to Digital Converter & Digital to Analog converter, Multiplexed seven segments LED display systems, Stepper Motor Control, Data Communication: Serial Data communication (8251), Programmable Timers (8253); 8086/8088 Microprocessor and its advanced features.

Module IV

Introduction to Digital Control: Sampling theorem, Signal conversion and Processing, Z- Transform, Digital Filters, Implementation of Digital Algorithm.

Course Outcomes:

Students who have done this course will have a good idea of the use of micro-processers for automation.

- Student will be able to describe the architecture and different modes of operations of a typical microprocessor.
- Student will be able to understand different addressing modes and instructions of 8086, design and develop assembly language programs using software interrupts, subroutines, macros.
- Student will be able to interface memory, I/O devises and interrupt controller with 8086 microprocessors.
- Student will be able to describe the internal architecture and different modes of operations of a typical microcontroller.
- Student will be able to analyze and compare the features of microprocessors and microcontrollers.

Text Books:

- Digital Electronics: An Introduction to Theory and Practice, William H. Gothmann, PHI Learning Private Limited.
- Digital Computer Electronics: An Introduction to Microcomputers, Albert Paul Malvino,Tata McGraw-Hill Publishing Company Ltd.

- Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh Gaonkar, PENRAM International Publishers.
- Digital Control Systems, Benjamin C. Kuo, Oxford University Press (2/e, Indian Edition, 2007).
- Microcomputer Experimentation with the Intel SDK-85, Lance A. Leventhal, Prentice Hall.

Reference Books:

- Kenneth J. Ayla, "The 8051 Micro controller", Thomson learning, 3rd edition, 2004, ISBN-140186158X
- Alan Clements, "Principles of Computer Hardware", Oxford University Press, 3rd Edition, 2003, ISBN-9780198564539

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Subject Code	Subject	L	T	P	C
7PECMEL324	Composite Materials	3	0	0	3

Course Objectives:

- To understand the mechanical behavior of composite materials.
- To get an overview of the methods of manufacturing composite materials.
- Explain the behavior of constituents in the composite materials.
- Enlighten the students in different types of reinforcement.
- Develop the student's skills in understanding the different manufacturing methods available for composite material.
- Illuminate the knowledge and analysis skills in applying basic laws in mechanics to the composite materials

Module I

Definition and applications of composite materials, Fibers- glass, carbon, ceramic and aramid fibers; Matrices- polymer, graphite, ceramic and metal matrices; characteristics of fibers and matrices. Lamina- assumptions, macroscopic viewpoint, generalized Hooke's law, reduction of homogeneous orthotropic lamina, isotropic limit case, orthotropic stiffness matrix, commercial material properties, rule of mixtures, transformation matrix, and transformed stiffness.

Module II

Manufacturing of composite materials, bag moldings, compression moldings, pultrusion, filament welding, other manufacturing processes.

Module III

Basic assumptions of laminated anisotropic plates, symmetric laminates, angle ply laminates, cross ply laminates, laminate structural module, evaluation of lamina properties, determination of lamina stresses, maximum stress and strain criteria, von Mises Yield Criterion for isotropic materials, generalized Hill's criterion for anisotropic materials, Tsai-Hill's criterion for composites, prediction of laminate failure, thermal analysis of composite laminates.

Module IV

Analysis of laminated plates- equilibrium equations of motion, energy formulation, static bending analysis, buckling analysis, free vibrations, natural frequencies.

Course Outcomes:

Upon completion of this course, the students will have an overview of the mechanical behavior and application of composite materials.

- Explain the mechanical behavior of layered composites compared to isotropic materials.
- Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.
- Determine stresses and strains relation in composites materials.

Text Books:

- Gibson R.F. Principles of Composite Material Mechanics, second edition, McGraw Hill,1994.
- Hyer M.W., Stress Analysis of Fiber- Reinforced Composite Materials, McGraw Hill,1998.
- Engineering Mechanics of Composite Materials, (2nd edition), by Isaac and M Daniel, Oxford University Press, 2006 .
- Analysis and performance of fibre Composites, (Second Edition), by B. D. Agarwal and L. J. Broutman, John Wiley & sons, NewYork , New York, 1990.

Reference Books:

- Mechanics of Composite Materials, (3ed edition), by R. M. Jones, Mc Graw Hill Company, New York, 2006.
- Analysis of Laminated Composite Structures, by L. R. Calcote, Van Nostrand Rainfold, New York, 1969.
- Mechanics of Composite Materials, (Second Edition), by Autar K. Kaw, CRC, 2010.

Subject Code	Subject	L	T	P	C
7PECMEL325	Computer Aided Design	3	0	0	3

Objectives:

- To provide an overview of how computers can be utilized in mechanical component design.
- To understand Parametric Modeling Fundamentals, Procedure, and "Shape before Size" Approach.
- To develop ability to Create Parametric 2-D Sketches, and create and Edit Parametric Dimensions.
- To develop the ability to apply Limits Fits, and Dimensional Tolerances, as well as Geometric Tolerances to components and assemblies on Engineering Drawings.

Module I

Fundamentals of Computer Graphics- Product cycle, sequential and concurrent engineering, Computer Aided Design, CAD system architecture, computer graphics, Coordinate systems, 2D and 3D transformations, viewing transformation.

Module II

Geometric Modeling- representation of curves, Hermite curves, Bezier curves, B-spline curves, rational curves, Techniques of surface modelling, surface patch, Coons and bicubic patches, Bezier and B-spline surfaces, Solid modelling techniques, CSG and B-rep.

Module III

Visual realism- hidden line-surface-solid removal algorithms, shading, coloring, computer animation.

Module IV

Assembly of parts- assembly modelling, interferences of positions and orientation, tolerance analysis, mass property calculations, mechanism simulation and interference checking CAD standards- Graphical Kernel System (GKS), standards for vex change images, Open Graphics Library (OpenGL), Data exchange standards- IGES, STEP, CALS etc., and Communication standards

Course Outcomes:

Upon completion of this course, the students can use computer and CAD software for modelling mechanical components.

- Understand the importance of CAD in the light of allied technologies such as CAM, CAE.
- Understand the significance of parametric technology and its application in 2D sketching.
- Ability to ensure manufacturability and proper assembly of components and assemblies.
- Ability to communicate between Design and Manufacturing using 2D drawings.
- Ability to create 3D assemblies that represent static or dynamic Mechanical Systems.

Text Books:

- Ibrahim Zeid, Mastering CAD CAM, Tata McGraw Hill Publishing Co.2007.
- C. McMohan and J. Browne, CAD/CAM Principles, II edition, Pearson Education, 1999.
- W. M. Neumann and R.F. Sproul, Principles of Computer Gra[hics, McGraw Hill,1989.
- D. Hearn and M.P> Baker, Computer Graphics, Prentice Hall Inc., 1992.

Reference Books:

- Automation, Production systems & Computer integrated Manufacturing/ Groover /P.E.
- CAD / CAM / CIM / Radhakrishnan and Subramanian / New Age.
- Principles of Computer Aided Design and Manufacturing / Farid Amirouche / Pearson.
- CAD/CAM: Concepts and Applications/Alavala/ PHI.
- Computer Numerical Control Concepts and programming / Warren S Seames / Thomson.

Subject Code	Subject	L	T	P	C
MC302	**Essence of Indian Knowledge Tradition	2	0	0	0

Course Objective:

- To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.
- To make the students understand the traditional knowledge and analyse it and apply it to their day to day life.

1. THE HISTORICAL PERSPECTIVE

1.1. The Indian Scene

1.2. The Modern Ruling Class

1.3. The Difficulties Facing the Historian

1.4. The Need to Study Rural and Tribal Society

1.5. The Villages

1.6. Recapitulation

2. PRIMITIVE LIFE AND PREHISTORY

2.1. The Golden Age

2.2. Prehistory and Primitive Life

2.3. Prehistoric Man in India

2.4. Primitive Survivals in the Means of Production

2.5. Primitive Survivals in the Superstructure

3. THE FIRST CITIES

3.1. The Discovery of the Indus Culture

3.2. Production in the Indus Culture

3.3. Special Features of the Indus Civilization

3.4. The Social Structure

4. THEARYANS

4.1. The Aryan Peoples

4.2. The Aryan Way of Life

4.3. Eastward Progress

4.4. Aryans after the Rig-Veda

4.5. The Urban Revival

4.6. The Epic Period

5. FROM TRIBE TO SOCIETY

5.1. The New Religions

5.2. The Middle Way

5.3. The Buddha and His Society

5.4. The Dark Hero of the Yadus

5.5. Kosala and Magadha

6. STATE AND RELIGION IN GREATER MAGADHA

6.1. Completion of the Magadha Conquest

6.2. Magadha Statecraft

6.3. Administration of the Land The State and Commodity Production

6.4. Asoka and the Culmination of the Magadha Empire

7. TOWARDS FEUDALISM

7.1. The New Priesthood

7.2. The Evolution of Buddhism

7.3. Political and Economic Changes

7.4. Sanskrit Literature and Drama

Course Outcomes:

- Student will be able to describe the system of Indian society and Indian village.
- Student will be able to describe the primitive and prehistory of India.
- Student will know how the Indus Civilization.
- Student will be able to describe the Evolution of Buddhism.

Text Books:

1. **India's Ancient Past Book by Ram Sharan Sharma**
2. **A History of Ancient and Early Medieval India: From the Stone Age to the 12th ...Book by Upinder Singh**

Subject Code	Subject	L	T	P	C
HSMC302	**Soft skills & interpersonal Communication	2	0	0	0

Course Objective:

The objectives of the course are:

- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills.
- To re-engineer attitude and understand its influence on behavior.
- To encourage the all round development of students by focusing on soft skills.
- To make the engineering students aware of the importance, the role and content of soft skills through instruction, knowledge acquisition, demonstration.

Unit I: Self Analysis

- Introduction to Soft Skills and Hard Skills, Importance of Soft Skills, Attributes regarded as Soft Skills, Identifying and improving your Soft Skills, Art of Negotiation
- Stage Fright
- Self Discovery, Importance of knowing oneself, Process of knowing oneself, SWOT Analysis, Benefits of SWOT analysis, SWOT Analysis , Self Esteem, Ways to improve Self Esteem, Aristotle on Self-Gender and Self, Feminist Self, Escaping the Self
- Self Development
- Developing Positive Attitude and Self Confidence, Forming Values

Unit II: Goal Setting and Career Planning

- Wish List, SMART Goals, Blue print for Success, Short term, Long Term, Life Time Goals,
- Art of Listening, Art of Reading, Art of Speaking, Art of Writing, writing E-mail
- Motivation Skills, Personality Development, Improving Perception
- Time Management, Stress Management, Conflict Handling
- Problem Solving and Decision Making, adaptability.

Unit III: Effective Communication

- Communication Skills, Concept/Meaning, Definition
-Types of Communication, Process of Communication, stages of Communication
- Difference between General and Technical Communication
- Barriers to Communication
- Communication Network
- 7 C's of Communication

Verbal &non verbal Communication

Unit IV: Interpersonal Skills

- Interpersonal Communication, Basic Skill set
- Effective Interpersonal Communication in Organization
- Team Building, Communicating in a Team
- Intercultural Communication
- Leadership traits through Communication
- Communicating assertively
- Presentation Skills

Course Outcome:

At the end of the course learners will be able to:

- Understand the importance of Soft Skills and Interpersonal Communication in Professional world.
- Effectively communicate through verbal /oral communication and improve the listening skills.
- Become more effective individual through goal/target setting, self motivation and practicing creative thinking.
- Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, inter –personal relationships, conflict management and leadership quality.

Suggested Readings:

- Covey Sean Seven Habits of Highly Effective Teens, New York, Fireside Publishers,1998.
- Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.
- Thomas A Harris, I am ok, You are ok, New York-Harper and Row,1972
- Dr. K. Alex Soft Skills, S. Chand.

Subject Code	Subject	L	T	P	C
7PCCME309P	Mechanical Engineering Laboratory-II	0	0	3	1.5

Objectives:

1. To understand the measurement of mechanical properties of materials
2. To understand the deformation behavior of materials
3. To understand the kinematic and dynamic characteristics of mechanical devices

Contents

1. Unit-axial tension test on mild steel rod
2. Torsion test on mild steel rod
3. Impact test on a metallic specimen
4. Brinnell and Rockwell hardness tests on metallic specimen
5. Bending deflection test on beams
6. Strain measurement using Rosette strain gauge
7. Microscopic examination of heat-treated and untreated metallic samples
8. Velocity ratios of simple, compound, epicyclic and differential gear trains
9. Kinematics of four bar, slider crank, crank rocker, double crank, double rocker and oscillating cylinder mechanisms
10. Cam & follower and motion studies
11. Single degree of freedom Spring-mass-damper system, determination of natural frequency and damping coefficient
12. Determination of torsional natural frequency of single and double rotor systems- undamped and damped natural frequencies

Course Outcomes:

Students who have undergone the course will be able to understand the measurement of mechanical properties of materials and will be able to characterize the dynamic behavior of mechanical systems

Subject Code	Subject	L	T	P	C
7PROJME310	Project II	0	0	2	3

Course Objectives:

This course is aimed to provide more weight age for project work. The project work could be done in The form of a summer project or internship in the industry or even a minor practical project in the College. Participation in any technical event/ competition to fabricate and demonstrate an innovative Machine or product could be encouraged under this course.