D. Y. PATIL TECHNICAL CAMPUS
Faculty of Engineering & Faculty of Management, Talsande
(An Autonomous Institute)
Department of Mechanical Engineering
S. Y. B. Tech. Curriculum
w.e.f. A.Y. 2025-2026

D. Y. Patil Education Society's

D. Y. Patil Technical Campus, Talsande

Faculty of Engineering and Faculty of Management

(An Autonomous Institute)

Approved by AICTE and affiliated to Shivaji University Kolhapur

(Accredited by NAAC with 'A' Grade in First Cycle)

Department of Mechanical Engineering

S.Y. B.Tech. Syllabus

Effective from Academic Year 2025-26

D. Y. PATIL TECHNICAL CAMPUS
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SEMESTER–III

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Course Credits	EXAM SCHEME					
								ISE	MSE	ESE	INT	OE/POE	TOTAL
1	PCC	ME24-211	Fluid Mechanics and Machineries	3	-	-	10	20	30	50	-	-	100
2		ME24-211P	Fluid Mechanics and Machineries Practical	-		2		-	-	-	25	25	50
3		ME24-212	Kinematics of Mechanisms and Machines	2	-	-		-	-	50	-	-	50
4		ME24-212P	Kinematics of Mechanisms and Machines Practical	-		2		-	-	-	25	25	50
5		ME24-213	Manufacturing Processes	3	-	-		20	30	50	-	-	100
6	CEP/FP	ME24-214-FP	Field Project	-	-	4	2	-	-	-	50	-	50
7	MDM-1	ME24-215-MDM1	Automobile System I	2	-	-	2	20	-	-	30	-	50
8	VEC	ME24-216	Organizational Behaviour	2	-	-	2	20	30	-	-	-	50
9	OEC-1	ME24-217-OE1	Green Technology	3	1	-	4	20	30	50	25	-	125
10	HSSM	ME24-218	Industrial Management	2	-	-	2	-	-	50	-	-	50
11	MC	ME24-219	Finishing School Training III	3	-	-	Audit	-	-	-	GRADE	-	GRADE
Total				**20**	**1**	**8**	**22**	**100**	**120**	**250**	**155**	**50**	**675**

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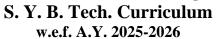**S. Y. B. Tech. Curriculum**
w.e.f. A.Y. 2025-2026

SEMESTER–IV

Sr. No.	Course Category	Course Code	Course Title	L	T	P	Course Credits	ISE	MSE	ESE	INT	OE/P OE	TOTAL
1	PCC	ME24-221	Strength of Materials	3	-	-	10	20	30	50	-	-	100
2		ME24-222	Dynamics of Machines	3	-	-		20	30	50	-	-	100
3		ME24-222P	Dynamics of Machines Practical		-	2		-	-	-	25	25	50
4		ME24-223	Applied Thermodynamics	2	-	-		20	-	30	-	-	50
5		ME24-223P	Applied Thermodynamics Practical	-	-	2		-	-	-	25	25	50
6	MDM-2	ME24-224-MDM2	Automobile System II	2	-	-	2	20	-	-	30	-	50
7	VEC	ME24-225	Environmental Study	2	-	-	2	20	-	-	30	-	50
8	HSSM	ME24-226	Engineering Economics	2	-	-	2	-	-	50	-	-	50
9	AEC	ME24-227	Basics of Finance	2	-	-	2	20	30	-	-	-	50
10	OEC-2	ME24-228-OE2	Enterprise Resource Planning	2	-	-	2	20	-	30	-	-	50
11	VSEC	ME24-229P	Testing & Measurement Practical	-	-	2	1	-	-	-	25	-	25
		ME24-230P	Work Shop Practice Practical	-	-	2	1	-	-	-	50	-	50
12	MC	ME24-231	Finishing School Training IV	3	-	-	Audit	-	-	-	GRADE	-	GRADE
13	CCA	ME24-232	Value Added Course	-	-	-	Audit	-	-	-	GRADE	-	GRADE
	Total			**21**	**-**	**8**	**22**	**140**	**90**	**210**	**185**	**50**	**675**
14	HC (Optional)	ME24-201	Honors Paper- I	3		2		20	30	50	25	-	125

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Course Title: Fluid Mechanics and Machineries	
Course Code: ME24-211	Semester: III
Teaching Scheme: L-T-P: 3-0-0	Credits: 3
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-II (10 marks)	ESE : 50 marks

Prior Knowledge of:	Applied Physics, Applied Chemistry

Course Objectives:

1.	To study physical significance of fluid static, Fluid Kinematics, fluid Dynamics and it's application
2.	To understand the different form of governing equation related to fluid flow.
3	To analyse and evaluate fluid mechanics system.
4.	To understand different types of losses.
5.	To understand the working principles of Impulse and reaction water turbine and also study the design parameters related to turbine.

Curriculum Details

Course Contents	Duration
UNIT I: Fluid Statics and Fluid Kinematics **A) Fluid Statics**: Properties of fluid, Statement of Pascal's law ,Hydrostatic law of pressure ,Definition of Total Pressure, Centre of Pressure ,Buoyancy ,Metacenter, Condition of Equilibrium of floating and submerged bodies. **B) Fluid Kinematics**: Eulerian and Langragian approach of fluid flow, Continuity Equationin Cartesian coordinates in three dimensional fluid flows .Velocity and Acceleration of fluid particles, Stream function and velocity potential function.	07 Hrs
UNIT II: Fluid Dynamics Euler's Equation of motion, Integration of Euler's equation Applications of Bernoulli's equation Venturimeter, orifice meter and Pitot tube Definition of Notch, classification and it Applications, Derivation of Flow over triangular and rectangular notches. Introduction to CFD and its application.	08 Hrs

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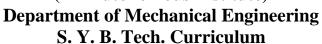**S. Y. B. Tech. Curriculum**
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UNIT III: Momentum Equation and Laminar Flow **A) Momentum Equation:** Derivation of momentum equation Applications of momentum equation, momentum correction factor, Analysis of fluid flow through pipe bends. **B) Laminar Flow**: Laminar flow through circular pipes and Laminar flow through parallel plates.	**09 Hrs**
UNIT IV: Flow Through Pipes and Boundary Layer Theory **A) Flow Through Pipe**: Different energy losses in flow through pipe, Losses due to friction: Darcy's Weisbach equation and Chezy's equation, Minor Losses due to expansion, contraction, pipe fittings, at entrance, at exit, due to obstruction etc. Flow through Series pipe, Parallel pipe, Siphon pipes, Branching pipes and equivalent pipes, Hydraulic Gradient line (HGL) and Total Energy Line (TEL). **B) Boundary Layer Theory**: Boundary layer thickness, laminar and turbulent boundary layers, Displacement thickness, Momentum thickness, Energy thickness, separation, boundary layer control	**08 Hrs**
UNIT V: Impulse Water Turbines: Eulers equation for work done in Rotodynamic Machines classification of water turbines ,Pelton wheel, its construction and working, velocity triangles, types. Pelton wheel design (bucket dimensions, Number of buckets, Jet diameter, Wheel diameter, Jet ratio, Speed ratio, Number of jets,) Calculation of efficiency, Power, Discharge etc. Governing of Pelton wheel.	**07 Hrs**
UNIT VI: Reaction Water Turbines: Principle of operation, Construction and working of Francis and Kaplan Turbine, Draft tube, Cavitation calculation of various efficiencies, Power, Discharge, Blade angles, Runner dimensions etc. Governing of Francis and Kaplan turbine. Draft tube-types and analysis.	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

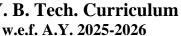| CO	Statements
211.1	Understand the and theoretical concepts of fluid statics, Fluid kinematics.
221.2	Apply fundamental equation of fluid mechanics and also apply boundary layer theory.
211.3	Analysis of laminar flow through circular pipe and parallel plates.
211.4	Calculate different losses in fluid flow through different arrangements of pipes.
211.5	Understand and Apply working principle of Rotodynamic Machines.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
211.1	2	3	2	-	-	-	-	-	-	-	-	-	1	-
221.2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
211.3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
211.4	3	3	3	-	-	-	-	-	-	-	-	-	2	-
211.5	3	3	3	-	-	-	-	-	-	-	-	-	2	-

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Fluid Mechanics"	9th	R. K.Bansal	Laxmi publications	2015
2	"Fluid Mechanics"	9th	Ramamrutham		2011
3	"Fluid Mechanics"	18	Modi and Seth	Modi and Seth	2011

Reference Books:

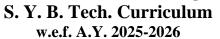| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Fluid Mechanics"	4th	V.L. Streeter and E.B. Wylie	Tata McGraw Hill PvtLtd	2011
2	"Fluid Mechanics"	8th	Foxand McDonald,J	Wiley	2015
3	"Mechanics of Fluid"	2nd	Merle C. Potter	Prentis HallofIndia	2012

Useful Link /Web Resources:

1. https://nptel.ac.in/courses/112105287

2. https://nptel.ac.in/courses/105103192

3. https://nptel.ac.in/courses/112106170

4. https://nptel.ac.in/courses/112106200

5. https://nptel.ac.in/courses/112105182

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Course Title: Fluid Mechanics and Machineries lab	
Course Code: ME24-211P	**Semester: III**
Teaching Scheme: L-T-P: 0-0-2	**Credit: 01**
Evaluation Scheme: INT (25 marks)	**POE: 25 Marks**

Prior Knowledge of:	Applied Physics

Course Objectives:

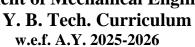|	
1.	To study physical significance of fluid static, Fluid Kinematics, fluid Dynamics and its application
2.	To understand the different form of governing equation related to fluid flow.
3.	To analyse and evaluate fluid mechanics system.
4.	To develop skills in the analysis system for lifelong learning
5.	To understand the working principles of Impulse and reaction water turbine and also study the design parameters related to turbine.

List of Experiments-

Exp. No	Title of Experiments	Duration
01	Verification of Bernoulli's equation.	02 Hrs
02	Calibration of Venturimeter & Orificemeter.	02 Hrs
03	Calibration of notches.	02 Hrs
04	Determination of minor losses in pips-fittings.	02 Hrs
05	Determination of coefficient of friction in pipes of different sizes.	02 Hrs
06	Determination of coefficient of friction in series pipe	02 Hrs
07	Theoretical assignment of Dimensional analysis which may include procedure andNumerical on Rayleigh's method and Buckingham π theorem.	04 Hrs
08	Case study on CFD	04 Hrs
09	Trial on Pelton wheel with characteristics curve.	02 Hrs
10	Trial on Francis and Kaplan turbine with characteristics curve.	02 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
211.1	Understand the and theoretical concepts of fluid statics, Fluid kinematics.
221.2	Apply fundamental equation of fluid mechanics and also apply boundary layer theory.
211.3	Analysis of laminar flow to calculate resistance to it through circular pipe and parallel plates.
211.4	Calculate different losses in fluid flow through different arrangements of pipes.
211.5	Understand and Apply working principle of Rotodynamic Machines.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
211.1	2	3	2	-	-	-	-	-	-	-	-	-	1	-
221.2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
211.3	3	3	3	-	-	-	-	-	-	-	-	-	2	-
211.4	3	3	3	-	-	-	-	-	-	-	-	-	2	-
211.5	3	3	3	-	-	-	-	-	-	-	-	-	2	-

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Fluid Mechanics"	2nd	R. K.Bansal	Laxmi publications	2018
2	"Fluid Mechanics"	1st	Ramamrutham		2013
3	"Fluid Mechanics"	3rd	Modi and Seth	Modi and Seth	2018

Reference Books:

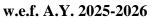| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Fluid Mechanics"	2nd	V.L. Streeter and E.B. Wylie	Tata McGraw Hill PvtLtd	1997
2	"Fluid Mechanics"	8th	Foxand McDonald,J	John Wileyand Sons	2011
3	"Mechanics of Fluid"	2nd	Merle C. Potter	Prentis HallofIndia	1997

Useful Link /Web Resources:

1. https://nptel.ac.in/courses/112105287

2. https://nptel.ac.in/courses/105103192

3. https://nptel.ac.in/courses/112106170

4. https://nptel.ac.in/courses/112106200

5. https://nptel.ac.in/courses/112105182

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Course Title: Kinematics of Mechanisms & Machines	
Course Code: ME24-212	Semester: III
Teaching Scheme: L-T-P:2-0-0	Credits: 2
Evaluation Scheme:	ESE : 50 Marks

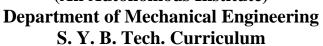| Prior Knowledge of:	1. Engineering Mathematics.
	2. Engineering Mechanics.
	3. Engineering Graphics

Course Objectives:

1.	Design a mechanism to get the desired motion for the application under consideration
2.	Analyze the mechanisms to determine velocity and acceleration of various links of the mechanism
3.	Design and Draw profile of the cam to obtain specified follower motion for an application
4.	Understand the basic theory on gears.

Curriculum Details

Course Contents	Duration
UNIT I: Basic Concepts of Mechanism: Kinematics Links, kinematics pair - types, kinematic chain, mechanism, constrained motions, mobility of mechanisms, Grubbler's and Kutzbach criterion, inversions of mechanisms, types of kinematic chains and their inversions.	**06 Hrs**
UNIT II: Kinematic analysis of the mechanisms: Velocity and acceleration diagrams for different mechanisms using Relative velocity and acceleration method,, Coriollis component of acceleration	**08 Hrs**
UNIT III: Kinematics of CAM Types of cams, types of followers, Terminology, displacement, velocity and acceleration diagrams for various follower motions, generation of cam profile for specified motion of different followers.	**08 Hrs**
UNIT IV: Gear & Gear Train **Gear:** Gear Geometry , Types of gear and tooth profiles, Theory of Spur gear, Interference in Involute tooth gears and methods for its prevention. **Types of Gear trains** - Simple, Compound, Reverted, Epicyclic gear train. Epicyclic gear train [Tabular method], Torque in Epicyclic gear train, Differential gear box.	**06 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

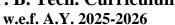| CO	Statements
212.1	Design a mechanism to get the desired motion for the application under consideration
212.2	Analyze the mechanisms to determine velocity and acceleration of various links of the mechanism
212.3	Design and Draw profile of the cam to obtain specified follower motion for an application
212.4	Understand the basic theory on gears.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
212.1	1	3	2	-	-	-	-	-	-	-	-	-	2	-
212.2	2	3	2	2	-	-	-	-	-	-	-	-	2	-
212.3	2	3	2	2	-	-	-	-	-	-	-	-	2	-
212.4	2	3	2	2	-	-	-	-	-	-	-	-	2	-

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory of Machines	8th	Ratan S.S	Tata McGraw Hill	1962
2	Theory of Machines	4th	V.P.Singh	DhanpatRai and Sons.	1987
3	Theory of Machines	3rd	Sadhu Singh	Tata McGraw Hill, New Delhi.	1996

Reference Books:

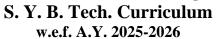| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory of Machines	3rd	Thomas Bevan	CBS Publishers, New Delhi.	1957
2	Theory of Machines and Mechanism	5th	Shigley	McGraw Hill, New York.	1963
3	Theory of Machines and Mechanism	5th	G.S. Rao and R.V. Dukipatti	New Age Int. Publications	1998

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/112/105/112105268/
2. **https://archive.nptel.ac.in/courses/112/106/112106270/**

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Course Title: Kinematics of Mechanisms & Machines Practical	
Course Code: ME24-212P	**Semester: III**
Teaching Scheme: L-T-P: 0-0-2	**Credit: 01**
Evaluation Scheme: INT (25 marks)	**POE : 25 Marks**

Prior Knowledge of:	Experiments based on mechanisms, different types of motions and mechanical elements.

Course Objectives:

1.	Define various terminologies related to kinematics of mechanism.
2.	Discuss effect of friction in various mechanisms.
3.	Perform force analysis of simple mechanisms.
4.	Design cam with follower for different applications.
5.	Analyze the various types of gear trains used for transmission of motion and power.

List of Experiments- Minimum 8 practical's need to perform from the following list

Exp. No	Title of Experiments	Duration
01	Sketch the various mechanisms and their inversions for various applications.	02 Hrs
02	Kinematic Analysis of mechanisms using relative velocity and acceleration method.	02 Hrs
03	Kinematic Analysis of mechanisms using instantaneous centre method	02 Hrs
04	Kinematic Analysis of mechanisms using Klein's construction method	02 Hrs
05	Determination of velocity and acceleration of mechanisms using Analytical method.	02 Hrs
06	Verification of ratio of angular displacement of shafts connected by Hooks joint.	02 Hrs
07	Synthesis of mechanisms for various applications.	02 Hrs
08	Generation of involute profile using rack cutter method.	02 Hrs
09	Experiment on Torque Measurement in epicyclical Gear Train.	02 Hrs
10	Computer aided force analysis of any one of following a. Slider crank mechanism , b. Four bar mechanism	02 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
212P.1	Perform force analysis of simple mechanisms.
212P.2	Discuss effect of friction in various mechanisms.
212P.3	Design cam with follower for different applications.
212P.4	Analyze the various types of gear trains used for transmission of motion and power.

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

PO's COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
212P.1	2	3	-	2	-	-	-	-	-	-	-	-	2	-
212P.2	3	3	-	2	-	-	-	-	-	-	-	-	2	-
212P.3	1	3	-	2	-	-	-	-	-	-	-	-	2	-
212P.4	2	3	-	2	-	-	-	-	-	-	-	-	2	-

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory of Machines	8th	Ratan S.S	Tata McGraw Hill	1962
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Reference Books:

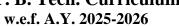| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Theory of Machines	3rd	Thomas Bevan	CBS Publishers, New Delhi.	1957
2	Theory of Machines and Mechanism	5th	Shigley	McGraw Hill, New York.	1963
3	Theory of Machines and Mechanism	5th	G.S. Rao and R.V. Dukipatti	New Age Int. Publications	1998

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/112/105/112105268/
2. **https://archive.nptel.ac.in/courses/112/106/112106270/**

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Course Title: Manufacturing Process	
Course Code: ME24-213	Semester: III
Teaching Scheme: L-T-P: 3-0-0	Credits: 3
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-II (10 marks)	ESE : 50 Marks

Prior Knowledge of:	Knowledge of basic mechanical engineering, workshop practice, engineering materials

Course Objectives:

1.	To introduce different methods of Molding and Casting.
2.	To introduce forming and Plastic Shaping processes.
3	To study various Metal Removal Processes and Machine tools.
4.	To study gear manufacturing processes.
5.	To study Nonconventional Machining.

Curriculum Details

Course Contents	Duration
UNIT I: Casting Processes: • Importance of casting as manufacturing process, advantages and limitations of casting processes, • foundry layouts and mechanization, Moulding types such as Green sand moulding, Shell molding, • Components of gating system, functions and of runners and risers, solidification control devices: chills, ceramics bricks, • Introduction to permanent mould casting process such as continuous casting, Gravity die casting, pressure die casting, centrifugal casting, Melting practices and Metallurgical control in Cupola furnace, oil/gas fired furnaces, Induction and Arc Furnace, • casting defects, metal pouring equipments, Cleaning-fettling and inspection of casting.	**09 Hrs**

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UNIT II: Forming Processes: • **Rolling:** Introduction, Hot and cold rolling, Rolling Mill Classification, Defects in rolling. • **Forging:** Introduction, Forging Machines (board Hammer, Air and Steam, Hydraulic Hammer), Open and Closed die Forging, Defects in forging. • **Extrusion:** Introduction, Direct, Indirect, Tube, Impact and Hydraulic Extrusion, Defects in extrusion.	**08Hrs**
UNIT III: Plastic Shaping: • Thermosetting and thermoplastic materials, their properties and applications, • Introduction to blow moulding, injection moulding, extrusion, calendaring and thermo forming.	**04Hrs**
UNIT IV: Machine Tools for Metal Cutting • **Lathe**: Introduction, Working principle, types, specifications, principle parts, accessories, attachments, and various lathe operations, Calculations of Change gears for thread cutting. • **Milling Machine:** Types- Horizontal, Vertical milling machines, Milling cutters, construction and working of column and knee type, milling operations, • **Drilling Machines:** Classification of drilling machines, Construction and of radial drilling machine,Various accessories and various operations.	**09Hrs**
UNIT V: CNC Technology. • CNC Technology and CNC tooling: Introduction, Construction and working of CNC, DNC and machining center. CNC axes and drives. Automatic Tool Changer (ATC) and Automatic pallet changer (APC)	**05Hrs**
UNIT VI: Nonconventional Machining: • Fundamental principle, machining unit, tool material, Advantages, limitations and applications of Abrasive Jet Machining, Electrical Discharge machining, Electro- Chemical machining, Laser beam machining, Ultrasonic machining, Water jet machining.	**05Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
213.1	Understand Importance of casting as manufacturing Process.
213.2	Understand different types of forming and Plastic Shaping processes
213.3	Remember Basic working principle, Configuration, Specification and classification of machine tools.
213.4	Remember Basic Working Principle and Applications of CNC & non-traditional machining.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
213.1	1	3	2	2	2	1	1	-	-	-	-	-	2	-
213.2	2	3	2	2	2	1	-	-	-	-	-	-	2	-
213.3	3	3	2	2	1	1	-	-	-	-	-	-	2	-
213.4	3	3	2	2	2	1	-	-	-	-	-	-	2	2

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Manufacturing Technology"	3rd	P. N. Rao,	Tata McGraw-Hill	2009
2	Principles of Foundry Technology	2nd	P.L. Jain	Tata McGraw-Hill	2010
3	Foundry technology	17th	O. P. Khanna	DhanapatRai Publications	2013

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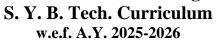**S. Y. B. Tech. Curriculum**
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Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Principles of metal casting	3rd	Haineand Rosenthal	Tata McGraw-Hill Book	2013
2	"Workshop Technology	3rd	W.A.J.Chapman	CBS Publishing	2007
3	Machine Tools and Manufacturing Technology	7th	Steve F. Krar	Mario Rapisarda	2015

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Course Title:-Field Project	
Course Code: ME24-214	Semester:-III
Teaching Scheme: L-T-P: 0-0-4	Credits : 2
Evaluation Scheme: INT(50)	ESE : --

Course Objectives:

01	To understand the Product Development Process including budgeting through Field Project.
02	To plan for various activities of the project and distribute the work amongst team of two members.
03	To develop student's abilities to transmit technical information and test the same by working on Field Project.

Course Contents	Duration
Field Project : Students have to initiate their own small conceptual or practical based projects individually as a team of no more than 2 members. Field Project Definition: The purpose of Field project is to promote self-study, innovative, creative thinking and independent research ability. While making this exercise it is expected that the knowledge acquired by them through application of subjects leant so far is applied by them carrying out mini project work will certainly help the students for satisfactory and successful completion of their Field project in the final year. Field Project Term Work: The term work under project submitted by students shall include Work Diary: Work Diary maintained by group and countersigned by the guide weekly. The contents of work diary shall reflect the efforts taken by project group for a. Searching suitable project work b. Brief report preferably on journals/research or conference papers/books or literature surveyed to select and bring up the project.	**30 Hr**

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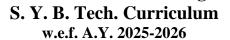| Course Contents	Duration
c. Day to day activities carried out related to project work for entire semester.	
d. Synopsis.	
The group should submit the synopsis in following format	
i. Title of Project	
ii. Names of Students	
iii. Name of Guide	
iv. Relevance	
v. Present Theory and Practices	
vi. Proposed work	
vii. Expenditure	
viii. References	
2. The synopsis shall be signed by the each student in the group, approved by the guide and endorsed by the Head of the Department	
3. Presentation: The group has to make a presentation in front of the Faculty members of department at the end of semester.	
Field Project Completion and Assessment:	
2. A mini project report is to be written upon completion of the activity. For team projects, each member has to write his own report. The report should include academic content such as the background, objectives, product/system description, the work done, the achievements and difficulties encountered. Students will deliver report presentation and demonstration of their work. The assessment will be done by Field project guide. For standardization of the Field project reports the following format should be strictly followed.	
1. Page Size: TrimmedA4	
2. Top Margin: 1.00Inch	
3. Bottom Margin: 1.32Inches	

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Course Contents	Duration
4. Left Margin: 1.5Inches	
5. Right Margin: 1.0Inch	
6. Para Text: Times New Roman 12 Point. Font	
7. Line Spacing: 1.5Lines	
8. Page Numbers: Right Aligned at Footer. Font 12 Point. Times New Roman	
9 Headings: Times New Roman, 14 Point, Bold Face	
10. References: References should have the following format	
For Books: "Title of Book", Authors, Publisher, Edition	
For Papers: "Title of Paper, Authors, Journal/Conference Details, Year	
Important Notes:	
• Project group should continue maintaining a diary for project and should write	
(a) Book referred	
(b) Company visited	
(c) Person contacted	
(d) Computer work done	
(e) Paper referred	
(f) Creative thinking.	
• The Diary along with Field Project Report shall be assessed at the time of oral examination	
• One copy of the report should be submitted to Institute/ Department, One copy to Guide and one copy should remain with each student of the project group.	

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Course Outcomes (COs): After successful completion of the course, students will be able to:

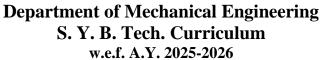| COs	Statement
214.1	Understand, plan and execute a Field Project with the team.
214.2	Implement various manufacturing techniques, CAD learnt so far for designing and developing a prototype of a model.
214.3	Prepare a technical report based on the Field project.
214.4	Deliver presentation on Mini Project work carried out.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
214.1	2	2	2	1	-	-	-	-	-	-	-	-	1	-
214.2	3	1	2	-	-	-	-	-	-	-	-	-	2	3
214.3	3	2	1	1	-		-	-	-	-	-	-	-	-
214.4	4	1	2	1	-	-	-	-	-	-	-	-	-	-

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Course Title : --Automobile Systems I	
Course Code: -- ME24-215-MDM -I	Semester: -- III
Teaching Scheme L-T-P : 2-0-0	Credits : 02
Evaluation Scheme ISE-I (10 Marks), ISE-II (10 Marks) ,INT(30Marks)	ESE Marks : --

Prior Knowledge of:	Mechanical linkage

Course Objectives:

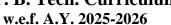| 1.	Gain the knowledge of history of automobile.
2.	Attain knowledge about clutch ,gear box and differential
3.	Know the braking system of the vehicle
4	Attain knowledge of steering system of automobile.

Curriculum Details

Course Contents	Duration
Unit- Unit 1. Introduction Automobile history and development, Classification, vehicle layouts- engine location and drive arrangement, specifications of vehicles, Types of Cars, Nomenclature s , Chassis types, constructional details, Types of Frames, sub frames, frameless vehicles.	**07**
Unit-II Transmission System Clutch – Function and requirements, Classification, Construction and working of Single-plate, Multi-plate, Diaphragm spring and centrifugal clutches, Gear Box – Necessity, classification, construction of manual gear boxes like Sliding mesh, constant mesh, Synchromesh, Automatic transmission, Electronic transmission control, Overdrive. Propeller shaft, Differential and final drive.	**08**
Unit III Braking System Need, principle, types, Mechanical, hydraulic and pneumatic brakes, disc and drum types, airbrakes, servo and power braking, Antilock Braking System (ABS), brake adjustments, defects and causes, Electronic Brake Distribution(EBD)..	**06**
Unit- Steering System Live and dead axles, live axle arrangement Steering systems, function, principle of steering, Ackerman and Davis, steering geometry, canter point steering, , steering gearbox, power steering, collapsible steering..	**06**

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Term work: Assignment on each chapter

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
215.1	Understand and Classify the automobiles and different layouts
215.2	Identify different components of automobile systems
215.3	Demonstrate the different systems of automobile
215.4	Differentiate the types of automobile systems

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
215.1	1,2	2	1	1	--	--	--	--	--	--	--	--	1	-
215.2	2	2	3	1	--	--	--	--	1	--	--	--	1	1
215.3	2	2	--	1	--	--	--	--	--	--	--	--	1	1
215.4	3	2	--	-	--	--	--	--	1	--	--	--	1	-

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Automobile Engineering	14th	Dr. Kripal Singh	Standard Publishers and Distributers Delhi	2017
2	Automobile Engineering	8th	G.B.Narang	Khanna Publication	2018

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	The Motor Vehicle	13th	T.K Garratt,K.Newton Steed & W.Steeds	Reed Educational and Professional Publishing Ltd	2001
2	Automotive Vehicle Safety	1st	George Pieters Barbara Pieters	Taylor & Francis	2003
3	Automotive Handbook	9th	Bosch	SAE Publications	2014

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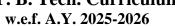**S. Y. B. Tech. Curriculum**
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Useful Link /Web Resources:

1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in

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Course Title: Organizational Behaviour	
Course Code: ME24-216	Semester: III
Teaching Scheme: L-T-P: 2-0-0	Credits: 2
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-II (10 marks)	ESE Marks: --

Prior Knowledge of:	Basic knowledge of English, human values, management

Course Objectives:

1.	Understand the group behaviour inside organizations, enhance skills in understanding and appreciating individuals interpersonal, and group process for increased effectiveness both within and outside of organizations.
2.	Evaluate theoretical behavioural patterns of human beings at individual and group levels.
3	Enhance communication, leadership qualities and team work.

Curriculum Details

Course Contents	Duration
Unit-I : Introduction to OB • Introduction to OB : Definition, Nature, Evolution of Organizational Behaviour Approach • Historical perspective – from Robert Owen(1825) to Elton Mayo(1925) • Disciplines contributing to OB – Psychology, Sociology, Anthropology, Social Psychology, Economics & political Science • Approaches to the study of OB -Human Resource Approach, Contingency Approach, Productivity Approach, and System Approach.	**07 Hrs**
Unit-II Individual Behavior : • Personality – Types – Factors influencing personality – Theories. • Learning – Types of learners – The learning process – Learning theories. • Attitudes – Characteristics – Components – Formation – Measurement- Values. • Perceptions – Importance – Factors influencing perception – Emotions and Moods in workplace	**07 Hrs**
Unit-III	**07 Hrs**

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• Leadership – Meaning, importance, Theories. Leaders Vs Managers. • Motivation at work – importance, need, types and its effects on work behavior. Motivation Theories : Maslow's, Herzberg, etc. • Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational Development – Characteristics & objectives	
Unit-IV Organizational Culture • Organizational culture and climate – Factors affecting organizational climate Importance. Organizational change – Importance – Stability Vs Change Proactive Vs Reaction change – the change process – Resistance to change Managing change. Organizational effectiveness, Case Study.	**07 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

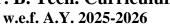| CO	Statements
216.1	Understand approach to organiazational behaviour
216.2	Understand the concept of perception and the process
216.3	Explain organization change and culture effect on working relationship at workplace
216.4	Understand the concept of attitude and values. Elaborate the sources and types of values
216.5	Relate different theories of motivation and Leadership with current situation and know the roles and activities of leadership

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
216.1	1	3	2	1	-	-	-	-	-	-	-	1	-	-
216.2	2	3	2	-	-	-	-	-	-	-	-	1	-	-
216.3	3	3	2	-	-	-	-	-	-	-	-	1	-	-
216.4	3	3	2	-	-	-	-	-	-	-	-	1	-	-
216.5	2	2	3	-	-	-	-	-	-	-	-	1	-	-

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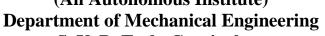**Department of Mechanical Engineering**
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Text Books:

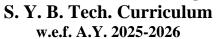| Sr. No	Title	Author(s)	Publisher
1	Organizational behaviour	Robbins, Stephen P. and Timothy A. Judge.	Prentice-Hall New Delhi
2	Organisation Behaviour	Arun Kumar & N. Meenakshi	Vikas publishing House PVT Ltd
3	Behaviour in organizations	Jerald Green Berg and Robert A. Baron	PHI Learning PVT Ltd

Reference Books:

Sr. No	Title	Author(s)	Publisher
1	Essentials of Management	Koontz, Harold, Cyril O'Donnell, and Heinz Weihrich	Tata McGraw-Hili, New Delhi
2	Business, Psychology and Organizational Behaviour	Eugene McKenna	
3	Organizational Behaviour	K. Aswathappa	8threvised edition
4	Organizational Behavior	Steers, Richard M. and J. Stewart Black	Harper Collins College Publishers, New York
5	Principles of Management	Govindarajan & Natarajan	Prentice Hall of India Private Limited, New Delhi
6	Fundamentals Organisational Behaviour	Slocum and Hell Riegel by Cengage learning	Slocum and Hell Riegel by Cengage learning
7	Management of Organizational Behaviour	Paul Hersey Kenneth. H. Blanchard and Dewey	PHI learning PVT Ltd.

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Course Title: Green Technology	
Course Code: ME24-217-OE1	Semester: III
Teaching Scheme: L-T-P: 3-0-0	Credits: 04
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-I (10 marks)	ESE : 50 Marks

Prior Knowledge of:	Basic Physics, Engineering Thermodynamics, Turbo machines, I.C. Engines.

Course Objectives:

1	To Understand the Fundamentals of green technology & various renewable energy sources.
2	To Analyze energy efficiency & sustainable practices.
3	To Characterize different types of waste and compare various conversion technologies.
4	To Understand future scope for green technology.

Curriculum Details

Course Contents	Duration
UNIT I: Fundamentals of Green Technology Introduction to Green Technology and Sustainable Development , Principles of Environmental Science , Green Chemistry and Engineering Basics , Renewable vs. Non-Renewable Resources	**06 Hrs**
UNIT II: Renewable Energy Systems Solar Energy: Solar Cells, Solar Power Plants, Applications , Wind Energy: Wind Turbine Design, Efficiency, Offshore Wind Farms , Hydropower: Small-Scale vs. Large-Scale, Environmental Impact , Biomass and Biofuels: Algae-Based Fuels, Biogas, Ethanol Production ,Geothermal Energy: Direct Use and Power Generation	**06 Hrs**
UNIT III: Energy Efficiency and Sustainable Practices Energy-Efficient Appliances and Technologies , Building Energy Management	**08 Hrs**

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Systems (BEMS) , LEED and Green, Building Certifications , Passive Design Strategies in Architecture ,Sustainable Manufacturing and Materials ,Green Manufacturing Processes and Circular Economy Biodegradable and Recyclable Materials ,Nanotechnology for Sustainable Materials Life Cycle Assessment (LCA) of Green Products	
UNIT IV: Waste Management and Pollution Control Solid Waste Management: Recycling, Composting, and Landfills ,Electronic Waste (E-Waste) and Sustainable Disposal Methods , Waste Processing Techniques; Source Reduction, Biological Conversion Products: Compost and Biogas, Incineration pyrolysis and Energy Recovery, waste plastic, RDF utilization, Govt. Policies Water Pollution: Treatment Methods and Sustainable Water Use , Air Pollution Control: Carbon Sequestration and Air Purifiers	**07Hrs**
UNIT V: Smart Cities and Urban Sustainability Internet of Things (IoT) for Energy Conservation ,Smart Grids and Renewable Energy Integration ,Sustainable Urban Planning and Green Infrastructure ,Water Conservation and Smart Irrigation Systems **Environmental Policies and Climate Action** Global Climate Agreements and Carbon Trading , Corporate Sustainability and Environmental Regulations , Green Economy and Sustainable Business Models Ethics and Social Responsibility in Green Technology	**08 Hrs**
UNIT VI: Future Trends in Green Technology -Artificial Intelligence (AI) for Environmental Monitoring, Carbon Capture and Utilization (CCU) Technologies , Green Hydrogen and Energy Storage Innovations Bio-Inspired Technologies for Sustainability .	**04 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
217.1	Understand the Fundamentals of green technology & various renewable energy sources.
217.2	Analyze energy efficiency & sustainable practices.
217.3	Characterize different types of waste and compare various conversion technologies.
217.4	Understand future scope for green technology.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
217.1	1	3	2	2	-	-	-	2	-	-	-	1	-	-
217.2	2	3	2	2	-	-	-	2	-	-	-	1	-	-
217.3	3	3	2	2	-	-	-	2	-	-	-	1	-	-
2217.4	2	3	2	2	-	-	-	2	-	-	-	1	-	-

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Solar Energy	3rd	,Sukhatme	TataMcGraw-HillEducation	2008
2	Power Plant Engineering	2nd	R.K.Rajput	Laxmi Publications,New Delhi	2001

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Reference Books:

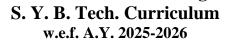| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Non-Conventional Energy Sources, Khanna Publication	5th	G. D. Rai,	Khanna Publications.	1988
2	Biogas Systems, Principle and Applications	2nd	K. M. Mital,.	New Age International Ltd	1996
3	Solar Engineering and Thermal Processes	2nd	J. A. Duffie and W.A. Beckman, , John	Wiley and Sons.	2013.

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/121/106/121106014/

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Course Title: Green Technology Tutorial	
Course Code: ME24-217-OE1	**Semester: III**
Teaching Scheme: L-T-P: 0-1-0	**Credits: 01**
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-I (10 marks)	**ESE Marks: 50 marks**

Prior Knowledge of:	Basic Physics, Engineering Thermodynamics, Turbo machines, I.C. Engines.

Course Objectives:

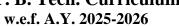| 1	To Understand the renewable energy technologies and their applications.
2	To Analyze sustainable energy solutions for buildings and daily life.
3	To Develop skills in assessing and implementing basic green technologies.
4	To Understand the environmental and economic context of green technologies.

List of Assignments- Minimum 10 assignments need to perform from the following list

Exp. No	Title of Experiments	Duration
01	List different types of renewable energy sources with examples.	01 HRS
02	Research & Present a case study on India's largest solar park.	01 HRS
03	Case Study on Solar Power Implementation in Rural Areas	01HRS
04	Rainwater Harvesting and Solar Heater Integration in Green Homes	01HRS
05	Create a model / drawing of a green building.	01HRS
06	Analyze the electricity bill of your home or campus for 3 months.	01HRS
07	Make a poster on 10 Daily Green Habits to save energy.	01HRS
08	Write a tutorial on how rainwater harvesting can reduce energy demand.	01HRS
09	Compare energy savings from a 5-star rated appliance vs. a regular one.	01HRS
10	Green Technology in Transportation: Electric Bus Systems in Cities	01HRS
11	List and explain the types of energy audits. Prepare a checklist for conducting a basic energy audit of a building	01HRS

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Exp. No	Title of Experiments	Duration
12	Group activity: Debate – "Is nuclear energy a green energy source?	01HRS
13	Prepare a short report on carbon credits and carbon trading.	01HRS

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
217.1	Identify and explain different types of renewable energy sources.
217..2	Evaluate the application of green technologies in real-world scenarios.
217..3	Propose and assess basic energy-saving practices and technologies.
217..4	Discuss the environmental and economic implications of energy choices.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
217.1	1	3	2	2	-	-	2	-	-	-	-	1	-	-
217..2	2	3	2	2	-	-	2	-	-	-	-	1	-	-
217..3	3	3	2	2	-	-	2	-	-	-	-	1	-	-
217..4	2	3	2	2	-	-	2	-	-	-	-	1	-	-

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Solar Energy	3rd	,Sukhatme	TataMcGraw-HillEducation	2008
2	Power Plant Engineering	2nd	R.K.Rajput	Laxmi Publications,New Delhi	2001

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Non-Conventional Energy Sources, Khanna Publication	5th	G. D. Rai,	Khanna Publications.	1988
2	Biogas Systems, Principle and Applications	2nd	K. M. Mital,.	New Age International Ltd	1996
3	Solar Engineering and Thermal Processes	2nd	J. A. Duffie and W.A. Beckman, , John	Wiley and Sons.	2013.

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/121/106/121106014/

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Course Title: Industrial Management	
Course Code: ME24-218	Semester: III
Teaching Scheme: L-T-P: 2-0-0	Credits: 2
Evaluation Scheme	ESE : 50 Marks

Prior Knowledge of:	Basic Industrial Terminology relative to Management.

Course Objectives:

1.	To know various concepts and principles of management.
2.	To study various functions of management to real life scenarios.
3	To know Production and marketing functional area of management.
4.	To understand Small Scale Industry and entrepreneurship development.

Curriculum Details:

Course Contents	Duration
UNIT I: Introduction to Management • Management: Introduction; Definition and Functions • Management Approaches – Mintzberg's Ten Managerial Roles – Principles of Taylor; Henry Fayol ; Weber; Parker • Forms of Organization: Sole Proprietorship; Partnership; Company (Private and Public); Cooperative , Public Sector Vs. Private Sector Organization • Business Environment: Economic; Social; Political; Legal	**07 Hrs**
UNIT II: Functions of Management • Definition of Management, • Planning –Objectives, Steps in Planning, elements of planning, • Organizing – Process of Organizing importance and principle of organizing, departmentation, Span of control. • Staffing – Nature, Purpose, Scope, Human resource management, Policies, Recruitment procedure, training and development, appraisal methods. • Leading – Leadership style, Communication process, Barriers, remedies, Motivation, importance Herzberg's theory, Maslow's theory, McGregor's theory. • Controlling–Process, Requirement for control management	**09 Hrs**

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UNIT III: Functional areas of Management • Production Management-Product mix, line balancing, break even analysis, Material Handling Equipment, TPM, Problem solving Techniques. • Marketing Management –Principles & Functions, Types of Market, Market Research, Market Segmentation, Marketing Mix, Advertisement, Channel Of Distribution.	**08 Hrs**
UNIT IV: Entrepreneurship Development • Types of small scale industries (SSI) • stages in starting SSI • Qualities required to be Entrepreneur, • Government policies for SSI • Problems of SSI, • Feasibility Report writing, • Industrial Safety, • Management Information System.	**06 Hrs**

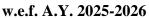**Course Outcomes (COs):** After successful completion of the course, students will be able to:

CO	Statements
218.1	State various concepts and principles of management.
218.2	Apply various functions of management to real life scenarios.
218.3	Know Production and marketing functional area of management.
218.4	Understand Small Scale Industry and entrepreneurship development.

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
218.1	1	1	2	2	-	-	-	-	-	-	-	1	-	-
218.2	3	1	2	2	-	-	-	-	-	-	-	1	-	-
218.3	2	1	2	2	-	-	-	-	-	-	-	1	2	-
218.4	2	1	2	2	-	-	-	-	-	-	-	2	2	-

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Industrial Management and Operation Research	6th	Nandkumar Hukeri	Electrotech Publication.	2014
2	Industrial Engineering and Management	2nd	O.P. Khanna	Dhanpat Rai Publications, Delhi.	2018

Reference Books:

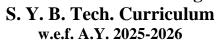| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Essentials of Management: An International Perspective	8th	Koontz. H. and Weihrich. H	Tata McGraw-Hill, New Delhi	2010
2	Management, Today – Principles and Practice	1st	Gene Burton and Manab Thakur,	Tata McGraw Hill Publishing Company, New Delhi.	2002
3	Business Management	4th	J.P.Bose, S. Talukdar,	New Central Agencies (P) Ltd.	2009

Useful Link /Web Resources:

1. https://archive.nptel.ac.in/courses/110/107/110107150/
2. https://nptel.ac.in/courses/122108038
3. https://archive.nptel.ac.in/courses/110/106/110106157/

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Course Title: Finishing School Training III	
Course Code: ME24-219	**Semester: III**
Teaching Scheme: L-T-P: 3-0-0	**Credits: Audit**
Evaluation Scheme: GRADE	**ESE Marks: GRADE**

Prior Knowledge of:	Mathematics, Logical

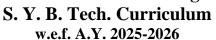### Course Objectives:

1.	To develop strong quantitative aptitude and problem-solving skills for various competitive and placement exams.
2.	To enhance logical reasoning and critical thinking abilities for effective decision-making.
3	To improve verbal aptitude, reading comprehension, and advanced grammar for effective communication.
4.	To train students in data interpretation techniques for analyzing and understanding numerical data.

Curriculum Details

Course Contents	Duration
UNIT I: Aptitude Training **A) Quantitative Aptitude**: Arithmetic, Algebra & Calculus, Geometry & Mensuration, Probability & Statistics.	**15 hours**
B) Logical Reasoning: Puzzles, Series & Sequences, Blood Relations, Coding-Decoding, Logical Deduction.	**15 hours**
C) Data Interpretation: Bar Graphs, Pie Charts, Line Graphs, Tables.	**10 hours**
UNIT II: Revision **A) Mock Tests & Assessments**: Practice tests for Aptitude and Verbal. **B) Review Sessions**: Doubt Clearing Sessions, recap of key concepts.	**8 Hrs**

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Course Outcomes (COs): Upon successful completion of this course, students will be able to:

CO	Statements
219.1	Apply advanced mathematical concepts such as arithmetic, algebra, calculus, probability, and statistics in problem-solving.
219.2	Solve complex logical reasoning problems, including puzzles, coding-decoding, and logical deductions.
219.3	Interpret and analyze data using bar graphs, pie charts, line graphs, and tables.
219.4	Successfully attempt mock tests and assessments to gauge their readiness for competitive exams and placements.
219.5	Clarify doubts and reinforce learning through review sessions and concept recaps.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
219.1	2	3	2	-	-	-	-	-	-	-	-	-	-	-
219.2	2	3	2	-	-	-	-	-	-	-	-	-	-	-
219.3	2	3	2	-	-	-	-	-	-	-	-	-	-	-
219.4	2	3	2	-	-	-	-	-	-	-	-	-	-	-
219.5	2	2	2	-	-	-	-	-	-	-	-	-	-	-

Useful Link /Web Resources:

www.campuscredentials.com

www.prepcrazy.com

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Course Title: Strength of Materials	
Course Code: ME24-221	**Semester: IV**
Teaching Scheme: L-T-P: 3-0-0	**Credits: 3**
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks), ISE-II (10 marks)	**ESE : 50 Marks**

Prior Knowledge of:	Engineering Mechanics

Course Objectives:

1.	To study different type of stresses and also see the how to find out that stresses.
2.	To study shear force and bending moment distribution for different types of loads and support conditions.
3	To study the distribution of various stresses and deformation in mechanical elements and also study the effect of component dimensions and shape on stresses and deformations
4.	To study the buckling, and strain energy effect in mechanical elements.

Curriculum Details

Course Contents	Duration
Unit I Stresses and Strains: Concept of Stress and Strain, (Linear, Lateral, Shear and Volumetric), Hooke's Law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Stress-strain diagram for ductile and brittle material, Factor of safety, Normal and shear stresses, Thermal Stresses, Inter-relationship between elastic constants. Tensile test on UTM machine.	**06 Hrs**

UNIT II: Torsion, Shear Force and Bending Moment Diagram
   A) Torsion: Introduction to Torsion, Basic assumptions, Torsion formula, Hollow and solid circular shafts, Angular deflection.
 	
   B) Shear Force and Bending Moment Diagram: Concept and definition of shear force and bending moment in determinate beams (Simply supported, cantilever and overhanging) due to concentrated, UDL, UVL and Couple.
	09 Hrs

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UNIT III: Bending Stresses and Shear Stresses
  A) Bending Stresses: Symmetric pure bending of beams, Flexure formula, moment of resistance of cross-sections, Simple built-up section, Design of rectangular and circular(solid and hollow) sections; L, I and T sections.
  B) Shear Stresses: Distribution of shear stresses in beams of various commonly used sections such as circular, L, I, and T .
	07 Hrs

UNIT IV: Principal Stresses and Strains Normal and shear stresses on any oblique planes, Concept of Principal planes, Derivation of expression for Principal stresses and maximum shear stress, Positions of principal planes and planes of maximum shear, Graphical solutions using Mohr's circle of stresses.	**09 Hrs**
UNIT V: Deflection of Beams Strain curvature and moment curvature relation, Solution of beam deflection problem by Double integration method, Area moment method. (Simply Supported Beam and Cantilever.)	**07 Hrs**

UNIT VI: Columns and Energy Methods
  A) Columns: Euler's formula for different end connections, Concept of equivalent length, Eccentric loading, Rankine formula.
  B) Energy Methods: Concept of strain energy, Resilience, Proof resilience, Modulus of resilience, derivation for deformation of axially loaded members under gradual, sudden and impact loads.
	07 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

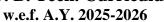| CO	Statements
221.1	Apply the concept of analysis of mechanical elements & Determine the stresses in Components, Principal Stresses, maximum shear stress & their orientations using analytical method and Graphical Method.
221.2	Draw shear force and bending moment diagrams for simple beams subjected to various loads and support conditions.
221.3	Compute and analyze bending stresses and shear stresses & the effect of deflection in beams.
221.4	Evaluate buckling and strain energy in beams subject to various types of loading.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
221.1	3	3	3	2	1	-	-	-	-	-	-	-	1	1
221.2	2	3	3	3	2	-	-	-	-	-	-	-	1	1
221.3	3	3	3	3	2	-	-	-	-	-	-	-	2	1
221.4	2	3	3	3	2	-	-	-	-	-	-	-	1	1

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Strength of Materials"	11th	S. Ramamruthum	DhanpatRai and Sons	2022
2	"Strength of Materials"	6th	R.K. Rajput	S Chand	2016
3	"Strength of Materials"	5th	R. K. Bansal	Laxmi Publication	2014
4	"Strength of Materials"	1st	Khurmi Gupta	S Chand	2013

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Strength of Materials"	1st	Beer and Johnson.	CBS Publication	2003
2	"Strength of Materials"	2nd	Nag and Chanda	Willey India Publication	2008

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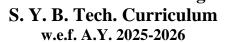**Department of Mechanical Engineering**
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Course Title : Dynamics of Machines	
Course Code: ME24-222	**Semester:-IV**
Teaching Scheme: L-T-P : 3-0-0	**Credits : 03**
Evaluation Scheme: ISE-I (10 Marks), MSE (30 Marks), ISE-II (10 Marks)	**ESE : 50 Marks**

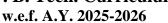| **Prior Knowledge of:**	Understanding the study of forces and motion within a mechanical system

Course Objectives:

1.	Acquire the fundamentals of gear train calculations and gyroscopes.
2.	Attain the knowledge of Inertia force analysis and flywheels.
3.	Acquire knowledge in balancing of rotating and reciprocating masses.
4	Gain knowledge of basics of vibration.

Curriculum Details

Course Contents	Duration
1.Friction Introduction, Types of Friction, Laws of Static Friction, Laws of Fluid Friction, Coefficient of Friction, Limiting Angle of Friction, Angle of Repose, Friction of a Body Lying on a Rough horizontal Plane, Friction of a Body Lying on a Rough Inclined Plane, Friction in vehicle.	**7 Hrs**
2.Gyroscope Gyroscopic couple and its effect on two wheeler, four wheeler vehicles, aero plane, and ship moving in a curved path.	**7 Hrs**
3.Balancing Dynamics of rotating bodies, unbalance effects, Balancing of inertia forces, unbalance in Single cylinder engine, unbalance in Multi cylinder-In-line and Radial Engines.	**7 Hrs**
4.Flywheel Rimmed flywheel, Turning moment diagram for single and multi-cylinder Internal combustion engine, Coefficient of fluctuation of speed. Coefficient of fluctuation of energy.	**6 Hrs**

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Course Contents	Duration
5 Fundamentals of vibration Vibration and oscillation, Causes and effects of vibrations, Vibration parameters – spring, mass, damper, Motion – periodic, non-periodic, harmonic, non- harmonic, Degree of freedom, Static equilibrium position, Vibration classification	**7 Hrs**
6. Vibration Measuring Instruments Instruments for measurement of displacement, velocity, acceleration and frequency of Vibration, Exciters FFT analyzer. Introduction to Condition Monitoring and Fault Diagnosis.	**8 Hrs**

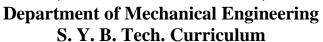**Course Outcomes (COs):** After successful completion of the course, students will be able to:

COs	Statement
222.1	Calculate speed and power of various drive systems.
222.2	Analyze effect of change in angular momentum in various applications using gyroscope.
222.3	Solve problems on balancing of rotary and reciprocating masses to reduce vibration.
222.4	Analyze effect of flywheel on speed and energy fluctuation in engine.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
222.1	2	-	-	-	-	-	-	-	-	-	-	1	2	-
222.2	2	1	-	1	2	2	-	-	-	-	1	-	2	-
222.3	3	-	-	1	2	2	-	-	-	-	1	-	2	-
222.4	3	-	-	1		1	-	-	-	-	-	-	2	-

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Suggested Learning Resources:

Text Books:

Sr. No	Title	Author(s)	Publisher
01	Theory of Machines	S.S Ratan	Tata McGraw Hill New Delhi.
02	Theory of Machines	P. L. Ballany	Khanna Publication, New Delhi
03	Theory of Machines	V. P. Singh	Dhanpatrai Publications, New Delhi.
04	Theory of Machines	R.S.Khurmi	S. Chand & Company ltd.Pune

Reference Books:

Sr. No	Title	Author(s)	Publisher
01	Theory of Machines	Thomas Bevan	CBS Publishers, New Delhi.
02	Theory of mechanism and machines	Sadhu Singh	Pearson, Chennai
03	Mechanism and Machines	Gosh and Mallik	East West Press, Chennai
04	Theory of mechanisms and machines	Jagdish Lal	Metropolitan book, New Delhi.

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Course Title : Dynamics of Machines Practical	
Course Code: ME24-222P	**Semester:- IV**
Teaching Scheme: L-T-P : 0-0-2	**Credits : 1**
Evaluation Scheme: INT(25 Marks)	**POE : 25 Marks**

Prior Knowledge of:	Understanding the study of forces and motion within a mechanical system

Course Objectives:

1.	Acquire formal procedures to compute number of teeth in gear train & generate tooth profile.
2.	Gain knowledge of gyroscopic couple and M.I. of system.
3.	Obtain key technical skills to perform balancing of masses and vibration measurement.
4	Gain knowledge of logarithmic decrement of system and whirling speeds of shafts.

List of Practicals

Practical No	Title of Experiments	Duration
01	Experiment on Gyroscope.	2Hrs.
02	Determination of M.I. by pendulum,	2Hrs.
03	Determination of M.I. of bi- filler suspension, Tri-filler suspension.	2Hrs.
04	Experiment on equivalent spring mass system.	2Hrs.
05	Demonstration of vibration measurement instrument.	2Hrs.
06	Determination of logarithmic decrement.	2Hrs.
07	Determination of natural frequency of system.	2Hrs.
08	Introduction to FFT analyzer, and prediction of spectral response of vibrating machine from workshop.	2Hrs.
09	Forced vibration characteristics- air &water damping	2Hrs.
10	Forced vibration characteristics- oil damping	2Hrs.

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Course Outcomes (COs): After successful completion of the course, students will be able to:

COs	Statement
222.1	Analyze effect of gyroscope to calculate gyroscopic couple.
222.2	Demonstrate balancing of an unbalanced rotary and reciprocating mass system to reduce vibration.
222.3	Calculate moment of inertia, logarithmic decrement of a particular system and critical speeds of shafts.
222.4	Perform the experiment individually and interpret the results.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
222.1	2	-	-	-	-	-	-	-	-	-	-	1	2	-
222.2	2	1	-	1	2	2	-	-	-	1	-	-	2	-
222.3	3	-	-	1	2	2	-	-	-	1	-	-	2	-
222.4	3	-	-	1		1	-	-	-	-	-	-	-	-

Text Books:

Sr. No	Title	Author(s)	Publisher
01	Theory of Machines,	Ratan S.S	Tata McGraw Hill New Delhi.
02	Theory of Machines	P.L.Ballany	Khanna Publication, New Delhi
03	Theory of Machines	V.P. Singh	Dhanpatrai Publications , Delhi
04	Theory of Machines I and II	Phakatkar	Nirali Publication, Pune

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Reference Books:

Sr. No	Title	Author(s)	Publisher
01	Theory of Machines	Thomas Bevan	CBS Publishers, New Delhi.
02	Theory of mechanism and machines	Sadhu Singh	Pearson, Delhi
03	Mechanism and Machines	Gosh And Mallik	East West Press
04	Theory of machines	Dr. R.K. Bansal	Laxmi Publication

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Course Title : Applied Thermodynamics	
Course Code: ME24-223	Semester: -- IV
Teaching Scheme L-T-P : 2-0-0	Credits : 02
Evaluation Scheme : ISE-I (10 marks), ISE-II (10 marks)	ESE : 30 marks

Prior Knowledge of:	1. Fundamental concepts of physics like Volume, Pressure, Velocity, Work ,Energy
	2. Concepts of mathematics like derivative, integration , nature of curves , slope of curve
	3. Construction and working of common mechanical devices / machines are essential

Course Objectives:

1.	To introduce student about basic physics and chemistry behind thermodynamics.
2.	To study basic concepts of thermodynamics and its applications.
3.	To study application of first and second law of thermodynamics to various thermodynamic devices like Steam generator, Condenser, Nozzles and Turbines**.**

Curriculum Details

Course Contents	Duration
Unit-I Review of Laws of Thermodynamics: Introduction, Laws of thermodynamics- Zeroth law, first law and second law of thermodynamics and third law. Steady flow energy equations and applied to typical mechanical devices like boiler ,turbines, condenser, compressors, pumps Equivalence of Second law Simple Numerical treatment second law of Thermodynamics (Heat engine, Refrigerator and Heat Pump), Entropy, Increase of entropy principle, Calculation of entropy changes of gases,(numerical treatment should be based on single Thermodynamic process),Introduction to availability Definition-Available Energy, Unavailable Energy, Dead State	**07**
Unit-II Pure substance and Vapour Power Cycles Properties of pure substance, Use of steam table and Mollier chart, temperature	**07**

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Course Contents	Duration
Entropy Diagram Carnot cycle using steam, Limitations of Carnot cycle Rankine cycle, Representation on P-V, T- S and h-s planes, Thermal efficiency, Specific steam consumption. Work ratio, Effect of steam supply pressure and temperature, Condenser pressure on the performance. (Numerical Treatment), Reheat and regenerative steam power cycles.	
Unit-III Steam Nozzles Functions, Shapes, Critical pressure ratio, Maximum discharge condition, Effect of faction, Design of throat and exit areas, Nozzle efficiency, Velocity coefficient, Coefficient of discharge, Supersaturated flow, Degree of under-cooling and degree of super saturation, Effects of super saturation(Numerical Treatment on nozzle without friction)	**06**
Unit IV Steam Turbine Principles of operation, Classification, Impulse and reaction steam turbine, compounding of steam turbines. Flow through impulse turbine blades, Velocity diagrams, Work done, Efficiencies, End thrust, Blade friction,.(Numerical Treatment on Single stage impulse turbine) Comparison between impulse and reaction, Flow through impulse reaction blades, turbine Velocity diagram, and degree of reaction, Parson's reaction turbine, governing of steam turbines. Losses in steam turbines, Performance of steam turbines. (Numerical Treatment on Single stage impulse reaction turbine)	**08**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
223.1	Remember the fundamental laws of thermodynamics
223.2	Explain components and working of steam power plant and solve problems on Rankine cycle
223.3	Understand and Solve the introductory problems on Nozzle
223.4	Classify and solve the problems of steam turbine

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Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
223.1	2	3	3	1	-	-	-	-	-	-	-	-	-	-
223.2	2	3	-	-	-	-	-	-	-	-	-	-	-	-
223.3	2	3	3	2	1	-	-	-	-	-	-	-	-	-
223.4	2	1	-	-	3	-	-	-		-	-	-	-	-

Suggested Learning Resources:

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Thermal Engineering	1st	M.M.Rathod,	Tata McGraw Hill Education Pvt.Ltd,	2010
2	Engineering Thermodynamics	4th	Dr.P.K.Nag	Tata McGraw Hill, New Delhi	2014
3	Thermal Engineering	3rd	R. K. Rajput	Laxmi Publications New Delhi	2013
4	Steam and Gas Turbines	2nd	R. Yadav	CPH Allahabad	2005

Reference Books:

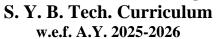| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Fundamentals of Thermodynamics	3rd	Claus Borgnakke, Sonntag R. E	John Wiley and Sons	2011
2	Thermodynamics: an Engineering Approach	3rd	Cengel and Boles	Tata McGraw-Hill, New Delhi	

Useful Link /Web Resources:
1. DELNET- http://www.delnet.in
2. NDL-http://ndl.iitkgp.ac.in
3. N-LIST- http://www.nlist.inflib.ac.in

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Course Title: Applied Thermodynamics Practical	
Course Code : ME223P	**Semester: IV**
Teaching Scheme: L-T-P: 0-0-2	**Credit : 01**
Evaluation Scheme: INT:25 Marks	**POE: 25 Marks**

Prior Knowledge of:	Basic Science, Basics of Thermodynamics

Course Objectives:

1.	To study types of boilers, mounting ,accessories and condensers
2.	To know the different properties of lubricants

List of Experiments-

Exp. No	Title of Experiments	Duration
01	Study and Demonstration of water tube and fire tube boilers.	4hrs
02	Study and Demonstration of boiler mountings, Accessories	4hrs
03	Study and Demonstration of condenser and study of cooling towers	4hrs
04	Test on Grease penetrometer and dropping point apparatus	2hrs
05	Determination of flash and fire point of a lubricating oil	2hrs
06	Test on Carbon residue, Cloud and Pour point apparatus.	2hrs
07	Determination of flash and fire point of a lubricating oil	2hrs
08	Industrial visit to a steam power plant and report of visit	2hrs
09	Demonstration of vapour compression refrigeration system	2hrs
10	Demonstration of heat pump	2hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
223P.1	Classify and demonstrate the boilers and condensers
223P.2	Understand the significance of lubricant properties and select lubricants for different applications.
223P.3	Identify stem power plant main components

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

PO's COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
223P.1	2	3	1	-	-	-	-	-	-	-	-	-	-	-
223P.2	2	3	-	-	--	-	-	-	-	-	-	-	-	-
223P.3	4	1	3	-	-	-	-	-	-	-	-	-	-	-

Suggested Learning Resources: --
Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Thermal Engineering	1st	M.M.Rathod,	Tata McGraw Hill Education Pvt.Ltd,	2010
2	Thermal Engineering	3rd	R. K. Rajput	Laxmi Publications New Delhi	2013

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Fundamentals of Thermodynamics	3rd	Claus Borgnakke, Sonntag R. E	John Wiley and Sons	2011

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Course Title : --Automobile System II	
Course Code: -- ME24-224-MDM2	**Semester: -- IV**
Teaching Scheme L-T-P : 2-0-0	**Credits : 02**
Evaluation Scheme ISE-I (10 Marks), ISE-II (10 Marks), INT(30 Marks)	**ESE : --**

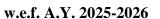| **Prior Knowledge of:**	Basic science, Mechanical linkages

Course Objectives:

1.	To know working of I.C. Engines
2.	Attain knowledge about suspension system
3.	Attain knowledge about electrical and electronic systems
4.	To know about accessories of automobile

Curriculum Details

Course Contents	Duration
Unit I- Power System Classification of I. C. Engines, Selection of IC Engine for automobiles, Engine specifications,BS-6 engine **Engine systems S.I engine-** Fuel supply, Carburetor, Electronic Petrol injection system (MPFI) – components such as sensors, ECU etc., merits and demerits **C.I engine-** Individual pump, Common rail and Distributor systems, Electronic diesel injection system,. Electronic management system	**07**
Unit-II Suspension system- Functions, Sprung and un sprung mass, Types of suspension linkages, types of spring - leaf, coil, air springs, telescopic shock absorber, hydro gas suspension, rubber suspension, Air suspension	**07**
Unit- Electrical and Electronic Systems-I Automotive batteries - lead acid batteries, Advances in batteries ,battery charging system, alternators, principle and operation of cut-out and regulators, starting systems of automobile,	**07**
Unit-IV Electrical and Electronic Systems-II Llighting and electrical accessories, automobile air conditioning, panel board	**06**

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Course Contents	Duration
instruments. Electronic Controlled Management (ECM) Systems, Automobile wiring. Sensors used in automobile, Cruise Control (ACC), Electronic Stability Program (ESP), Traction Control System (TCS).	

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
224.1	Understand and explain the working of I.C Engines as a power plant of automobile.
224.2	Explain the suspension systems of automobile
224.3	Understand and explain charging and starting systems of automobile
224.4	Explain electric systems , accessories and controls of automobile

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs / COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
224.1	2	2	1	3	--	--	--	--	--	--	--	--	1	--
224.2	2	1	1	3	--	--	--	--	1	--	--	--	--	1
224.3	2	1	1	3	--	--	--	--	--	--	--	--	--	1
224.4	2	1	1	2	3	--	--	--	1	--	--	--	1	--

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Automobile Engineering	14th	Dr. Kripal Singh	Standard Publishers and Distributers Delhi	2017
2	Automobile Engineering	8th	G.B.Narang	Khanna Publication	2018
3	Automobile Electrical Equipment"	1st	P.L.Kohali	Technical EducationSeries	

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Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Automotive Safety Handbook	2nd	Ulrich Seiffert and LotharWech	SAE Publications	2007
2	Automotive Vehicle Safety	1st	George Pieters Barbara Pieters	Taylor & Francis	2003
3	Automotive Handbook	9th	Bosch	SAE Publications	2014

Useful Link /Web Resources:

1. DELNET- http://www.delnet.in

2. NDL-http://ndl.iitkgp.ac.in

3. N-LIST- http://www.nlist.inflib.ac.in

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Course Title: Environmental Studies	
Course Code: ME24-225	Semester: IV
Teaching Scheme: L-T-P: 2-0-0	Credits: 2
Evaluation Scheme: - ISE 1:(10Marks), ISE2:(10 Marks), INT: (30Marks)	ESE : --

Prior Knowledge of:	This course is imparting fundamental knowledge and awareness of Environmental Studies among students and importance of conservation of environment.

Course Objectives:

1.	Study scope and importance of natural resources, ecosystems, biodiversity for creating awareness and their conservation in multiple disciplines.
2.	Learn various types of pollution, their impacts and control measures for minimizing pollution and sustainable development.
3	Understand social issues related to the environment, environmental ethics and human rights towards the environment.
4.	Study various laws and regulations related to environment and its applicability in society and industries.

Curriculum Details

Course Contents	Duration
UNIT I: Nature of Environmental Studies: • Definition, scope and importance. Multidisciplinary nature of environmental studies. Need for public awareness.	02 Hrs
UNIT II: Natural Resources and Associated Problems • Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people. • Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems. • Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources. • Food resources: World food problem, changes caused by effect of modern agriculture, fertilizer-pesticide problems. • Energy resources: Growing energy needs, renewable and nonrenewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.	05Hrs

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• Land resources: Solar energy, Biomass energy, Nuclear energy, Land as a resource, land degradation, man induced landslides, soil erosion and desertification. • Role of individuals in conservation of natural resources	
UNIT III: Ecosystems • Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. • Types, characteristics features, structure and function of **any one** of the following ecosystem :- 　　a) Forest ecosystem, 　　b) Grassland ecosystem 　　c) Desert ecosystem 　　d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, Estuaries).	**05 Hrs**
UNIT IV: Introduction and Value of biodiversity • Definition, types of biodiversity, consumptive use, productive use, social, ethical, aesthetic and option values. • India as a mega diversity nation. • Ghats as a biodiversity region. Hot-spot of biodiversity. Threats to biodiversity. • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.	**05 Hrs**
UNIT V: Environmental Pollution & Social Issues • Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards • Role of an individual in prevention of pollution) • Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. • Environmental ethics: Issue and possible solutions. Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation.	**08 Hrs**
UNIT VI: : Environmental Protection • Environmental Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and control of Pollution) Act. • Wildlife Protection Act. • Forest Conservation Act., Population Growth and Human Health	**05 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
225.1	Summarize natural resources, importance of ecosystem and conservation of biodiversity with respect to multiple disciplines
225.2	Explain causes, effects, solutions for various pollution problems and its minimization strategies.
225.3	Interpret environmental ethics and their implementation for betterment of environment and human life.
225.4	Outline the requirements of laws and regulations for environmental conservation and applicability of legislations in society and industries.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
225.1	2	-	-	3	-	-	3	-	3	3	-	3	-	-
225.2	2	-	-	3	-	-	3	-	3	3	-	3	-	-
225.3	2	-	-	3	-	-	3	3	3	3	-	3	-	-
225.4	2	-	-	3	-	-	3	3	3	3	-	3	-	-

Text Books:

Sr. No	Title	Author(s)	Publisher
1	Environmental Studies	Dr. P.D.Raut	Shivaji University

Reference Books:

Sr. No	Title	Author(s)	Publisher
1.	Environmental Science	Miller T.G. Jr	Wadsworth Publications
2.	Fundamentals of Ecology	Odum, E.P	W.B. Saunders
3.	Handbook of Environmental Laws	Trivedi R.K	Environmental Media

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Course Title: Engineering Economics	
Course Code:ME24-226	Semester:IV
Teaching Scheme: L-T-P:2-0-0	Credits:2
Evaluation Scheme: --	ESE: 50 Marks

Prior Knowledge of:	Basic knowledge of Mathematics, Statistics.

Course Objectives:

1.	To introduce the students about engineering economics
2.	To understand production function and pricing practices
3	To understand capital budgeting and business cycles
4.	To understand market structure, price determination under various market situations

Curriculum Details

Course Contents	Duration
Unit-I :Introduction to Engineering Economics Definition, features and Scope of Engineerng Economics – types and determinants of Demand – Law of Demand –Elasticity of Demand – Price, Income and Cross elasticity of demand – Concept and methods of demand forecasting	**08Hrs**
Unit-II : Production, Cost and Revenue Analysis Nature and features of production function – Cobb Douglas Production function and its features – Law of variable proportion and Returns to Scale – Least cost factor combination – Cost concepts and its types – Short run and Long run cost curves – Revenue curves under different market structure	**08Hrs**
Unit-III :Market Structure and Pricing Practices Classification of Market Structure – Price and Output determination under Monopolistic competition (simple numerical)– Characteristics of Oligopoly – Kinked Demand curve – Price Leadership - Pricing Practices: Cost Plus Pricing-Multi Product Pricing - Dumping	**07 Hrs**
Unit-IV Capital Budgeting Business Cycles Concept and significance of capital budgeting – Methods of capital budgeting (simple numerical): NPV – IRR – ARR Concept and phrases of Business cycle: Hicks theory – Schumpeter's theory	**07 Hrs**

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
226.1	Apply concept of elasticity of demand and demand forecasting
226.2	Understand production cost and revenue of the business organization
226.3	Understand the product pricing system in different markets
226.4	Understand investment appraisal and capital budgeting

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
226.1	1	3	2	1	-	-	-	-	-	-	-	1	-	-
226.2	2	3	2	-	-	-	-	-	-	-	-	1	-	-
226.3	3	3	2	-	-	-	-	-	-	-	-	1	-	-
226.4	3	3	2	-	-	-	-	-	-	-	-	1	-	-

Text Books:

Sr. No	Title	Author(s)	Publisher
1	Managerial Economics-Analysis and Problems	Mehata P. L.	Himalaya Publishing House, Mumbai
2	Managerial Economics,	Gupta G. S	McGraw Hill Education , New York, NY USA

Reference Books:

Sr. No	Title	Author(s)	Publisher
1	Managerial Economics	Dwivedi D. N.	Vikas Publishing House Pvt. Ltd. New Delh
2	Managerial economics text, Problem and Cases	Varshney R. L. and Maheshwari K.L.	Sultan Chand and Sons, Educational Publishers, New Delhi

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Course Title: Basics of Finance	
Course Code:ME24-227	Semester:IV
Teaching Scheme: L-T-P:2-0-0	Credits:2
Evaluation Scheme: ISE-I (10 marks), MSE (30 marks),ISE-II (10 marks)	ESE Marks:--

Prior Knowledge of:	Basic knowledge of Mathematics

Course Objectives:

1.	Understand the capital management, reserves, and surplus in finance
2.	To analyse financial statements using various tools
3	To understand cost accounting principles,
4.	To understand GST structure

Curriculum Details

Course Contents	Duration
Unit-I : Introduction to capital, reserves and surplus • Definition of capital, capital types, equity capital: common stock and preference shares, debt capital: bond, debentures and loans, sources of finance- internal and external sources. Short term financing, bank loans, take credit, long term financing- equity shares, debentures, venture capital • Reserves- purpose, importance, types, revenue reserves, • Surplus- definition and utilization strategies	**08 Hrs**
Unit-II : Analysis of Financial Statements • Financial Statements analysis- definition, objectives, limitations • Tools of financial statement analysis, balance sheet, vertical balance sheet (Simple Numerical), comparative statement, Common sized statements: introduction, methods and steps for preparation. • Cash flow statement : Importance, steps for preparation and use. • Accounting ratios- Definition, objectives, classification.	**08 Hrs**
Unit-III : Cost Accounting • Cost Accounting- definition, scope, objectives and importance of cost	**07 Hrs**

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accounting, relation with management accounting and financial accounting • Elements of costs- direct cost vs. indirect cost, material cost vs labour cost, overhead cost, • Cost types- variable cost, fixed cost, semi variable cost, prime cost, factory cost • Total cost and selling price- calculation and analysis, • Process cost and production cost- concept, application, equivalent units calculation, production cost, cost control: controlling overhead cost, labour cost etc.	
Unit-IV Goods and service Tax (GST) • Definition, overview of GST, History, Background and evolution of GST,ojectives and benefits of GST implementation, Structure and components of GST • GST Types- central goods and service tax (CGST), state goods and service tax(SGST), integrated goods and service tax (IGST)**.** • GST registration and compliance: mandatory and voluntary GST registration, GSTIN GST identification number, filing of GST returns and compliance requirement. • GST rates and classifications.Future trends in GST: Recent ammendments and updates in GST laws, impact of GST on business and economy.	**07 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
227.1	Understand capital, its types and reserves
227.2	Draw and analyse financial statements
227.3	Understand industrial costs and its types
227.4	Understands GST

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POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
227.1	1	3	2	1	-	-	-	-	-	-	-	1	-	-
227.2	2	3	2	-	-	-	-	-	-	-	-	1	-	-
227.3	3	3	2	-	-	-	-	-	-	-	-	1	-	-
227.4	3	3	2	-	-	-	-	-	-	-	-	1	-	-

Text Books:

Sr. No	Title	Author(s)	Publisher
1	Financial Management: Theory and Practice	Prasanna Chandra	McGraw Hill Publication, 11th edition
2	Cost accounting : Principles and practice	M.N. Arora	Vikas Publishing House, 13th Edition
3	GST: A practical Approach	Vandana Bandgar, Yogendra Bandgar	Aadhya Prakashan PVT. Ltd. 1 ED 2017.

Reference Books:

Sr. No	Title	Author(s)	Publisher
1	Financial Management	Rajiv Srivastava, Anil Misra,	Oxford University Press
2	Business, Psychology and Organizational Behaviour	Eugene McKenna	
3	GST made easy`	S.P.Gupta Mahesh Gour,	S.Chand & Co. Ltd.

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Course Title: Enterprise Resource planning	
Course Code: ME24-228B-OE2	Semester: IV
Teaching Scheme: L-T-P: 2-0-0	Credits: 2
Evaluation Scheme: ISE-I (10 marks), ISE-II (10 marks)	ESE: 30 Marks

Prior Knowledge of:	Knowledge of basic mechanical engineering, workshop practice, engineering materials

Course Objectives:

1.	Know the basics, evolution , importance of ERP.
2.	Correlate ERP and related technology.
3	Understand manufacturing perspectives of ERP.
4.	Know business modules of ERP.
5.	Understand the key implementation issues and some popular products in ERP
6.	Understand implementation of ERP package.

Curriculum Details

Course Contents	Duration
UNIT I: Introduction to ERP Introduction, Evolution, Reasons for the growth of ERP market, Advantages, Reasons for failure of ERP. Benefits of ERP-Reduction of lead time, On time shipment, Reduction in cycle time, Improved resource utilization, Better customer satisfaction, Input supplier performance.	07 Hrs
UNIT II: ERP and Related Technologies Data warehousing, Data mining, Business Process Reengineering (BPR), Management Information System (MIS), Supply Chain Management (SCM), Decision Support System (DSS),Executive Information System (EIS),Customer relationship management (CRM)	07 Hrs
UNITIII: **ERP Modules** Introduction and study of Business modules like Finance, Mfg. and Production, HR,	07Hrs

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Plant maintenance, Quality and Material Management, Sales and Distribution.	
UNIT IV: ERP Implementation Life Cycle Introduction, Pre-evaluation Screening, Package evaluation, Project planning, Gap Analysis, Reengineering, Configuration, Team training, Testing, End user training and Post-implementation phases, Expanding ERP boundaries, Service oriented architecture, Enterprises application integration.	**07 Hrs**

Course Outcomes (COs): After successful completion of the course, students will be able to:

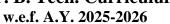| CO	Statements
228.1	Understand the structure of an ERP system and know how process chains in Materials management, production, controlling and sales are implemented in an ERP system
228.2	Implementation and customize an ERP system using the appropriate modeling methods,that are Entity Relationship Modeling (ERM) and Event-Driven Process Chains (EPC)
228.3	Understand the customization of an ERP system and customize essential parts of materials management, production, controlling and sales in SAP ECC
228.4	Understand what to expect, and not to expect, from a consultant implementing an ERP system

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
228.1	2	3	2	2	2	1	-	-	-	-	-	-	2	2
228.2	2	3	2	2	2	1	-	-	-	-	-	-	1	1
228.3	3	2	2	2	1	-	-	-	-	-	-	-	1	-
228.4	3	2	2	1	1	-	-	-	-	-	-	-	1	-

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Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Entrepreneurship	1st	Mr. Arya Kumar	Pearson, Delhi	2012

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Entrepreneurship Development – Small Business Enterprises	1st	Mrs. Poornima M.CH	Pearson, Delhi	2009
2	Entrepreneurship and Innovation	2nd	Mr. Michael H. Morris, ET. al.,	Cen gage Learning, New Delhi,	2011
3	Management and Entrepreneurship	1st	Mr. KanishkaBedi	Oxford University Press, Delhi	2009

Useful Link /Web Resources:

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Course Title: Testing & Measurement Practical	
Course Code: ME24-229P	**Semester: IV**
Teaching Scheme: L-T-P: 0-0-2	**Credit: 01**
Evaluation Scheme: INT (25 marks)	**ESE Marks: --**

Prior Knowledge of:	Applied Thermodynamics, Fluid Mechanics, Applied Physics

Course Objectives:

1.	To gain knowledge of different types of measuring instruments for mechanical engineering
2.	To study and calibration of various measuring instruments

List of Experiments- Minimum 8 practical's need to perform from the following list

Exp. No	Title of Experiments	Duration
01	Study and assignment on generalized measurement system and characteristics of instruments.	02 Hrs
02	Study and assignment on sensing elements and transducers.	02 Hrs
03	Testing of mechanical pressure gauge by using dead weight pressure gauge tester	02 Hrs
04	Study and Measurement of fluid flow by using Rota meter/ Anemometer/ Turbine meter/ Target Meter.	02 Hrs
05	Study and Measurement of Angular speed by using Magnetic Pickup and Photoelectric Pickup/ Stroboscope.	02 Hrs
06	Study and Measurement of Temperature by using Thermocouple, RTD, Thermister/Pyrometer	02 Hrs
07	Study and Measurement of Displacement by using LVDT.	02 Hrs
08	8. Study and Measurement of Force and Torque by using Strain Gauges.	02 Hrs
09	9. Study and Measurement of Vacumm by using Mc-lead guage/ Pirani gauge	02 Hrs
10	10. Study of Vibrations testing by using Vibrometer.	02 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
229.1	Understand basic constriction of working of various instruments
229.2	Select the various of types of instruments for the measurement system

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

COs \ PO's	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
229.1	2	3	2	1	1	-	-	-	-	-	-	-	2	-
229.2	3	3	1	-	-	-	-	-	-	-	-	-	2	-

Text Books:

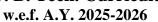| Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Mechanical Measurement	5th	Beckwith and Buck	Pearson Education Asia	2001
2	Mechanical Measurement and Control	4th	D.S. Kumar,	Metropolitan Book	2007

Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Measurement Systems	4th	DoebelinEmesto,	McGraw Hill International	1990
2	Mechanical Measurement and Control	12th	A.K. Sawhney and P. Sawhney	Dhanpat Rai	2010

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Course Title: Work Shop Practice Practical	
Course Code: ME24-230P	Semester: I
Teaching Scheme: L-T-P: 0-0-2	Credit: 01
Evaluation Scheme: INT (50 marks)	POE Marks: -

Prior Knowledge of:	Engineering Graphics, Fundamentals of Mechanical Engineering

Course Objectives:

1.	To study Machine layout, Installation of Machine Tools, Selection of Tools.
2.	To study Lathe Machine, Drilling Machine, Milling Machine. Shaping Machine
3	To study machining operations and prepare Job
4.	To study basics of CNC and VMC Machine

List of Experiments-

Exp. No	Title of Experiments	Duration
01	Study of Construction, Mechanism and Application of following machines Lathe Machine, Drilling Machine, Milling Machine, Shaping Machine.	02 Hrs
02	One Job of MS material; plain turning, taper turning, external threading and knurlingoperation with its process sheet.	02 Hrs
03	To manufacture the components as per the drawing requiring at least four of the following operations i) Milling, ii) Shaping, iii) Grinding, iv) Tapping, v) Internal threading vi) Boring vii) Slotting	06 Hrs
04	Introduction to CNC and VMC Machine.	06 Hrs
05	One Job on VMC.	04 Hrs
06	Machine layout, existing machine specifications, Installation procedure of Machine Tools.	02 Hrs
07	A visit report based on the industrial visit.	02 Hrs

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Course Outcomes (COs): After successful completion of the course, students will be able to:

CO	Statements
230.1	Understand Machine layout, method of Machine Tool installation, selection of Tools for various machining operation.
230.2	Understand Construction, Mechanism and Application of Lathe Machine, Drilling Machine, and Milling Machine, Shaping Machine.
230.3	Understand machining operations and prepare the Job.
230.4	Understand basics of CNC and VMC Machine

Course Articulation Matrix: Mapping of Course Outcomes (Cos) with Program Outcomes (PO's)

PO's COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
230.1	2	3	-	-	-	-	-	-	-	-	-	-	1	-
230.2	2	3	-	-	-	-	-	-	-	-	-	-	2	-
230.3	2	3	-	-	-	-	-	-	3		-	-	2	-
230.4	2	3	-	-	-	2	-	-	-	-	-	-	2	-

Text Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	"Manufacturing Technology"	3rd	P. N. Rao,	Tata McGraw-Hill	2009
2	Principles of Foundry Technology	2nd	P.L. Jain	Tata McGraw-Hill	2010
3	Foundry technology	17th	O. P. Khanna	Dhanapat Rai Publications	2013

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Reference Books:

Sr. No	Title	Edition	Author(s)	Publisher	Year
1	Principles of metal casting	3rd	Haineand Rosenthal	Tata McGraw-Hill Book	2013
2	"Workshop Technology	3rd	W.A.J.Chapman	CBS Publishing	2007
3	Machine Tools and Manufacturing Technology	7th	Steve F. Krar	Mario Rapisarda	2015

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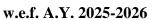**S. Y. B. Tech. Curriculum**
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Course Title: Finishing School Training IV	
Course Code: ME24-232	Semester: IV
Teaching Scheme: L-T-P: 3-0-0	Credits: AUDIT
Evaluation Scheme: GRADE	ESE Marks: GRADE

Prior Knowledge of:	English language, Basic Speaking Skills

Course Objectives:

1	To improve verbal aptitude, reading comprehension, and advanced grammar for effective communication.
2	To prepare students for group discussions by teaching the structure, importance, and strategies to excel.
3	To develop interview skills through resume building, mock interviews, and personalized feedback.
4	To assess students' readiness through mock tests and assessments.
5	To provide revision and doubt-clearing sessions for reinforcing key concepts.

Curriculum Details

Course Contents	Duration
UNIT I: Verbal Training Vocabulary, Critical Reasoning, Reading & Comprehension, Grammar	10 Hrs
UNIT II: Group Discussions & Personal Interviews (GDPI) **A) Group Discussions:** JAM sessions, Importance & Structure of GD, Strategies to excel in GD, Regular practice sessions of speaking skills with feedback. **B) Personal Interviews**: Life Skills, Resume Building, Run through the interview preparation tips, Feedback with practice sessions on life skills.	14 Hrs

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UNIT III: Revision A) **Mock Tests & Assessments**: Practice tests for Aptitude and Verbal. B) **Review Sessions**: Doubt Clearing Sessions, recap of key concepts.	**8 Hrs**

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

CO	Statements
231.1	Demonstrate strong verbal aptitude by effectively using advanced vocabulary, comprehension skills, and critical reasoning.
231.2	Participate confidently in group discussions by applying structured techniques and strategies.
231.3	Build a strong resume and perform well in personal interviews with professional preparation techniques.
231.4	Successfully attempt mock tests and assessments to gauge their readiness for competitive exams and placements.
231.5	Clarify doubts and reinforce learning through review sessions and concept recaps.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

POs COs	BTL	1	2	3	4	5	6	7	8	9	10	11	PSOs 1	PSOs 2
231.1	2	-	-	-	-	-	-	3	2	3	-	1	-	-
231.2	2	-	-	-	-	-	-	2	3	3	-	2	-	-
231.3	2	-	-	-	-	-	-	3	-	1	-	-	-	-
231.4	2	-	-	-	-	-	-	3	-	-	-	-	-	-
231.5	2	-	-	-	-	-	-	3	-	-	-	-	-	-

Useful Link /Web Resources:

www.campuscredentials.com

www.prepcrazy.com