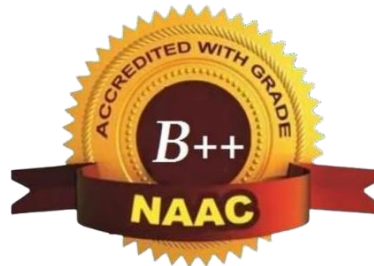


Shanti Education Society's

A. G. Patil Institute of Technology, Solapur.

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Second Year to Final Year B.Tech.

Mechanical Engineering

Structure & Curriculum

(w.e.f. A. Y. 2026-27)

As Per NEP 2020

Recommended in BOS (Mechanical Engineering)

Meeting dated: 22nd May 2026

**Recommended in BOS (Mechanical Engineering) Meeting
dated: 22nd May 2026**

Name Of BOS Member and Designation	Signature
Dr. Katikar N. S., Assistant Professor, WIT, Solapur	
Dr. Kamble P. G., Professor, P D A C E, Kalburagi	
Dr. Bewoor A. K., Professor, Cummins College of Engg., Pune	
Dr. Khandal S. V., Associate Professor, TKIET Warananagar, Kolhapur	
Er. Jeurkar S. A., Director, saj Consultancy Services	
Mr. Revankar Vijaykumar, Managing Director Tech.Mantra, Autodesk Learning Partner	

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Second Year to Final Year B.Tech.

Mechanical Engineering

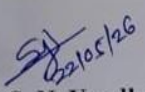
Structure & Curriculum

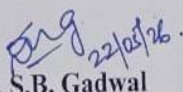
(w.e.f. A. Y. 2026-27)

As Per NEP 2020

Recommended in BOS (Mechanical Engineering)

Meeting dated: 22nd May 2026


Prof. S. N. Upadhe
Member Secretary
Academic Council


Dr. S.B. Gadwal
BOS chairman
(HOD Mech. Engg.)


Dr. V.V. Potdar
Principal



Second Year B. Tech. in Mechanical Engineering Semester-III (w.e.f. 2026-27)

Course Code	Course Category	Name of Course	Teaching Scheme			Scheme	Evaluation Scheme		Credit		
			L	T	P		Max. Marks	Min. % for passing			
25UGMEPC301	PCC	Engineering Thermodynamics	3	-	-	ISE	20	40	3		
							MSE			20	
							ESE			60	
							ISE	20	40	3	
25UGMEPC302		Fluid Mechanics	3	-	-	MSE	20				
						ESE	60				
						ISE	20	40	3		
25UGMEPC303		Material Science And Metallurgy	3	-	-	MSE	20				
						ESE	60				
	ISE					20	40	2			
25UGMEMD304	MDM -I	2	-	-	MSE	20					
					ESE	60					
					ISE	20	40	2			
25UGMEOE305 (A -E)	OE	Refer table	2	-	-	MSE			20		
						ESE			60		
						ISE	20	40	2		
25UGMEEE306	EEM	Entrepreneurship Development	2	-	-	ISE	50			20	2
25UGMEVE307	VEC	Universal Human Values	2	-	-	ISE	50			20	2
25UGMEPC308L (A-E)	PCC	OE Lab	-	-	2	ISE	50	20	1		
25UGMEPC309L		Fluid Mechanics Lab	-	-	2	ISE	30	20	1		
						ESE	20				
25UGMEPC310L		Material Science and Metallurgy Lab	-	-	2	ISE	30	20	1		
						ESE	20				
25UGMEVS311L	VSEC	MD Cad Lab	-	-	4	ISE	30	20	2		
						ESE	20				
Total			17	00	10	-	800	-	22		
	Total Credits								22		
	Total Marks								800		
	Total Contact Hr.								27		

ISE – In Semester Evaluation, ESE – End Semester Examination, MSE – Mid Semester Examination, L, T, P -Lecture, Tutorial,

Practical hours per week.

CUMULATIVE CREDITS: 42+22 = 64



List of Open Elective Courses

Course Code	Course Category	Course Code	Course Title
1	Open Elective I	25UGMEOE305A	Solid Waste & E-Waste Management
2		25UGMEOE305B	Fundamentals of Electrical Engineering
3		25UGMEOE305C	Organizational Behavior
4		25UGMEOE305D	Object Oriented Programming (C++)
5		25UGMEOE305E	Transform techniques and complex variables

List of Multidisciplinary Minor (MDM)-I Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD304	Manufacturing Processes



Semester-IV (w.e.f. 2026-27)

Course Code	Course Category	Name of Course	Teaching Scheme			Scheme	Evaluation Scheme		Credit
			L	T	P		Max. Marks	Min. % for passing	
25UGMEPC401	PCC	Strength of Materials	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC402		Metrology and Measurement	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC403		Manufacturing Processes-I	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEMD404	MDM	MDM-II	2	-	-	ISE	20	40	2
						MSE	20		
						ESE	60		
25UGMEOE405 (A-E)	OE	Refer Table	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEIK406	IKS	IKS	2	-	-	ISE	50	20	2
25UGMEAE407	AEC	Introduction to Body language and Mass Communication	2	-	-	ISE	50	20	2
25UGMEVE408	VEC	Basic Human Rights	2	-	-	ISE	50	20	2
25UGMEPC409L	PCC Lab	Strength of Materials Lab	-	-	2	ISE	30	20	1
						ESE	20		
25UGMEPC410L	PCC	MP- I Lab		-	2	ISE	30	20	1
						ESE	20		
25UGMEVS411L	VSEC	Design Thinking Lab	-	-	2	ISE	30	20	1
						ESE	20		
Total			20	00	06	-	800	-	23
	Total Credits								23
	Total Marks								800
	Total Contact Hr.								26

ISE – In Semester Evaluation, ESE – End Semester Examination, MSE – Mid Semester Examination, L, T, P - Lecture, Tutorial, Practical hours per week.

CUMULATIVE CREDITS: 64+23 = 87



List of Open Elective II Courses

Sr. No.	Course Category	Course Code	Course Title
1	Open Elective II	25UGMEOE405A	Plastic Engineering & Technology
2		25UGMEOE405B	Advance Materials
3		25UGMEOE405C	Fundamentals of Maintenance Management
4		25UGMEOE405D	DFA-DFM
5		25UGMEOE405E	Entrepreneurs Tool Kit
6		25UGMEOE406F	Numerical Methods of Mechanical Engineering

List of Multidisciplinary Minor (MDM)-II Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD404	Mechanical System Design



Third Year B. Tech. in Mechanical Engineering
Semester-V (w.e.f. 2027-28)

Course Code	Course Category	Name of Course		Teaching Scheme		Scheme	Evaluation Scheme		Credit
			L	T	P		Max. Marks	Min. % for passing	
25UGMEPC501	PCC	Theory of Machine-I	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC502		Machine Design - I	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC505		Manufacturing Processes-II	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPE506 (A-C)	PEC	Program Elective Course -I	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEMD507	MDM	MDM-III	2	-	-	ISE	20	40	2
						MSE	20		
						ESE	60		
25UGMEOE508 (A-E)	OE	Refer table	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC509L	PCC	TOM-I Lab	-	-	2	ISE	30	20	1
						ESE	20		
25UGMEPC510L		Machine Design - I Lab				-	-	2	ISE
					ESE	20			
25UGMEPE511L (A-C)	PEC	Program Elective Course -I Lab	-	-	2	ISE	50	20	1
25UGMEMD512L	MDM	MDM Lab	-	-	2	ISE	50	20	1
25UGMEVS513L	VSEC	Introduction to Artificial Intelligence and Machine Learning	1	-	2	ISE	30	20	2
						ESE	20		
Total			17	00	10	-	850	-	23
	Total Credits								23
	Total Marks								850
	Total Contact Hr.								27

T, P - Lecture, Tutorial, Practical hours per week

CUMULATIVE CREDITS: 87+23 = 110



List of Open Elective III Courses

Sr. No.	Course Category	Course Code	Course Title
1	Open Elective III	25UGMEOE508A	Project Management
2		25UGMEOE508B	Energy Audit & Management
3		25UGMEOE508C	Costing & Cost Control
4		25UGMEOE508D	Supply Chain Management
5		25UGMEOE508E	Finite Element Analysis

List of Multidisciplinary Minor (MDM)-III Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD507	Thermal Engineering

List of Programmed Elective Courses (PEC) - I

Course Code	Course Name	Domain
25UGMEPE506A	Product Design Engineering	Design
25UGMEPE506B	Applied Thermodynamics	Thermal
25UGMEPE506C	Advanced Manufacturing Processes	Manufacturing



Third Year B. Tech. in Mechanical Engineering
Semester-VI (w.e.f. 2027-28)

Course Code	Course Category	Name of Course	Teaching Scheme			Scheme	Evaluation Scheme		Credit	
			L	T	P		Max. Marks	Min. % for passing		
25UGMEPC601	PCC	Heat Transfer	3	-	-	ISE	20	40	3	
						MSE	20			
						ESE	60			
25UGMEPC602			Machine Design -II	3	-	-	ISE	20	40	3
						MSE	20			
						ESE	60			
25UGMEPC603			CAD CAM	3	-	-	ISE	20	40	3
						MSE	20			
						ESE	60			
25UGMEPE604 (A-C)	PEC	Program Elective Course -II	3	-	-	ISE	20	40	3	
						MSE	20			
						ESE	60			
25UGMEPE605 (A-C)			Program Elective Course - III	3	-	-	ISE	20	40	3
						MSE	20			
						ESE	60			
25UGMEMD606	MDM	MDM -IV	2	-	-	ISE	20	40	2	
						MSE	20			
						ESE	60			
25UGMEPC607L	PCC	HT Lab	-	-	2	ISE	30	20	1	
						ESE	20			
25UGMEPC608L			Machine Design -II Lab	-	-	2	ISE	30	20	1
						ESE	20			
25UGMEPC609L			CAD CAM Lab	-	-	2	ISE	50	40	1
25UGMEPE610L (A-C)		PEC	Program Elective Course Lab	-	-	2	ISE	30	20	1
						ESE	20			
25UGMEPR611	PR	Project Phase -I	-	-	4	ISE	20	40	2	
						MSE	40			
						ESE	40			
Total			17	-	12	-	900	-	23	
	Total Credits								23	
	Total Marks								900	
	Total Contact Hr.								29	

ISE – In Semester Evaluation, ESE – End Semester Examination, MSE – Mid Semester Examination, L, T, P - Lecture, Tutorial, Practical hours per week.

CUMULATIVE CREDITS: 110+23 = 133



List of Multidisciplinary Minor (MDM)-IV Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD606	Advances in Automobile Engineering

List of Programmed Elective Courses (PEC) - II

Course Code	Course Name	Domain
25UGMEPE604A	Experimental Stress Analysis	Design
25UGMEPE604B	Internal Combustion Engine	Thermal
25UGMEPE604C	Production & Operation Management	Manufacturing

List of Programmed Elective Courses (PEC) - III

Course Code	Course Name	Domain
25UGMEPE605A	Engineering Tribology	Design
25UGMEPE605B	Renewable Energy Sources	Thermal
25UGMEPE605C	GD&T and Statistical Quality Control	Manufacturing



Final Year B. Tech. in Mechanical Engineering
Semester-VII (w.e.f. 2028-29)

Course Code	Course Category	Name of Course	Teaching Scheme			Scheme	Evaluation Scheme		Credit
			L	T	P		Max. Marks	Min. % for passing	
25UGMEPC701	PCC	HVAC	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC702		Theory of Machine-II	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPC703		Additive Manufacturing	2	-	-	ISE	20	40	2
						MSE	20		
						ESE	60		
25UGMEPE704 (A-C)	PEC	Program Elective Course -IV	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEPE705 (A-C)		Program Elective Course -V	3	-	-	ISE	20	40	3
						MSE	20		
						ESE	60		
25UGMEMD706	MDM	MDM -V	2	-	-	ISE	20	40	2
						MSE	20		
						ESE	60		
25UGMEPC707L	PCC	HVAC Lab	-	-	2	ISE	30	20	1
						ESE	20		
25UGMEPC708L		Theory of Machine-II Lab	-	-	2	ISE	30	20	1
						ESE	20		
25UGMEPE709L	PEC	Program Elective Course Lab	-	-	2	ISE	30	20	1
						ESE	20		
25UGMEPR710L	PR	Project Phase -II	-	-	4	ISE	20	40	2
						MSE	40		
						ESE	40		
Total			16	0	10	-	850	-	21
	Total Credits								21
	Total Marks								850
	Total Contact Hr.								26

ISE – In Semester Evaluation, ESE – End Semester Examination, MSE – Mid Semester Examination, L, T, P

- Lecture, Tutorial, Practical hours per week.

CUMULATIVE CREDITS: 133+21 = 154



List of Multidisciplinary Minor (MDM)-V Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD706	Renewable Energy Sources

List of Programmed Elective Courses (PEC) - IV

Course Code	Course Name	Domain
25UGMEPE704A	Mechanics of Composite Materials	Design
25UGMEPE704B	Computational Fluid Dynamics	Thermal
25UGMEPE704C	Industrial Engineering and Management	Manufacturing

List of Programmed Elective Courses (PEC) - V

Course Code	Course Name	Domain
25UGMEPE705A	Automobile Engineering	Design
25UGMEPE705B	Hybrid and E-vehicle	Thermal
25UGMEPE705C	Tool Engineering	Manufacturing



Final Year B. Tech. in Mechanical Engineering
Semester-VIII (w.e.f. 2028-29)

Course Code	Cours Category	Name of Course	Teaching Scheme			Scheme	Evaluation Scheme Theory Course		Credit
			L	T	P		Max. Marks	Min. % for passing	
25UGMEPC801	PCC	Online Course-I (Select Any Course from Design, Thermal, Manufacturing Stream)	2	-	-	ISE	20	40	2
						MSE	30		
						ESE	60		
25UGMERM802	RM	Online Course-I (Select Any Course from Research Methodology Stream)	4	-	-	ISE	20	40	4
						MSE	30		
						ESE	60		
25UGMEMD803L	MDM	Project	-	-	4	ISE	20	40	2
						MSE	40		
						ESE	40		
25UGMEOJ804L	OJT	Internship (In House or External)	-	-	24	ISE	30	40	12
						MSE	90		
						ESE	180		
Total			06	00	28		600		20
	Total Credits								20
	Total Marks								600
	Total Contact Hr.								34

ISE – In Semester Evaluation, ESE – End Semester Examination, MSE – Mid Semester

Examination, L, T, P - Lecture, Tutorial, Practical hours per week.

Note: Exams of PCC & RM will be conducted offline

CUMULATIVE CREDITS: 154+20 = 174



Shanti Education Society's

A. G. Patil Institute of Technology, Solapur

(An Autonomous Institute)

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18 (2/2A) / 2, Pratap Nagar, OPP. SRP Camp, Vijapur Road, Solapur – 413 008 (Maharashtra)
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List of Multidisciplinary Minor (MDM)-VI Courses

Sr. No.	Minor	Course Code	Course name
01	Minor in Mechanical Engineering	25UGMEMD803	MDM Mini project



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech.	Semester: III	L	T	P	Credit
Course Code: 25UGMEPC301	Course Name: Engineering Thermodynamics	3	-	-	3

Course Objectives:

The objectives of this course are:

CE1: To provide students with a fundamental understanding of thermodynamic systems, properties, processes, heat, work, temperature measurement, and thermodynamic equilibrium.

CE2: To develop the ability to apply the First Law of Thermodynamics to closed systems and steady-flow engineering devices such as turbines, compressors, pumps, boilers, nozzles, and throttling valves.

CE3: To develop an understanding of the Second Law of Thermodynamics, entropy, reversibility, irreversibility, heat engines, refrigerators, heat pumps, and Carnot cycle.

CE4: To develop competency in analysing the thermodynamic behaviour and properties of pure substances, particularly steam, using property tables and thermodynamic diagrams.

CE5: To introduce the concepts of availability, irreversibility, second-law efficiency, ideal-gas behaviour, gas laws, and equations of state for analysing thermal systems.

Course Outcomes (CO)

After successful completion of the course, students will be able to:

CO1 Develops fundamental thermodynamic knowledge required for professional engineering practice.

CO2 Enables students to apply thermodynamic laws to practical thermal and mechanical equipment.

CO3 Develops analytical ability for evaluating thermal cycles, energy conversion and system performance.

CO4 Develops competence in analysing steam and pure-substance systems encountered in power and thermal engineering.

CO5 Develops the ability to evaluate energy availability, efficiency, irreversibility and ideal-gas behaviour for engineering applications



Course Content:		
Unit No.	Description	Hrs
1	Fundamental Concepts and Definitions Fundamental Concepts and Definitions Thermodynamic system and its type; Macroscopic vs. Microscopic viewpoint, properties, processes and cycles, point function, path function. Thermodynamic equilibrium, Quasi-static process. Work and heat Transfer: Work transferred and other types of work, Heat transfer, temperature and its measurement (principle of measurement, various instruments etc.). Zeroth law of thermodynamics, specific heat and latent heat, relationship between CP and CV.	8
2	First Law of Thermodynamics First law of thermodynamics for a closed system undergoing a cycle and change of state, Energy, different forms of energy, Enthalpy, PMM-I control volume. Application of first law of steady flow processes (nozzle, turbine, compressor, pump, boiler, throttle valve etc.)	8
3	Second Law of Thermodynamics Limitation of first law of thermodynamics, cycle heat engine, refrigerator and heat pump, Kelvin-Planck and Clausius statements and their equivalence, Reversibility and Irreversibility, Carnot cycle, Carnot theorem, Absolute thermodynamic temperature scale. Entropy: Introduction, Clausius theorem, T-s plot, Clausius inequality, Entropy and Irreversibility, Entropy principle and its application, combined First and Second laws, Entropy and direction, Entropy and disorder.	8
4	Pure Substance Properties of Pure Substance Phase change phenomenon of pure substance, phase diagram of pure substance, p-v, T-s, and h-s diagrams properties of steam, critical point parameters, triple point, property table, representation of processes of steam on p-v, T-s, and other diagrams, Dryness fraction and its measurement.	8
5	Ideal Gas Availability and unavailability, Second law efficiency, Availability balance, Measure of irreversibility, Applications in thermal systems, Calculations of maximum available energy and second law efficiency. Boyle's law, Charl's law, Avogadro's law, universal gas constant, ideal processes with question, other equation of states	8



Reference

Text books:

1. An Introduction to Thermodynamics, Y.V.C. Rao, University Press (India) Private Limited, revised Edition, 2004).
2. P.K.Nag, “Engineering Thermodynamics”, Tata McGraw Hill, New Delhi, 6th edition.
3. Fundamentals of Classical Thermodynamics, G.VanWylen, R.Sonntag and C.Borgnakke, John Willey & Sons (Fourth edition).

Reference Books:

4. Thermodynamics: An Engineering Approach, Y.A.Cengal and M.A.Boles, McGraw Hill (Fifth edition).
5. M. Moran, H. Shapiro, D. Boettner, and M. Bailey, Fundamentals of Engineering Thermodynamics, Wiley, 9th edition, 2018.
6. C. Borgnakke, and R. Sonntag, Fundamentals of Thermodynamics, Wiley, 10th edition, 2019.
7. M. Achuthan, Engineering Thermodynamics, PHI Learning Pvt. Ltd, 2nd edition, 2009.
8. M. W. Zemansky and R. H. Dittman, Heat and Thermodynamics, Mc Graw Hill International Editions, 7th edition, 2007.

Open-Source Learning Resources

1. Thermodynamics By Prof. Anand T. N. C., IIT Palakkad
https://onlinecourses.nptel.ac.in/noc23_me76/preview
2. Basic Thermodynamics by Prof. S. K. Som, IIT Kharagpur.



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: III	L	T	P	Credit
Course Code: 25UGMEPC302	Course Name: Fluid Mechanics	03	-	-	03

Course Objectives:

The objectives of course are:

1. To understand basic properties of fluids.
2. To learn fluid statics and dynamics and study basics of flow visualization
3. To understand Bernoulli's theorem and its applications.
4. To understand losses in flow, drag and lift forces
5. To learn to establish relation between flow parameters.

Course Outcomes:

After completing the course students will be able to

1. DETERMINE various properties of fluid
2. APPLY the laws of fluid statics and IDENTIFY types of fluid flow.
3. APPLY principles of fluid dynamics to laminar flow
4. DETERMINE Values of Drag, Lift forces and concepts of buoyancy.
5. ESTIMATE friction and minor losses in internal flows

Prerequisite:

Engineering Mathematics - I, Engineering Mathematics - II, Engineering Mechanics, Engineering Physics



Course Content:		
Unit No.	Description	Hrs
1	INTRODUCTION TO FLUID MECHANICS Fluid Properties: Types of fluids, Mass Density, Specific Weight, Specific Gravity, Newton's Law of Viscosity, Dynamic Viscosity, Surface Tension, Capillarity, Compressibility, and Vapour pressure (Basic Numerical) Fluid Statics: Pascal's law, Hydrostatic law, pressure variation in a static fluid in 2D.	8
2	FLUID KINEMATICS Fluid Kinematics: Types of Flow- steady, unsteady, uniform, non-uniform, laminar, turbulent, one, two and three dimensional, compressible, incompressible, rotational, irrotational, stream lines, path lines, streak lines, Continuity equation in 2D and 3D (Cartesian Co-ordinates only), velocity and acceleration, velocity potential function and stream function (Numerical).	7
3	FLUID DYNAMICS Fluid Dynamics: Introduction to Navier-Stroke's Equation, derivation of Euler's equation of motion along a stream line, and Bernoulli's equation from Euler's equation and first principles, Application of Bernoulli's equation to pitot tube, venturimeter, orifice meter (Numerical).	7
4	FLOW AROUND IMMERSED BODIES Buoyancy: Buoyancy, centre of buoyancy, Archimedes' principle, principle of floatation, metacentre and metacentric height, stability of floating and submerged bodies, determination of Metacentric height by experimental method. (Numerical) Flow around Immersed Bodies: -Force exerted by flowing fluid on stationary body, expression for Lift and Drag, Classification of Drag, Flow around circular cylinder and Aerofoil, Development of lift on Aerofoil.	7
5	FLOW THROUGH PIPES Flow Through Pipes: Introduction to flow of viscous fluid through circular pipes, two parallel plates Derivation, Energy losses through pipe, Major losses, Darcy-Weisbach equation, Chezy's Equation, Minor losses in pipes-sudden enlargement, sudden contraction, TEL, HGL, pipes in series and parallel, Siphons, Transmission of power (Numerical).	6



References

1. Yunus A. Cengel and John M. Cimbala., 'Fluid Mechanics', McGraw Hill, 4th Edition, 2017, ISBN-(13 digits): 978-9385401374
2. P. N. Modi and Seth, "Fluid Mechanics and Hydraulic Machines", 22nd edition, Standard Book House, 2018. References

Text books

1. Bansal R.K., "Fluid Mechanics and Hydraulic Machines", 9th edition, Laxmi Publications (P)Ltd., New Delhi, 2018. ISBN 9788131808153
2. R. K. Rajput, "A Text Book of Fluid Mechanics and Hydraulic Machines", 6th edition, S. Chand, 2015. ISBN 9789385401374 Text books

Open-Source Learning Resources

- <https://archive.nptel.ac.in/courses/112/105/112105171/>
- <https://unacademy.com/content/gate/videos/mechanical-engineering/fluid-mechanics/#>
- <https://www.youtube.com/watch?v=clVwKynHpB0>
- <https://nptel.ac.in/courses/103102211>
- <https://nitsri.ac.in/Department/DisplayDeptPage.aspx?page=magee&ItemID=ocgkk&nDept>



B. Tech. Second Year Third Semester Engineering Syllabus (Mechanical Engineering) With Effect from AY 2026-27

Class: S Y	Semester: III	L	T	P	C
Course Code: 25UGMEPC303	Course Name: Material Science & Metrology	3	-	-	3

Course Objectives:

The objectives of course are:

1. To facilitate student understanding of the interrelation ship between structure, properties, processing, and performance of engineering materials.
2. To familiarize different categories of metal sand, explain the irrespective heat treatment processes.
3. To guide student sin comprehending phase diagrams, solidification behavior, and various material strengthening mechanisms.
4. To provide students with exposure to typical failure modes in metal sand train the min standard
5. material testing methods.

Course Outcomes:

After completing the course students will be able to

1. Explain the basic concepts of crystallography and imperfections in metals and to Identify and interpret phase diagrams, especially their on-carbon diagram
2. Demonstrate knowledge of various mechanical and non-destructive testing methods
3. Explaintheprinciplesandproceduresofvariousheattreatmentprocesses
4. Classify and compare ferrous and non-ferrous alloys
5. Analyze common metallurgical failures and types of corrosion



Course Content:		
Unit No.	Description	Hrs.
1	Introduction to Metallurgy & Crystal Structure Introduction to metallurgy and classification of materials, Crystal structure of metals: BCC, FCC, HCP in perfect crystals (point, line, surface), Grain structure and grain boundaries, Solidification of metals, grain growth, and dendritic structures. Mechanical Properties and Testing Stress-strain behavior, Elastic and plastic deformation, Ductility, toughness, hardness, fatigue, and creep, Destructive testing: Tensile, impact (Charpy/Izod), hardness (Brinell, Rockwell, Vickers), Non-destructive testing (NDT): Ultrasonic, radiography, dye penetrant, magnetic particle	7
2	Iron-Carbon Diagram and Phase Transformations Iron-iron carbide (Fe-Fe ₃ C) phase diagram, Construction and interpretation of the diagram, Critical temperatures and microstructures of steel, Types of steels: Hypoeutectoid, eutectoid, and hypereutectoid, Cooling curves and TTT diagrams	7
3	Heat Treatment of Steels Principal and purposes of heat treatment, Annealing, normalizing, hardening, tempering, Case hardening: carburizing, nitriding, cyaniding, Surface hardening methods and applications, Effects on mechanical properties and microstructure	7
4	Alloy Steels and Non-Ferrous Alloys Effect of alloying elements (Cr, Ni, Mo, V, Mn, etc.), Stainless steels, tool steels, spring steels, Aluminum alloys: Duralumin, Al-Si, Al-Cu systems, Copper alloys: Brass, bronze, Titanium and magnesium alloys	7
5	Metallurgical Failures and Corrosion Types of failures: brittle, ductile, fatigue, creep, Fractography and failure analysis, Corrosion: Types (uniform, galvanic, pitting, etc.), Corrosion control methods: coatings, cathodic protection, Selection of materials for corrosion resistance	7



References:

Textbooks:

1. Material Science and Metallurgy–Dr. Kodgire (Everest, Pune).
2. Introduction to Physical Metallurgy–Sidney H. Avner
3. Engineering Metallurgy I&II–A.S. Gholap & M.S. Kulkarni
4. Introduction to Engineering Materials –B. K. Agarwal (TMH)

Reference books:

1. Heat treatment principles and technique-Rajan Sharma& Sharma
2. Introduction to Physical metallurgy–Avner, TMH.
3. Engineering Metallurgy Vol. I&II–R. A. Higgins (ELBS).
4. Engineering Metallurgy–E. C. Rollason (ELBS)
5. Engineering Metallurgy -Lak thin (MIR Publishers).

Open-Source Learning Resources

1. NPTEL Course-Principles of Extractive Metallurgy, IIT Kharagpur-<https://nptel.ac.in/courses/113105441>
2. Dissemination of IT for the Promotion of Materials Science- (DoITPoMS): <https://www.doitpoms.ac.uk/index.php>



**B. Tech. Second Year Third Semester Engineering
Syllabus (Mechanical Engineering) With Effect
from AY 2026-27**

Class: SY	Semester: III	L	T	P	Credit
Course Code: MDM 25UGMEMD304	Course Name: Manufacturing Processes	2	-	0	2

Course Objectives

- Understand how common engineering products are manufactured.
- Learn basic manufacturing terminology.
- Become familiar with manufacturing processes used in civil, computer, and electronics industries.
- Develop awareness of modern production technologies.

Course Outcomes

- After completing this course, students will be able to:
- **CO1:** Explain basic manufacturing processes and the properties, applications, and selection of engineering materials.
- **CO2:** Describe primary manufacturing processes such as casting, powder metallurgy, plastic and glass manufacturing.
- **CO3:** Explain joining and fabrication methods including welding, brazing, soldering, adhesive bonding, and fasteners.
- **CO4:** Describe basic machining, surface finishing, and CNC processes used in manufacturing engineering components.
- **CO5:** Explain modern manufacturing concepts including automation, robotics, 3D printing, Industry 4.0, and green manufacturing.



Unit 1: Introduction to Manufacturing and Engineering Materials

What is manufacturing? Manufacturing in daily life, Product development cycle, Engineering materials: Metals, Plastics, Ceramics, Composites, Material properties and applications, Selection of materials for engineering products, Case Studies, Cement and steel in construction, Mobile phone body materials, Computer cabinet materials

Unit 2: Primary Manufacturing Processes

Casting: concept and applications, moulding process (basic idea only), Powder metallurgy (overview) Plastic moulding processes, Glass manufacturing (overview), Applications, Manhole covers, Engine blocks, Plastic electronic housings, PVC pipes

Unit 3: Joining and Fabrication Processes

Welding fundamentals, Gas welding and arc welding, Brazing and soldering, Adhesive bonding, Fasteners: Nuts, Bolts, Rivets, Screws, Applications, Building structures, electronic circuit assembly, Computer hardware assembly.

Unit 4: Machining and Surface Finishing

Need for machining, Turning, drilling, milling (concept only), Grinding and polishing, Surface finishing methods, Introduction to CNC machines, Applications, Manufacturing of shafts, Machine components, Precision parts for electronics

Unit 5: Modern Manufacturing and Industry Applications Automation in manufacturing, Robotics in industry, 3D Printing, Smart manufacturing, Industry 4.0 (basic concepts), Green manufacturing and sustainability, Applications, Construction automation, Electronics manufacturing, Customized product manufacturing



Suggested Practical

1. Identification of engineering materials.
2. Demonstration of casting process.
3. Demonstration of welding operations.
4. Identification of fastening elements.
5. Visit to machine shop.
6. Study of CNC machine.
7. Demonstration of 3D printing.
8. Industrial visit and report.

Textbook

1. Manufacturing Technology – Vol. I & II — P. N. Rao, **McGraw Hill Education**.

Reference Books

1. A Textbook of Production Technology — P. C. Sharma, **S. Chand**.
2. Production Technology: Manufacturing Processes, Technology and Automation — R. K. Jain, **Khanna Publishers**.
3. Manufacturing Processes — M. P. Groover
4. Workshop Technology – Vol. I & II — B. S. Raghuwanshi, **Dhanpat Rai & Co.**
5. Manufacturing Engineering and Technology — S. Kalpakjian



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: III	L	T	P	Credit
Course Code: 25UGMEOE305A	Course Name: Solid waste & E waste management	2	-	-	2

Course Objectives:

The objectives of course are:

1. To introduce fundamentals of solid waste and e-waste management.
2. To understand collection, segregation and processing techniques.
3. To study waste-to-energy, biomining and disposal methods.
4. To analyze environmental and health impacts of waste.
5. To understand policies and sustainable practices

Course Outcomes:

After completing the course students will be able to

- CO1: Explain sources, types and characteristics of solid waste.
- CO2: Describe waste collection, segregation and transportation systems.
- CO3: Apply processing techniques like composting, biogas and biomining.
- CO4: Understand hazardous waste and e-waste impacts.
- CO5: Explain e-waste management, policies and best practices

Prerequisite: Basic knowledge of environmental science



Course Content:		
Unit No.	Description	Hrs.
1	Solid Waste Basics (Solapur Context) Definition, sources and types of solid waste; Waste generation and material flow; Physical and chemical characteristics; Waste management hierarchy; Overview of Solid Waste Management Rules, 2016; Solapur case: mixed waste and poor segregation issues	7
2	Storage and collection (primary & secondary); Collection systems (hailed & stationary); Segregation at source; Issues in segregation (Solapur condition); Transfer stations and transportation	7
3	Composting and anaerobic digestion; Biogas plants (wet waste management in Solapur); Waste-to-energy basics; Biomining of dump yards; Thermal methods (incineration, pyrolysis)	7
4	E-Waste Basics & Impacts Definition, sources and types of e-waste; Hazardous components (Lead, Mercury, Cadmium); Environmental and health impacts; Overview of E-Waste Management Rules, India	7
5	E-Waste Management & Practices Collection (formal & informal sectors); Recycling, reuse and material recovery; Extended Producer Responsibility (EPR); Case studies (India & local); Public awareness and best practices	7

References:

Text books:

1. Integrated Solid Waste Management
2. Solid Waste Management

Reference Books:

1. Handbook of Solid Waste Management
2. CPCB Guidelines on Solid Waste & E-Waste

Open-Source Learning Resources:

1. SWAYAM / NPTEL – Solid Waste Management
2. CPCB & MoEFCC official resources edition, 2007.



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: III	L	T	P	Credit
Course Code: 25UGMEOE305B	Course Name: Fundamentals of Electrical Engineering	2	-	-	2

Course Objectives:

The objectives of this course are:

1. Understand the working principles of electrical machines and their applications.
2. Explain operation and characteristics of DC and induction motors.
3. Identify different special motors and select suitable motors for applications.
4. Understand basic electronic circuits and signal conditioning techniques.
5. Gain introductory knowledge of digital systems, microprocessors, and microcontroller

Course Outcomes:

At the end of this course, the students should be able to:

1. Explain working and performance of DC motors and apply basic concepts.
2. Describe construction and operation of three-phase induction motors.
3. Identify and select appropriate motors for different industrial applications.
4. Understand basic electronic circuits, digital systems, and signal processing.
5. Explain fundamentals of microprocessors and microcontrollers.

Prerequisite:



Course Content:		
Unit No.	Description	Hrs.
1	DC Motors Principle of motor action Back EMF and its significance Types of DC motors Torque equation and characteristics Speed control methods (basic concepts) Starters: need and types	5
2	Three Phase Induction Motors Rotating magnetic field concept Construction and working principle Slip and its significance Torque-slip characteristics Starting methods (DOL, Star-Delta, Auto-transformer)	5
3	Special Motors and Applications Single phase induction motor Universal motor and shaded pole motor Stepper motor and servo motor (basic idea) Brushless DC motor (introduction) Selection of motors for applications	5
4	Basic Electronics and Digital Circuits Semiconductor basics and diode concept Rectifiers (half wave and full wave – basic idea) Introduction to transistor and its applications Combinational and sequential logic (basic idea) Flip-flops and counters (introduction only)	5
5	Signal Conditioning and Microcontrollers Need for signal conditioning Operational amplifier basics and applications ADC and DAC (basic concept only) Introduction to microprocessor (8085 – basic idea) Introduction to microcontroller (8051 – basic concept)	5



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305C	Course Name: Organizational Behavior	2	-	-	2

Course Objectives:

The objectives of this course are:

1. To introduce basic concepts of Organizational Behavior in a simple and practical manner.
2. To help students understand human behavior in organizations.
3. To develop teamwork, communication, and leadership skills.
4. To improve interpersonal relationships and workplace adjustment.
5. To prepare students for real-world organizational challenges.

Course Outcomes:

At the end of this course, the students should be able to:

1. Understand basic concepts of organizational behavior.
2. Analyze individual and group behavior in organizations.
3. Apply motivation and leadership concepts in real situations.
4. Communicate effectively in workplace environments.
5. Handle stress, conflict, and change in organizations.

Prerequisite:



Course Content:		
Unit No.	Description	Hrs
1	Introduction to Organizational Behavior Meaning and Importance of Organizational Behavior Relationship between Management & OB Basic Managerial Functions (Planning, Organizing, Controlling) Models of Organizational Behavior Challenges in modern organizations Ethics in organizations (basic concept)	7
2	Individual Behavior Personality (types & basics) Perception and Factors affecting perception Attitudes and Job Satisfaction Learning (simple behavioral concepts) Values and Work Behavior Emotional Intelligence (basic concept)	7
3	Group Behavior & Teamwork Meaning and Types of Groups Group Development (Stages) Team vs Group Teamwork and Collaboration Group Communication Factors affecting team performance	7
4	Motivation & Leadership Meaning and Importance of Motivation Maslow's Need Hierarchy Theory McGregor's Theory X & Y Herzberg Two Factor Theory Leadership: Meaning & Importance Leadership Styles (Autocratic, Democratic, Laissez-faire)	7
5	Organizational Processes Communication Process & Barriers Conflict: Meaning, Types & Resolution Stress Management (Causes & Coping Techniques) Organizational Change (basic idea) Adaptation to Workplace Environment Work-life balance	7

References:

TEXT BOOKS:

1. Organizational Behavior – Stephen P. Robbins
2. Organizational Behavior – L. M. Prasad
3. Organizational Behavior – K. Aswathappa

REFERENCE BOOKS:

1. Organizational Behavior – Fred Luthans
2. Human Behavior at Work – Keith Davis & Newstrom
3. Management & OB – Hersey & Blanchard
4. Principles of Management – Koontz & O'Donnell



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305D	Course Name: Object-Oriented Programming with C++	2	-	-	2

Course Objectives:

The objectives of course are:

1. To introduce C++ programming basics and control structures for engineering logic.
2. To master modular programming using functions and data handling with arrays.
3. To implement object-oriented modeling for machine components and materials.
4. To design complex systems using inheritance, polymorphism, and reusable templates.
5. To manage engineering data through file handling and error-resistant code.

Course Outcomes:

After completing the course students will be able to

1. Develop basic C++ programs for mechanical computations like pressure and temperature.
2. Use arrays and functions to process experimental stress-strain data.
3. Create databases for machine components using classes and objects
4. Build hierarchical models for vehicles and manufacturing simulations.
5. Log production data to files and handle runtime errors in numerical software.

Prerequisite:

1. Basic knowledge of C++



Course Content:		
Unit No.	Description	Hrs.
1	Foundations of C++ & Control Logic: Introduction to OOP vs. POP. Tokens, identifiers, and I/O (cin/cout). Control structures: if-else, switch case, and loops (for, while, do-while). Applications: Temperature conversion and force computations.	7
2	Functions, Arrays & Pointers: Function overloading, inline functions, and call by reference. 1D and 2D arrays for engineering data. Introduction to pointers and string handling. Applications: Matrix operations and sorting experimental readings.	8
3	Classes, Objects & Constructors: Access specifiers, member functions, and friend functions. Constructors, destructors, and copy constructors. Array of objects. Applications: Material property database and student database design.	9
4	Inheritance, Polymorphism & Reusability: Single, multiple, and multilevel inheritance. Virtual functions, overriding, and abstract classes. Function and class templates. Applications: Vehicle hierarchy and manufacturing process simulations.	9
5	Data Management & Error Handling: Operator overloading and type conversion. File handling: Reading/Writing sequential files. Exception handling (try-catch) and STL basics (vectors). Applications: Production data logging and maintenance records.	7

Textbook:

1. **E. Balagurusamy, *Object-Oriented Programming with C++*, McGraw Hill Education.**

Reference Books:

1. **D. Ravichandran, *Programming with C++*, New Age International.**
2. **Herbert Schildt, *C++: The Complete Reference*, McGraw Hill.**
3. **Bjarne Stroustrup, *The C++ Programming Language*, Addison-Wesley.**
4. **Stanley B. Lippman, Josée Lajoie & Barbara E. Moo, *C++ Primer*, Addison-Wesley.**



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305E	Course Name: TRANSFORM TECHNIQUES AND COMPLEX VARIABLES	2	-	0	2

Course Objectives

The course aims to:

1. **Develop** the ability to analyze periodic functions using Fourier series and Fourier transforms.
2. **Provide** knowledge of partial differential equations and methods for solving wave, heat, and Laplace's equations.
3. **Introduce** Z-transforms and their applications to difference equations and inverse transformations.
4. **Develop** understanding of complex variables, including continuity, differentiability, analyticity, and harmonic functions.
5. **Apply** complex integration techniques, including Cauchy's theorems, Taylor and Laurent series, singularities, and residue theory.

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

CO1: evaluate Fourier series and Fourier transform of a function

CO2: solve partial differential equations, heat flow and wave propagation problems **CO3:** discuss the Z- transform technique and use it to solve difference equations

CO4: examine continuity, differentiability and analyticity of a complex valued function

CO5: evaluate the integral of a complex function over a simple closed contour



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Course Content:		
Unit No.	Description	Hrs.
1	UNIT-I Fourier series and Fourier Transforms: Dirichlet's conditions, Fourier series, conditions for a Fourier expansion, functions of any period, odd and even functions - half range series. Fourier integrals, Fourier cosine and sine integrals, Fourier transform, Fourier sine and Fourier cosine transforms and properties.	7
2	UNIT-II Partial Differential Equations: First order partial differential equations, solutions of first order linear and nonlinear PDEs. Method of separation of variables, solution of wave, heat and Laplace's equation in Cartesian coordinates	8
3	UNIT-III Z-Transforms: Definition of Z-transform, elementary properties, linearity property, damping rule, shifting to the right and left, multiplication by n, initial value theorem, final value theorem, inverse Z-transform, convolution theorem (without proof)	9
4	UNIT-IV Complex Variables-Differentiation: Continuity, differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate function	9
5	UNIT-V Complex variables-Integration: Contour integrals, Cauchy theorem (without proof), Cauchy integral formula (without proof), Taylor's series, zeros of analytic functions, singularities, Laurent's series, residues, Cauchy residue theorem (without proof)	7

Textbook:

B.S. Grewal, "Higher Engineering Mathematics", 44th edition, Khanna publishers, 2017.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons, 2006.
2. J. W. Brown and R. V. Churchill, "Complex Variables and Applications", 7th edition, McGraw Hill, 2004.
3. Web References:
<https://nptel.ac.in/courses/111/106/111106111>
<https://nptel.ac.in/courses/111/107/111107056>
/



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: III	L	T	P	Credit
Course Code: 25UGMEEE306	Course Name: ENTREPRENEURSHIP DEVELOPMENT	02			02

Course Objectives

The objectives of course are:

1. **To develop entrepreneurial mindset** among students by fostering creativity, innovation, and risk-taking ability.
2. **To understand the fundamentals of entrepreneurship**, including the role of entrepreneurs in economic development and startup ecosystems.
3. **To impart knowledge of business planning**, opportunity identification, and feasibility analysis.
4. **To familiarize students with startup processes**, including idea validation, business model development, and scaling strategies.
5. **To provide awareness of financial aspects**, such as funding sources, budgeting, and financial management for startups.

Course Outcomes

After completing the course students will be able to:

CO1: Enlarge the supply of entrepreneurs for rapid industrial development

CO2: Develop small and medium enterprises sector which is necessary for generation of employment

CO3: Industrialize rural and backward regions

CO4: Provide gainful self-employment to educated young men and women

CO5: Diversify the sources of entrepreneurship



Course Content:		
Unit No.	Description	Hrs.
1	Introduction to Entrepreneurship Evolution of the Concept of Entrepreneur Functions of Entrepreneur, Characteristics of an Entrepreneur, Types of Entrepreneurs, Concept of Entrepreneurship, Growth of Entrepreneurship, Barriers of Entrepreneurship, Role of Entrepreneurship in India, Entrepreneurial Motivation, Major Entrepreneurial Competencies.	5
2	Small Scale Industries (SSI) Characteristics of Small-Scale Industry, Basis for Classification of Small-Scale Industry: Resource Based, Demand Based, Ancillary, Subsidiary Based or Sub-Controlled Type, Technology Based etc. Government Policy for Small Scale Industry, Growth of SSI in Developing Countries, Role of National and State Agencies Providing Assistance to SSI's, Relationship between Small and Big Industries, Ownership Structure, Registration of SSI.	5
3	Project Identification and Project Formulation Meaning of Project, Project Identification and Selection, Elements of Project Formulation, Concept and Significance of Project Formulation, Meaning, Significance and Contents of Project Report.	5
4	Marketing Management Market Segmentation, Marketing Mix, and Packaging, Pricing Policy, Distribution Channels, and Govt. Purchases from SSIs. Laws Concerning Entrepreneur: Income Tax Laws, Excise Duty, The Central Sales Tax Act, Professional Tax, Value Added Tax (VAT), Service Tax, The Workmen Compensation Act, The Minimum Wages Act, The Maternity Benefit Act, The Payment of Bonus Act.	5
5	Project Appraisal Concept of Project Appraisal, Project Appraisal Methods, Cash Flows as Costs and Benefits, Payback Period, Average Rate of Return. Discounted Cash Flow Techniques, Working Capital Management, Cost of Capital, Financing of Enterprises, Project Sickness & Corrective Measures.	5

References:

1. S. S. Khanka, "Entrepreneurial Development", S. Chand and Company Ltd.
2. C. B. Gupta, N. P. Srinivasan, "Entrepreneurship Development in India", S. Chand and Sons.
3. B. Badhai, "Entrepreneurship Development Programmed", Mansell Publishing Ltd.
4. V. Desai, "Dynamics of Entrepreneurial Development and Management", Hindustan Publishing House.
5. David H. Holt, "Entrepreneurship", PHI Learning.
6. Roy Rajeev, "Entrepreneurship", Oxford University Press.



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEVE307	Course Name: Universal Human Values	2	-	-	2

Course Objectives:

The objectives of this course are:

1. To introduce the concept of value education and enable students to understand the need for self-exploration in achieving happiness and prosperity.
2. To develop understanding of the human being as a co-existence of self and body and the significance of health and self-regulation.
3. To facilitate understanding of harmonious relationships in the family and society based on trust, respect, and justice.
4. To build awareness of harmony in nature and existence, encouraging students to relate sustainability with engineering practices.
5. To understand the implications of holistic development, natural acceptance, and how it leads to a value-based life and human order.

Course Outcomes:

At the end of this course, the students should be able to:

1. Understand the concept of value education and apply self-exploration as a process to identify the basic human aspirations of happiness and prosperity.
2. Analyze the co-existence of the Self and the Body, and demonstrate harmony within the human being through self-regulation and holistic health practices.
3. Evaluate the foundational values of trust and respect in human relationships and articulate a vision for harmony in the family and society.
4. Comprehend the interconnectedness and mutual fulfillment among the four orders of nature and realize existence as co-existence at all levels.
5. Apply the understanding of ethical human conduct and universal human values to professional life, promoting humanistic education and value-based engineering practice.

Prerequisite:



Course Content:		
Unit No.	Description	Hrs.
1	Introduction to Value Education Understanding Value Education Self-exploration as the Process for Value Education Continuous Happiness and Prosperity – the Basic Human Aspirations Right Understanding, Relationship and Physical Facility Happiness and Prosperity – Current Scenario Method to Fulfill the Basic Human Aspirations	5
2	Harmony in the Human Being Understanding Human being as the Co-existence of the Self and the Body Distinguishing between the Needs of the Self and the Body The Body as an Instrument of the Self Understanding Harmony in the Self Harmony of the Self with the Body Programmer to Ensure self-regulation and Health.	5
3	Harmony in the Family and Society Harmony in the Family – the Basic Unit of Human Interaction Values in Human-to-Human Relationship 'Trust' – the Foundational Value in Relationship 'Respect' – as the Right Evaluation Understanding Harmony in the Society Vision for the Universal Human Order	5
4	Harmony in the Nature (Existence) Understanding Harmony in the Nature Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature Realizing Existence as Co-existence at All Levels the Holistic Perception of Harmony in Existence	5
5	Implications of the Holistic Understanding – a Look at Professional Ethics Natural Acceptance of Human Values Definitiveness of (Ethical) Human Conduct A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies Strategies for Transition towards Value-based Life and Profession	5



References:

Textbooks:

1. R.R. Gaur, R. Sangal, G.P. Bagaria, A Foundation Course in Human Values and Professional Ethics, Excel Books, 2019.
2. Subhash Sharma, Management in New Age: Western Windows Eastern Doors, New Age International, 2007.
3. K. Subrahmanyam, Value Education, Sri Ramakrishna Math, Chennai, 2005.
4. Erach Bharucha, Textbook of Environmental Studies, University Grants Commission, Orient Black Swan, 2023.
5. M.G. Velasquez, Business Ethics: Concepts and Cases, Pearson Education, 2012.
6. A.N. Tripathi, Human Values, New Age International, 2019.

Reference books:

7. R. R. Gaur and G.P. Bagaria, Teachers' Manual for Universal Human Values, AICTE, 2020.
8. Kireet Joshi, Philosophy of Value-Oriented Education: Theory and Practice, Indian Council of Philosophical Research, 2002.
9. Wahidul K. Biswas and Michele John. Engineering for Sustainable Development: Theory and Practice, Willey Online Publications, 2022.
10. E. G. Seebauer and R. L. Barry, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press.
11. Harish Kumar Yadav, Education for Sustainable Development, Redshine Publications, 2024.
12. P. L. Dhar and R. R. Gaur, Science and Humanism, Commonwealth Publishers.



B. Tech. Second Year Third Semester Engineering Syllabus (Mechanical Engineering) With Effect from AY 2026-27

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEPC308L(A-E)	Course Name: OE Lab	-	-	02	1

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305A	Course Name: Solid waste & E waste management	-	-	02	1

Sr. No.	Title of Experiment	Hours
1	To arrange field visit at waste collection zones in Solapur City	6
2	To prepare Biochar from furnace with Pyrolysis process using organic waste Biomass	6
3	To do post processing of Biochar	6
4	To Study Vermicomposting (Field Visit)	6
5	To create awareness in the students about collection of E-Waste from different areas of the city	6
6	Micro Project on Reduce Reuse and Recycle	6



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Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305B	Course Name: Fundamentals of Electrical and Electronics Engineering	-	-	02	01

Practical / Tutorial List

1. Speed Control of DC Motor (Demonstration)
2. Study of Induction Motor
3. Study of Rectifier Circuits
4. Basic Logic Gates and Flip-Flops
5. Op-Amp Applications (Adder/Comparator)
6. Microcontroller Demonstration



Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305C	Course Name: Organizational Behavior	-	-	02	01

Practical/ Tutorial List-

1. Case Study on Organizational Behavior
2. Personality Self-Assessment
3. Perception Activity
4. Group Task & Team Analysis
5. Stages of Group Development Observation
6. Application of Maslow's Motivation Theory
7. Leadership Role Play
8. Stress and Conflict Management Case Study



Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEOE305D	Course Name: Object-Oriented Programming with C++	-	-	02	01

List of Practical Experiments:

Unit No.	Description
1	Basic Logic: Arithmetic operations and unit conversions using control loops.
2	Data Arrays: Matrix multiplication and string manipulation for engineering records.
3	OO Modeling: Implementing constructors and destructors for a machine part class.
4	Hierarchy: Developing an inheritance-based system with virtual function demonstration.
5	Storage & Safety: File handling for experimental data and exception handling for calculations.



B. Tech. Second Year Third Semester Engineering Syllabus (Mechanical Engineering) With Effect from AY 2026-27

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEPC309L	Course Name: Fluid Mechanics Lab	-	-	02	01

Course Outcomes:

After completing the course students will be able to:

CO1 Understand laminar and turbulent flow and determine Critical Reynolds number using Reynolds Apparatus.

CO2 Verify Bernoulli's theorem.

CO3 Determine pressure drop in flow through pipes and pipe fittings. CO4 Verify momentum equation using impact of jet apparatus.

CO5 Determine viscosity using viscometer

CO6 Calibrate the pressure gauges, rotameter etc.

CO7 Use manometers for pressure measurement.

List of Experiments (Any 6 experiments from the list)

1. Verification of Bernoulli's theorem.
2. Determination of Critical Reynolds number using Reynolds Apparatus.
3. Determination of various flow measuring coefficients.
4. Determination of pressure drop in pipes of various cross-sections.
5. Determination of pressure drops in pipes with various pipe fittings.
6. Viscosity measurement using viscometer (at least one type).
7. Verification of momentum equation using impact of jet apparatus.
8. Determination of metacentric height of a floating body.



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEPC310L	Course Name: Material Science and Metallurgy Lab	-	-	02	01

List of Experiments:

1. Brinell Hardness Test
2. Rockwell Hardness test
3. Dye Penetrant Test
4. Study and drawing of microstructures of plain carbon steels of varying carbon percentage
5. Study and drawing of microstructures of heat-treated steels
6. Study and drawing of microstructures of cast irons
7. Study and drawing of microstructures of non-ferrous alloys
8. Hardening of steels of varying carbon percentage



**B. Tech. Second Year Third Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEVS311L	Course Name: Machine Drawing and CAD Lab	-	-	04	02

Course Outcomes:

After completing the course students will be able to

CO1 Draw Conventional representation of standard machine components, welds, materials etc.

CO2 Draw sectional view of a given machine component.

CO3 Develop Assemble view from details of given component i.e. valve, pump, machine tool part, etc.

CO4 Combine details of given machine component and draw assembled view

CO5 Use various AutoCAD commands to draw orthographic projection

List of Drawing Sheets/ Assignments:

1. One full imperial drawing sheet consisting the drawing/sketches of representation of standard components, symbols of pipe joints, weld joints, rivet joint etc., surface finish symbols and grades, limit, fit and tolerance sketches. of Drawing Sheets/ Assignments
2. Two full imperial drawing sheets, one consisting of assembly and the other consisting of details of any one standard component such as valves, components of various machine tools, pumps, joints, engine parts, etc.
3. Two assignments on AutoCAD: Orthographic Projections of any one simple machine component such as bracket, Bearing Housing or Cast component for Engineers such as connecting rod, Piston, etc.; with dimensioning and detailing of three views of components.
4. 3-D model using AutoCAD of at least one simple machine component.

Texts:

1. N. D. Bhatt, “Engineering Drawing”, Charotar Publishing House, Anand, India.
2. N. D. Bhatt, “Machine Drawing”, Charotar Publishing House, Anand, India.
3. Ajeet Singh, “Working with AutoCAD 2000”, Tata McGraw Hill, New Delhi.

References:

1. Narayana, Kannaiah, Reddy, “Machine Drawing”, New Age International Publishers.
2. AutoCAD and Auto LISP manuals from Autodesk Corp. U.S.A.
3. IS Code: SP46-1988, Standard Drawing Practices for Engineering Institutes.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEPC409L	Course Name: Strength of Materials	03	-	-	03

Course Objectives:

The objectives of course are:

1. To acquire basic knowledge of stress, strain due to various types of loading.
2. To draw Shear Force and Bending Moment Diagram for transverse loading.
3. To determine Bending, Shear stress, and Torsional shear stress
4. To apply the concept of Principal Stresses.
5. To solve problems of Deflection on Beam and Buckling for the column.

Course Outcomes:

1. Define various types of stresses and strain developed on determinate and indeterminate members.
2. Draw Shear force and bending moment diagram for various types of transverse loading and support.
- 3 Evaluate Bending and Shear stress on Beam
- 4Design basic components by applying the concept of Principal Stresses and Torsional shear stress for shaft
- 5 Evaluate deflection for beams, buckling for the column

Prerequisite:

Engineering Mathematics- I and II, Engineering Mechanics



Course Content:		
Unit No.	Description	Hrs
1	Simple Stress & Strain: Introduction to types of loads (Static, Dynamic & Impact Loading) and various types of stresses with applications, Hooke's law, Poisson's ratio, Modulus of Elasticity, Modulus of Rigidity, Bulk Modulus. Interrelation between elastic constants, Stress strain diagram for ductile and brittle materials, factor of safety, Stresses and strains in determinate and indeterminate beam, homogeneous and composite bars under concentrated loads and self-weight, Thermal stresses in plain and composite members.	7
2	SFD & BMD: Introduction to SFD, BMD with application, SFD & BMD for statically determinate beam due to concentrated load, uniformly distributed load, uniformly varying load, couple and combined loading, Relationship between rate of loading, shear force and bending moment, Concept of zero shear force, Maximum bending moment, point of contra flexure.	8
3	Bending Stress on a Beam: Introduction to bending stress on a beam with application, Theory of Simple bending, assumptions in pure bending, derivation of flexural formula, Moment of inertia of common cross section (Circular, Hollow circular, Rectangular, I & T), Bending stress distribution along the same cross-section Shear Stress on a Beam: Introduction to transverse shear stress on a beam with application, shear stress distribution diagram along the Circular, Hollow circular, Rectangular, I & T cross-section.	7
4	Principal Stresses: Introduction to principal stresses with application, Transformation of Plane Stress, Principal Stresses and planes (Analytical method and Mohr's Circle), Stresses due to combined Normal and Shear stresses. Torsion of circular shafts: Introduction to torsion on a shaft with application, Basic torsion formulae and assumption in torsion theory, Torsion in stepped and composite shafts, Torque transmission on strength and rigidity basis, Torsional Resilience	7
5	Slope & Deflection on a Beam: Introduction to slope & deflection on a beam with application, slope, deflection and Radius of Curvature, Macaulay's Method, Slope and Deflection for all standard beams. Buckling of columns: Introduction to buckling of column with its application, Different column conditions and critical, safe load determination by Euler's theory. Limitations of Euler's Theory.	7



References:

1. Egor. P. Popov, “Introduction to Mechanics of Solids”, Prentice Hall Publication
2. G. H. Ryder, “Strength of Materials”, Macmillan Publication
3. Beer and Johnston, “Strength of materials”, CBS Publication
4. James M. Gere, “Mechanics of Materials”, CL Engineering
5. Timoshenko and Young, “Strength of Materials”, CBS Publication, Singapore
6. Prof. S.K. Bhattacharyya, IIT Kharagpur

Text books:

1. Strength of material by S. Ramamurtham, Dhanpat Rai Publication
2. Strength of Materials by R. K. Bansal, Laxmi Publication
3. Strength of Material by S.S. Rattan, Tata McGraw Hill Publication Co. Ltd.
4. Strength of Material by B.K. Sarkar, McGraw Hill New Delhi
5. Strength of Material by Singer and Pytel, Harper and row Publication
6. Mechanics of Materials by R. C. Hibbeler, Prentice Hall Publication



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	C
Course Code: 25UGMEPC402	Course Name: Metrology & Mechanical Measurement	03	-	-	03

Course Objectives:

The objectives of this course are:

- 1 To understand basic concepts of measurement and standards.
- 2 To learn limits, fits, tolerances and simple gauge design.
- 3 To study measurement techniques for linear, angular and surface measurements.
- 4 To understand working principles of measuring instruments and systems.
- 5 To apply measurement techniques for temperature, pressure, flow and strain.

Course Outcomes:

At the end of this course, the students should be able to:

- 1 Explain measurement concepts, standards and errors.
- 2 Apply limits, fits and tolerances in simple problems.
- 3 Use measuring instruments for linear and angular measurements.
- 4 Understand characteristics of instruments and transducers.
- 5 Perform basic measurement of engineering parameters.

Prerequisite:



Course Content:		
Unit No.	Description	Hrs.
1	Basics of Metrology & Standards Need and importance of measurement Definition: Measurement, Metrology Accuracy, Precision & Errors (basic) Standards: Line, End, Wavelength Slip gauges: Selection & simple numerical	8
2	Limits, Fits, Tolerances & Gauges Terminology of limits, fits and tolerances Types of tolerances and fits Hole basis & shaft basis systems Tolerance calculations (addition/subtraction) Taylor's principle of gauge design Types of gauges & basic design concept Simple numerical problems	10
3	Measurement Techniques Vernier caliper & Micrometer Angular measurement: Sine bar, Clinometer Optical flats & Interferometry (basic idea) Introduction to CMM & Profile projector	8
4	Mechanical Measurement Systems Generalized measurement system Static characteristics (accuracy, sensitivity, repeatability) Dynamic characteristics (basic idea) Calibration Transducers: Classification & basics	7
5	Measurement of Engineering Parameters Temperature: Thermocouple, RTD Pressure: Bourdon tube Speed: Tachometer, Stroboscope Flow: Rotameter Strain & vibration (basic introduction)	7

TEXT BOOKS:

1. Engineering Metrology and Measurements – N.V. Raghavendra & L. Krishnamurthy
2. Engineering Metrology – I.C. Gupta

REFERENCE BOOKS:

1. Engineering Metrology & Measurements – Natrajan & Venkatesh
2. Mechanical Measurements – Beckwith, Marangoni & Lienhard
3. Engineering Metrology – K.J. Hume
4. Mechanical Measurements & Instrumentation – Rajput



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: IV	L	T	P	C
Course Code: 25UGMEPC403	Course Name: Manufacturing Process-I	3	-	-	3

Course Objectives:

The objectives of this course are:

1. To provide fundamental knowledge of casting processes.
2. To impart fundamental knowledge of metal forming processes, focusing on rolling and forging techniques, equipment and operations.
3. To provide an understanding of extrusion, drawing, and sheet metal working processes, including their types, operations, and common defects.
4. To develop a basic understanding of various joining processes.
5. To provide basic knowledge of lathe, boring, and drilling machines, their types, construction, operations, and accessories.

Course Outcomes:

After completing the course students will be able to

1. Apply the principles, materials, design, and techniques involved in casting processes, including defect analysis and advanced casting methods.
2. Explain the principles, types, equipment, and common defects in rolling and forging processes used in metal forming and to Understand and apply various extrusion, drawing, and sheet metal working techniques along with identifying common defects.
3. Distinguish joining methods, understand welding processes and equipment, and identify common weld defects and inspection techniques.
4. Describe the construction, working, types, and operations of lathe, boring, and drilling machines along with their accessories.
5. Demonstrate the types, construction, working principles, and operations of milling, shaping, and slotting machines.

Prerequisite:

1. Workshop Practice
2. Engineering Drawing



Course Content:		
Unit No.	Description	Hrs.
1	Introduction: Introduction to Manufacturing, Selection of Manufacturing Processes, casting processes, Patterns: Pattern materials, types of patterns, allowances, Molding sand, Properties of molding sands, Core making, gating system, melting practices and furnaces, Pure Metals, Alloys, Fluid Flow, Fluidity of Molten metal.	8
2	Casting Processes: Introduction to Casting, Directional and Progressive solidification, Cleaning and Finishing of casting, Defects and remedies, Principle and equipment of Permanent mound casting, Sand Casting, Shell Molding, Investment casting, Die casting, Centrifugal casting, Vacuum Casting, Continuous casting, casting defects and remedies.	8
3	Metal Forming Process: Rolling and Forging Introduction, Hot and cold working processes Rolling: Introduction, Hot and Cold Rolling, Rolling Mill Classification, Defects in Rolling. Forging: Introduction, Hand Forging Operations, Forging Machines (Board, Air and Steam and Hydraulic Hammer), Open and Closed Die Forging, Defects in Forging.	8
4	Metal Forming Process: Extrusion, Drawing & Sheet Metal Working Extrusion: Introduction, Types of Extrusion, Defects in Extrusion. Drawing: Wire and tube drawing process. Sheet Metal Working: Bending, deep drawing, blanking, piercing, embossing and coining	8
5	Joining Process: Classification of joining processes, Welding terminology and types of joints Arc Welding Processes: Principles and equipment of Single carbon arc welding, Oxyfuel gas Welding, FCAW, TIG, MIG, SAW Resistance Welding: Spot, Seam and Projection weld process, Gas Welding and Cutting, Soldering, brazing and braze welding, Weld inspection, Defects in various joints and their remedies.	8



References:

Textbooks:

1. P. L. Jain, “Principles of Foundry Technology”, Tata McGraw-Hill, New Delhi, 2nd Edition.2014
2. P. N. Rao, “Manufacturing Technology- Foundry, Forming and Welding, Vol. I”, Tata-McGraw-Hill, New Delhi, 3rd edition, 2014
3. S.K. Hajra Choudhury and A.K. Hajra Choudhury, “Elements of Workshop Technology vol. II”, Media promoters and Publishers Pvt. Ltd, New Delhi,13th Edition,2012.
4. R. K. Rajput “A Textbook of Manufacturing Technology” Laxmi Publications Pvt. Ltd, New Delhi.
5. B. S. Raghuwanshi, “A Course in Workshop Technology Volume 1 and Volume 2”, Dhanpat Rai & Co.

Reference books:

1. Serope Kalpak Jain and Steven R. Schmid, “Manufacturing Engineering and Technology”, Addison Wesley Longman (Singapore) Pte. India Ltd., 6th edition, 2009.
2. Milkell P. Groover, “Fundamentals of Modern Manufacturing: Materials, Processes, and Systems”, John Wiley and Sons, New Jersey, 4th edition, 2010.
3. Paul DeGarmo, J.T. Black, Ronald A. Kohser, “Materials and Processes in Manufacturing”, Wiley, 10th edition, 2007.

Open-Source Learning Resources:

1. Manufacturing Process Technology I & II By Prof. Shantanu Bhattacharya | IIT Kanpur https://onlinecourses.nptel.ac.in/noc22_me28/preview
2. Manufacturing Processes (Foundry & Casting) Virtual Simulation Lab <https://msvs-dei.vlabs.ac.in/ajay/mpfclab.html>



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class:	Semester:	L	T	P	C
Course Code: 25UGMEMD404	Course Name: Mechanical System Design	2	-	-	2

Course Objectives:

The objectives of course are:

1. Understand Design Steps: Learn how an engineer takes an idea and turns it into a real, sellable product.
2. Choose the Right Materials: Learn how to pick the best materials and manufacturing methods for a machine.
3. Design Safe Tanks: Learn how to safely design pressure tanks (like LPG cylinders or industrial boilers).
4. Move Heavy Materials: Learn how factory moving systems, like airport luggage belts and escalators, are designed.
5. Design for Real Life: Learn how to design products that don't fail easily and can handle real-world variations.
6. Make it User-Friendly: Learn to design machines that are safe, comfortable, and easy for

Course Outcomes:

After completing the course students will be able to

1. Pick standard sizes and correct materials for any basic machine component.
2. Design a safe, leak-proof pressure tank from scratch.
3. Calculate how much motor power is needed to run a factory conveyor belt.
4. Changes a machine's shape, buttons, and handles so it looks good and feels comfortable to use.
5. Predict how reliable a machine is and make sure it won't break down unexpectedly.

Prerequisite:

1. Basic knowledge of Machine and Elements



Course Content:

Unit No.	Description	Hrs.
1	Design Basics & Standards: The steps to design a product. Why we use standard sizes (like standard bolt sizes) instead of random numbers. How to design parts so they are easy to manufacture.	8
2	Designing Pressure Tanks: How to design safe cylinders and spheres that hold high-pressure gas or liquid. How to safely add pipes, nozzles, and openings to these tanks without weakening them.	8
3	Factory Moving Systems: How factory conveyor belts work. How to calculate how strong a belt needs to be and how powerful the motor must be to move heavy materials.	8
4	Human-Friendly Design: How to design machines that fit the human body (shapes, sizes, button placement). Using colors and styles to make products look good and adding proper safety guards.	8
5	Reliability & Lifespan: Using simple math to handle real-world errors in manufacturing. How to calculate the lifespan of a machine and make sure backup systems keep it running.	8

References:

Textbooks:

A. K. Digraskar, “Mechanical System Design”, Laxmi Publications, New Delhi.

V. B. Bhandari, “Design of Machine Elements”, Tata McGraw Hill, New Delhi.

Reference books:

Joseph E. Shigley, “Mechanical Engineering Design”, McGraw-Hill, SI Units Ed.

N. K. Mehta, “Machine Tool Design and Numerical Control”, Tata McGraw Hill.

Open-Source Learning Resources

Design of Machine Elements, IIT Kharagpur <https://nptel.ac.in/courses/112105124>



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: IV	L	T	P	Credit
Course Code: 25UGMEOE405A	Course Name: PLASTIC ENGINEERING AND TECHNOLOGY	3	-	-	3

Course Objectives:

The objectives of course are:

1. Understand the fundamental concept of structure and properties of different kinds of plastics and the mechanism of polymerization.
2. Understand processing of plastics.
3. Design the plastic products.
4. Design compression and transfer molds incorporating essential components.
5. Analyze and design injection molds
6. Understand the cooling system of plastic injection mould.

Course Outcomes:

After completing the course students will be able to

1. Predict the structure and properties of different kinds of plastic material and select the plastic materials for particular end user application.
2. Explain the processing of various plastic materials in relation to end-user requirements.
3. Design the plastic products.
4. Design compression and transfer molds.
5. Design Injection Moulds.
6. Analyze and design efficient cooling systems for injection molds.



Course Content:		
Unit No.	Description	Hrs.
1	Study of Plastic Materials Definition and Classification of Plastic Materials, Properties of plastics, applications, Testing methods for plastics, additives in plastics, Monomers & Polymers, Polymerization - Types of Polymerizations. Introduction to composite plastics, Introduction of polymer degradation and biodegradable plastics, advanced application like Agriculture, Packaging, Building, Transport, Electrical, Electronics, Medical and Furniture.	6
2	Processing of Plastics and Welding of Plastics Processing of Plastics: Injection molding, Extrusion molding, sheet forming processes, calendaring, Blow molding, Processing of thermosetting plastics, compression molding, Transfer molding, rotational molding. Welding of Plastics: Hot gas welding, hot tool welding, High frequency induction welding, laser welding, Infrared welding, ultrasonic welding, friction welding.	7
3	Design of Plastic Parts Basic design features, Tolerances of molded plastics parts, allowances in plastics, Design corners, undercuts, curing time, ribs, minimum wall thickness, design of inserts, cores mold materials.	7
4	Design of compression and transfer molds a) Design and main parts of compression mould, standard insert mould body, design of loading chamber, design of punch, ejectors, stripper guided pin. b) Technology of transfer mould, types, main parts, automation in transfer mould.	8
5	Injection Mould Design Injection mould design, Single, multi cavity, semi-automatic and automatic moulds. Types of injection mould, detailed structure and working. Feed system, Temperature control system, Ejection System, application.	6



List of Experiments/Assignments/Case Studies:

1. Study of plastic material- Polymerization, properties and specific applications in wide areas.
2. Design of Plastic product.
3. Injection mould design for simple components.
4. Design of Compression mould.
5. Design of Blow Mould.
6. Two Case studies for mould Manufacturing-At least one case study with any CAD/CAM software.
7. Study and applications of advanced Plastics.
8. Industry Visit to Plastic Part Manufacturing Units (Minimum. Two Units).

Text Books:

1. Prof. (Dr.) Sanjay K. Nayak, Fundamentals of Plastics Mould Design, Tata McGraw Hill Education Private Limited, New Delhi.
2. Fred W. Billmeyer, JR., "TextBook of Polymer Science", John Wiley & Sons, Singapore, 1994
3. Robert O. Ebewele, "Polymer Science and Technology", Taylor & Francis.

Reference Book

1. J. A. Brydson, "Plastics Materials", Butter worth Heinemann Oxford, 1999
2. Schwartz & good man "Plastics materials and processing"
3. Irwin Rubin "Handbook of Plastic Materials and Technology"
4. Charles A. Harper, "Handbook of Plastic Processes", WILEY India Pvt.Ltd., 2014
5. R.C.Batra, "Comprehensive Injection Moulding", CBS Publishers and Distributors Pvt. Ltd., 2011



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: IV	L	T	P	Credit
Course Code: 25UGMEOE405B	Course Name: Advanced Engineering Materials	3	-	-	3

Course Objectives:

The objectives of course are

COB1: To acquire knowledge about ceramic. COB2:

To study about Polymer materials

COB3: To study about composite building materials COB4:

To familiarize with Nanomaterials

COB5: To gain knowledge about different functional materials

Course Outcomes:

After completing the course students will be able to

CO1: Explain the structure, properties, fabrication routes and applications of ceramics

CO2: Summarize the structure, properties, fabrication routes and applications of polymers

CO3: Describe the constituents, properties, fabrication routes and applications of composites

CO4: Explain the structure, properties, synthesis routes and applications of nanomaterials and the challenges associated with it

CO5: Describe the composition, properties, fabrication routes and applications of other emerging materials such as functionally graded materials, high entropy alloys and super alloys

CO6: Analyse the problems and accordingly suggest materials for different applications



Course Content:		
Unit No.	Description	Hrs.
1	Ceramics Crystal structure, Silicate ceramics, Imperfections in ceramics, Diffusion in ionic materials, Ceramic phase diagram. Fracture behaviour, Stress-strain curve, Mechanisms of plastic deformation, Types and applications of ceramics: Glasses, Refractories, Abrasives, cements etc. Fabrication and processing of glasses, glass-ceramics and clay product; Powder pressing and Tape casting.	6
2	Polymers Polymer molecule chemistry, Molecular configuration, Polymer types, Copolymers, Crystallinity and crystals in polymers, Defects and diffusion in polymeric materials. Stress-strain behaviour, Fracture behaviour, Mechanical properties, Deformation behaviour and Factors affecting mechanical properties of polymers. Crystallization, Melting, Glass-transition, Types and applications, Polymerization, Additives, Forming techniques, Fabrication of elastomers, fibres and films.	7
3	Composites Principle of combined action, Matrix phase, Reinforcement, Rule of mixture, large particle composite and Dispersion strengthened composites Influence of fibre length, Elastic behavior and Tensile stress-strain behavior of continuous and aligned fibre composites, discontinuous and aligned fibre composites and discontinuous and randomly oriented fibre composites. Fabrication/processing, properties and applications of different types of composites.	7
4	Nanomaterials History and scope, Classification, Microstructure and Defects in Nanocrystalline Materials and Effect of Nano-dimensions on Materials Behavior Synthesis Routes: Bottom-Up Approaches, Top-Down Approaches and Consolidation of Nano powders Applications of nanomaterials, Comparison of composites and nanocomposites, Nanostructured Materials with High Application Potential, Concerns and Challenges of Nanotechnology	8
5	Emerging Engineering Materials Functionally Graded Materials: Introduction, Composition, Fabrication, Properties and Applications. High Entropy Alloys: Introduction, Composition, Fabrication, Properties and Applications. Super Alloys: Introduction, Composition, Fabrication, Properties and Applications	6



Text Books

Clyne T. W. and Withers P. J. - 'An Introduction to Metal Matrix Composites' - Cambridge University Press - 2003

Duerig T. W, Melton K. N., Stöckel D. and Wayman C. M. - 'Engineering Aspects of Shape Memory Alloys' - Butterworth Heinemann – 1990

Materials Science and Engineering an Introduction by William D. Callister and David G.

Rethwisch Textbook of Nanoscience and Nanotechnology by B.S. Murthy, P. Shankar, · Baldev Raj, B.B. Rath and James Murday

Reference Books

'Handbook of Nanostructured Materials and Nanotechnology' - Academic Press - 2000

Wang Z. I., Liu Y. and Zhang Z. - 'Handbook of Nanophase and Nanostructured Materials: Vol 1. Synthesis' - Kluwer Academic/Plenum Publishers - 2002

Sinha A. K. - 'Physical Metallurgy Handbook' - McGraw Hill – 2002 Materials Science and Engineering: A First Course by V. Raghavan



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: IV	L	T	P	Credit
Course Code: 25UGMEOE405C	Course Name: Fundamentals of Maintenance and Management Engineering	3	-	-	3

Course Objectives:

The objectives of course are:

CO 1: Understand the fundamentals and importance of maintenance engineering in industry.

CO2: Learn maintenance planning, scheduling, and management techniques.

CO3: Study tribology concepts such as friction, wear, and lubrication.

CO4: Understand machine condition monitoring and diagnostic techniques.

CO5: Apply reliability, availability, and maintainability concepts in maintenance systems.

Course Outcomes:

After completing the course students will be able to

CO1: Explain basic concepts and significance of maintenance engineering.

CO2: Compare and apply different maintenance strategies for industrial equipment.

CO3: Analyze friction, wear, and lubrication practices for improved machine performance.

CO4: Utilize machine health monitoring techniques for condition-based maintenance.

CO5: Evaluate reliability, availability, and maintainability of engineering systems.



Course Content:		
Unit No.	Description	Hrs.
1	Introduction Fundamentals of Maintenance Engineering, Maintenance Engineering, Its Importance in Material & Energy Conservation, Inventory Control, Productivity, Safety, Pollution Control, etc. Safety Regulations, Pollution Problems, Human Reliability, Total Quality Management (TQM), Total Productivity Maintenance (TPM), Environmental Issues in Maintenance, ISO 9000.	6
2	Maintenance Management Types of Maintenance Strategies, Planned and Unplanned Maintenance, Breakdown, Preventive & Predictive Maintenance, Comparison, Advantages & Disadvantages, Computer Aided Maintenance, Maintenance Scheduling, Spare Part Management, Inventory Control, Organization of Maintenance Department	7
3	Tribology In Maintenance Friction Wear and Lubrication, Friction & Wear Mechanisms, Prevention of Wear, Types of Lubrication Mechanisms, Lubrication Processes. Lubricants- Types, General and Special Purpose, Additives, Testing of Lubricants, Degradation of Lubricants, Seal & Packing.	7
4	Machine Health Monitoring Condition Based Maintenance, Signature Analysis, Oil Analysis, Vibration, Noise and Thermal Signatures, OnLine & Off Line Techniques, Instrumentation & Equipment Used in Machine Health Monitoring, Instrumentation in Maintenance, Signal Processing, Data Acquisition and Analysis, Application of Intelligent Systems, Data Base Design	8
5	Reliability, Availability & Maintainability (RAM) Analysis Introduction to RAM Failure Mechanism, Failure Data Analysis, Failure Distribution, Reliability of Repairable and Non-Repairable Systems, Improvement in Reliability, Reliability Testing, Reliability Prediction, Utilization Factor, System Reliability by Monte Carlo Simulation Technique.	6



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18 (2/2A) / 2, Pratap Nagar, OPP. SRP Camp, Vijapur Road, Solapur – 413 008 (Maharashtra)
Ph. No.: 0217 – 2342499, Email Id: contact@agpit.edu.in Website: www.agpit.edu.in

Text Books

1. Srivastava S K, “Industrial Maintenance Management”, S. Chand, 1998
2. L.S. Srinath, “Reliability Engineering”, Affiliated East-West Press, 4th Edition 2005
3. Higgins L.T., “Maintenance engineering hand book”, Mc. Graw Hill Inc, 1995

Reference Books

- 1 Gopal Krishnan and Banerji, Maintenance & Spare parts Management,
- 2 Mishra and Pathak, Maintenance Engineering and 164 Management, PHI
- 3 CNR Rao, Handbook of Condition Monitoring,
- 4 Higgins, Maintenance Engineering Hand Book.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY Mech	Semester: IV	L	T	P	Credit
Course Code: 25UGMEOE405D	Course Name: DESIGN FOR MANUFACTURING AND ASSEMBLY	3	-	-	3

Course Objectives:

The objectives of course are: Introduce the principles and constraints of manufacturability that influence product design.

1. Familiarize students with Design for Manufacturability (DFM) methodology and its application across various manufacturing processes.
2. Enable students to identify infeasible or impractical designs early in the product development cycle.
3. Guide students to select appropriate materials and processes based on functionality and manufacturability.
4. Equip students with tools to improve assembly efficiency through manual and automated design considerations.

Course Outcomes:

After completing the course students will be able to

1. Understand and evaluate quality and cost aspects of product design for manufacture and assembly.
2. Apply Boothroyd's systematic DFA/DFM methods to optimize design and improve manufacturability.
3. Integrate DFM principles in casting, machining, forming, welding, and plastic component design.
4. Analyze and identify key design variables to align product development with customer and process specifications.
5. Apply automation and manual assembly techniques to enhance production efficiency and reliability.



Course Content:		
Unit No.	Description	Hrs.
1	Introduction: Design philosophy steps in Design process - General Design rules for manufacturability - basic principles of design Ling for economical production - creativity in design. Materials: Selection of Materials for design Developments in Material technology - criteria for material selection - Material selection interrelationship with process selection process selection charts.	8
2	Machining Process: Overview of various machining processes - general design rules for machining - Dimensional tolerance and surface roughness - Design for machining - Ease - Redesigning of components for machining ease with suitable examples. General design recommendations for machined parts. Metal Casting: Appraisal of various casting processes, selection of casting process, - general design considerations for casting - casting tolerances - use of solidification simulation in casting design - product design rules for sand casting.	7
3	Metal Joining: Appraisal of various welding processes, Factors in design of weldments - general design guidelines - pre and post treatment of welds - effects of thermal stresses in weld joints - design of brazed joints. Forging - Design factors for Forging - Closed dies forging design - parting lines of dies drop forging die design - general design recommendations. Extrusion & Sheet Metal Work: Design guidelines for extruded sections - design principles for Punching, Blanking, Bending, Deep Drawing - Keeler Goodman Forming Line Diagram - Component Design for Blanking. PLASTICS: Viscoelastic and Creep behavior in plastics – Design guidelines for Plastic components – Design considerations for Injection Moulding.	8
4	Assemble Advantages: Development of the assemble process, choice of assemble method assemble advantages social effects of automation. Automatic Assembly Transfer Systems: Continuous transfer, intermittent transfer, indexing mechanisms, and operator - paced free – transfer machine.	7
5	Design of Manual Assembly: Design for assembly fits in the design process, general design guidelines for manual assembly, development of the systematic DFA methodology, assembly efficiency, classification system for manual handling, classification system for manual insertion and fastening, effect of part symmetry on handling time, effect of part thickness and size on handling time, effect of weight on handling time, parts requiring two hands for manipulation, effects of combinations of factors, effect of symmetry effect of chamfer design on insertion operations, estimation of insertion time.	8



TEXT BOOKS:

1. Assembly Automation and Product Design, Geoffrey Boothroyd, Marcel Dekker Inc., New York, 1st Edition, 1992.
2. Engineering Design: A Materials and Processing Approach, George E. Dieter, McGraw- Hill International, 2nd Edition, 2000.
3. Handbook of Product Design, Geoffrey Boothroyd, Marcel Dekker Inc., New York, 1st Edition, 1990.

REFERENCES:

1. Product Design for Manufacturing and Assembly, Geoffrey Boothroyd, Peter Dewhurst, Winston Anthony Knight, CRC Press, 3rd Edition, 2010.
2. Design for Manufacturability Handbook, James G. Bralla, McGrawHill, 2nd Edition, 1999.
3. Materials and Design: The Art and Science of Material Selection in Product Design, Michael F. Ashby and Kara Johnson, Butterworth-Heinemann, 3rd Edition, 2013.
4. Manufacturing Processes for Design Professionals, Rob Thompson, Thames and Hudson, 1st Edition, 2007.
5. Design and Manufacturing of Plastics Products, Nabil Bashir, WileyScrivener, 1st Edition, 2020.

RESOURCES:

1. <https://ocw.mit.edu/search/?q=manufacturing>
2. <https://www.coursera.org/specializations/digital-manufacturing-design>
3. <https://www.udemy.com/topic/design-for-manufacturing/>
4. https://www.youtube.com/results?search_query=design+for+manufacturing+and+assembly+lecture
5. <https://www.sciencedirect.com/topics/engineering/design-for-manufacture>
6. <https://link.springer.com/search?query=design+for+manufacturing>
7. <https://nptel.ac.in/courses?searchQuery=manufacturing>



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: IV	L	T	P	C
Course Code: 25UGMEIK405E	Course Name: Entrepreneurs Tool Kit	03	-	-	03

Course Objectives:

The objectives of course are:

1. **Systematic Problem Solving:** Master structured frameworks like **TRIZ** and **HIT Matrices** to identify and resolve complex technical contradictions.
2. **User-Centric Design:** Utilize **User Journey Mapping** to visualize interactions and design solutions that address specific user pain points.
3. **Market Intelligence:** Conduct detailed **competitor analysis** to identify market gaps and establish a clear **Unique Selling Proposition (USP)**.
4. **Business Viability:** Apply the **Business Model Canvas** to evaluate the economic sustainability and operational structure of new innovations.
5. **Professional Communication:** Develop the ability to create comprehensive **Project Reports** and deliver high-impact **investor pitches**.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Explain structured approach to define the problem with every possible detail, identify conflicts and solve them.
2. Apply User Journey Map to the selected problem to show user interaction at various stages.
3. Analyze the solutions provided by competitors for effectiveness and gaps if any.

Prerequisite:

A Student who is going to enroll for this course should have following abilities:

1. Creativity and Innovativeness
2. Problem identification
3. Apply design thinking approach to develop working prototype
4. Structured approach to problem solving



Course Content:		
Unit No.	Description	Hrs.
1	Systematic Innovation: Define the problem in depth with all details, Trend prediction, Modeling the problem to identify tradeoffs and contradictions. RIZ: Theory of Inventive problem solving (TRIZ), HIT Matrix, Scamper, Algorithms of brain storming and innovation, Functional Analysis.	5
2	Frugal and Disruptive Innovation: Biomimicry and frugal innovation for prototyping, Disruptive innovation. User Journey Map: Map showing user interaction at every stage of product/service. Step-by step process of UJM creation.	5
3	Competitor analysis: Analysis of competitor and users for similar products, effectiveness of existing solutions and identifications of gaps. Product/Software Design Specifications: Detailed specifications for better product design, detailed UI for software for clarity on user interaction, specify USPs of the product in comparison to the competitors.	5
4	Business Canvas: Definition of a Business Model. The 9 Building Blocks: 1. Customer, 2. Value Propositions, 3. Channels/distribution, 4. Customer relationships, 5. Revenue, 6. Key Resources, 7. Key Activities, 8. Key Partnerships, 9. Cost Structure	5
5	Project Report: a) Economic Aspects, b) Technical Aspects, c) Financial Aspects, d) Production Aspects, e) Managerial Aspects. Investor Pitch Tool: a) Introduction and content sharing, b) Helpful Tips about preparation, pitching, c) Does and Don'ts, d) Introduction, e) Problem, f) Solution/Product/Service, g) Traction, h) Market Opportunities/ Size, i) Competition, j) Go To Market Strategies, k) Financials, l) Team.	5

References:

- J. Knapp. Design Sprint, Simon & Schuster Publisher.
- D. Silverstein. The Innovator's Toolkit, Wiley Publishing House.
- M. A. Orloff. ABC-TRIZ: Introduction to creative design thinking with modern TRIZ modeling, Springer Publication.
- M. Laverty. Entrepreneurship, OpenStax Publication.

Evaluation Scheme:

ISE – 100% (Minimum Passing: 50%)**Evaluation Method:** In every session students will be assessed. Each assessment will be of minimum 10 marks. The best 10 performances of the student will be considered for ISE.



B. Tech. Second Year Forth Semester Engineering Syllabus (Mechanical Engineering) With Effect from AY 2026-27

Class: SY	Semester: IV	L	T	P	C
Course Code: 25UGMEIK405F	Course Name: Numerical Methods of Mechanical Engineering	03	-	-	03

Course Objectives:

1. To introduce students to the fundamental concepts of numerical methods,
2. To develop students' ability to analyze and estimate computational errors,
3. To enable students to solve nonlinear and simultaneous algebraic equations.
4. To develop proficiency in numerical integration and differential equations,
5. To equip students with interpolation, curve-fitting and regression techniques
6. To introduce students to modern computational and machine-learning-based techniques
7. To develop students' problem-solving and computational skills

Course Outcomes: Students will be able to:

1. Use numerical methods in modern scientific computing.
2. Determine numerical solutions of nonlinear equations in a single variable.
3. Use numerical interpolation and obtain numerical solution to engineering problems using programming.
4. Estimate solution to problems using numerical integration and differentiation.



Course Content:		
Unit No.	Description	Hrs.
1	Numerical Integration: Trapezoidal rule, Simpson's 1/3rd Rule, Simpson's 3/8th Rule, Gauss Quadrature (2-point and 3-point method). Double Integration: Using Trapezoidal rule and Simpson's 1/3rd Rule.	7
2	Ordinary Differential Equations (ODE): Taylor series method, Euler Method, Runge-Kutta fourth order, Simultaneous equations using Runge-Kutta second-order method.	7
3	Partial Differential Equations (PDE): Finite Difference Methods - Introduction to finite difference method, Simple Laplace method, Parabolic explicit solution, Elliptic explicit solution.,	7
4	Curve fitting and Regression analysis: Interpolation: Approximation by Forward, Backward, Central, and Divided Difference Formulae, Interpolation using Newton's Formulae, Lagrange's Method, Spline Interpolation, Hermite and Stirling Formulae. Curve Fitting: Least Square Technique (Straight line, Power equation, Exponential equation, Quadratic equation).	9
5	Regression using Machine Learning Algorithms: Linear Regression, Logistic Regression, Polynomial Regression, Support Vector Regression, Regression Trees (Decision tree, Random Forest), Ridge Regression, Lasso Regression. Clustering and Neural Networks: K-Means, K-Nearest Neighbor (KNN), Artificial Neural Networks.	10

Textbooks:

- [1] Steven C. Chapra, Raymond P. Canale, Numerical Methods for Engineers, 7th Edition, McGraw-Hill Education, 2015.
- [2] Steven C. Chapra, Applied Numerical Methods with MATLAB for Engineers and Scientists, 4th Edition, McGraw-Hill Education, 2018.
- [3] S. S. Sastry, Introductory Methods of Numerical Analysis, 5th Edition, PHI Learning, 2012.
- [4] Rajaraman, Computer Oriented Numerical Methods, Revised Edition, PHI Learning.
- [5] T. Veeraranjan, T. Ramachandran, Theory and Problems in Numerical Methods, Revised Edition, McGraw-Hill Education.

Reference Books:

- [1] William H. Press, Saul A. Tenkolsky, William T. Vetterling, Brian P. Flannery, *Numerical Recipes: The Art of Scientific Computing*, 3rd Edition, Cambridge University Press, 2007.
- [2] Aurélien Géron, *Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems*, 2nd Edition, O'Reilly Media, 2019.
- [3] Alex Smola, S.V.N. Vishwanathan, *Introduction to Machine Learning*, 2nd Edition, Cambridge University Press, 2020.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester:	L	T	P	C
Course Code: 25UGMEIK406	Course Name: Essence Of Indian Traditional Knowledge	02	-	-	02

Course Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system.

Course Outcomes:

Course Outcomes

CO 1: Understand the concept of Traditional knowledge and its importance.

(L2) CO 2: Know the need and importance of protecting traditional knowledge.

(L2)

CO 3: Know the various enactments related to the protection of traditional knowledge. (L2)

CO 4: Understand the concepts of Intellectual property to protect the traditional knowledge.

(L2) CO 5: Understand the traditional knowledge in different sectors. (L2)

Prerequisite:



Course Content:		
Unit No.	Description	Hrs.
1	Introduction to traditional knowledge Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge	6
2	Protection of traditional knowledge The need for protecting traditional knowledge Significance of TK Protection, the value of TK in the global economy, Role of Government to harness TK.	6
3	Legal framework and Traditional Knowledge A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act); B: The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.	6
4	Traditional knowledge and intellectual property Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.	6
5	Traditional knowledge in different sectors Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.	6

References:

Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

References:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
- "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	Credit
Course Code: 25UGMEAE407	Course Name: Introduction to Body language & mass communications.	02	-	-	2

Course Objectives:

The objectives of course are:

1. To introduce students to the fundamentals of communication and body language.
2. To develop understanding of traditional, broadcast, and digital media systems.
3. To familiarize students with media ethics, regulations, and social responsibility.
4. To enhance professional communication skills required for engineers.
5. To improve students' ability to create, interpret, and present content effectively across media platforms

Course Outcomes:

After completing the course students will be able to

CO1: Explain the concepts, process, and types of communication and demonstrate appropriate body language in professional contexts.

CO2: Describe the structure and functioning of print, broadcast, and digital media.

CO3: Apply basic content creation techniques for traditional and digital media platforms. **CO4:** Analyze the role of media in society and identify ethical issues including fake news and media regulations.

CO5: Demonstrate effective technical and professional communication skills such as report writing, presentations, group discussions, and interviews.

Prerequisite:

Fundamental knowledge of verbal and written communication in English and basic awareness of media platforms.



Course Content:		
Unit No.	Description	Hrs.
1	Foundations of Communication and Body Language Concept, nature and types of communication; Communication process and elements; Introduction to body language – meaning, types and role in professional communication	7
2	Traditional and Broadcast Media Basics of print media; Structure of newspapers; News writing (5Ws & 1H); Introduction to radio and television; Basics of broadcast communication; Audio-visual elements	7
3	Digital Media and Content Creation New media platforms; Social media communication; Basics of content creation; Mobile journalism; Online ethics and cyber law overview	7
4	Media, Society and Ethical Practices Media influence on society; Social responsibility; Overview of media regulations in India; Fake news and ethical issues	7
5	Professional Communication for Engineers Technical writing basics; Public speaking and presentations; Group discussion and interview skills; Professional networking platforms; Visual communication basics	7

Text books: References:

Text Books

1. Meenakshi Raman & Prakash Singh, Business Communication, Oxford University Press.
2. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press.

Reference Books

1. Denis McQuail, McQuail's Mass Communication Theory, Sage Publications.
2. M. Ashraf Rizvi, Effective Technical Communication, McGraw Hill Education.

Open-Source Learning Resources

1. SWAYAM / NPTEL – Courses on Communication Skills and Media Studies.
2. e-PG Pathshala (UGC) – Mass Communication modules.

Virtual Labs / Practical Learning Resources

1. NPTEL Video Lectures on Soft Skills and Technical Communication.
2. Google Digital Garage – Fundamentals of Digital Communication.



B. Tech. Second Year Forth Semester Engineering Syllabus (Mechanical Engineering) With Effect from AY 2026-27

Class: SY	Semester: III	L	T	P	Credit
Course Code: 25UGMEVE408	Course Name: BASIC HUMAN RIGHT	2	-	-	2

Course Objectives:

1. To train the young minds facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture.
2. To give knowledge of the major "signposts" in the historical development of human rights, the range of contemporary declarations, conventions, and covenants.
3. To enable them to understand the basic concepts of human rights (including also discrimination, equality, etc.), the relationship between individual, group, and national rights.
4. To develop sympathy in their minds for those who are denied rights.
5. To make the students aware of their rights as well as duties to the nation.

Course Outcomes:

On completion of the course, students will be able to:

CO1 Students will be able to understand the history of human rights.

CO2 Students will learn to respect others caste, religion, region and culture.

CO3 Students will be aware of their rights as Indian citizen.

CO4 Students will be able to understand the importance of groups and communities in the society.

CO5 Students will be able to realize the philosophical and cultural basis and historical perspectives of human rights.



Course Content:		
Unit No.	Description	Hrs.
1	UNIT1: The Basic Concepts: Individual, group, civil society, state, equality, justice. Human Values, Human rights and Human Duties: - Origin, Contribution of American bill of rights, French revolution. Declaration of independence, Rights of citizen, Rights of working and exploited people.	8
2	UNIT 2 Fundamental rights and economic programmed: Society, religion, culture, and their inter-relationship. Impact of social structure on human behavior, Social Structure and Social Problems: - Social and communal conflicts and social harmony, rural poverty, unemployment, bonded labor.	7
3	UNIT3: Migrant workers: Migrant workers and human rights violations, human rights of mentally and physically challenged. State, Individual liberty, Freedom and democracy. NGOs and human rights in India: - Land, Water, Forest issues.	7
4	UNIT4: Human rights in Indian constitution and law i) The constitution of India: Preamble ii) Fundamental rights. iii) Directive principles of state policy. v) Fundamental duties. v) Some other provisions.	7
5	UNIT5: Universal declaration: Universal declaration of human rights and provisions of India, Constitution and law, National human rights commission and state human rights commission.	7

Text/Reference Books

1. Shastry, T.S.N., India and Human rights: Reflections, Concept Publishing Company India (Private Ltd.), 2005
2. Nirmal, C.J., Human Rights in India: Historical, Social and Political Perspectives (Law in India), Oxford India.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: III	L	T	P	Credit
Course Code: 25UGMEPC409L	Course Name: Strength of Material Lab		-	02	01

List of Experiments:

1. Tension test for ductile material using extensometer on Universal Testing Machine.
2. Compression test for Brittle material on Universal Testing Machine.
3. To understand the working principle of Strain gauge - Virtual Lab experiment
4. Shear test of ductile material on Universal Testing Machine.
5. Slope & deflection calculation for a simply supported beam with point load at center.
6. Torsion testing for circular bar.
7. Verification of results of any one from experiments no 1-6 using any software tools.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: IV	L	T	P	C
Course Code: 25UGMEPC410L	Course Name: Manufacturing Process-I Lab	-	-	2	1

List of Experiments:

1. Making a simple component by sand casting using a split pattern.
2. An experiment on blanking operation.
3. An experiment on drawing operation
4. Cutting of a steel plate using oxyacetylene flame cutting /plasma cutting.
5. Making a butt joint on two stainless steel plates using TIG/MIG Welding.



**B. Tech. Second Year Forth Semester Engineering Syllabus
(Mechanical Engineering) With Effect from AY 2026-27**

Class: SY	Semester: IV	L	T	P	C
Course Code: 25UGMEVS411L	Course Name: DESIGN THINKING LAB	2	-	-	1

Course Objectives:

The objectives of course are:

Systematic Problem Solving: Master structured frameworks like TRIZ and HIT Matrices to identify and resolve complex technical contradictions.

User-Centric Design: Utilize User Journey Mapping to visualize interactions and design solutions that address specific user pain points.

Market Intelligence: Conduct detailed competitor analysis to identify market gaps and establish a clear Unique Selling Proposition (USP).

Business Viability: Apply the Business Model Canvas to evaluate the economic sustainability and operational structure of new innovations.

Professional Communication: Develop the ability to create comprehensive Project Reports and deliver high-impact investor pitches.

Course Outcomes:

After successful completion of the course, students will be able to:

1. Identify the new product opportunities and sources of new product ideas.
2. Elaborate the product life cycle and product design process.
3. Integrate the customer and end-consumer needs into design process.
4. Assimilate the various product characteristics to design a novel product.
5. Participate effectively in group work sessions and teams to become acquainted with the importance of teamwork and collaboration that is critical to new product success.

Prerequisite:

Course is open to all Students. The course demands application of creativity, sensitivity towards solving problems and liking for doing something new and creative.



Sr. No.	Title of Experiment	Hours
1	To arrange field visit at waste collection zones in Solapur City	4
2	To prepare Biochar from organic waste Biomass	6
3	To study working of CNC machines (In house /Industrial Visit)	4
4	To Design and Manufacture a mechanical component by using 3D Printing Process (FDM)	6
5	To study and assemble the components of Automated Guided Vehicles (Electronic Kits)	6
6	To Identify any technical problem and provide a solution by using DT Techniques	4
7	To prepare Prototype of the solution	6
8	To prepare a report of the Prototype model	4