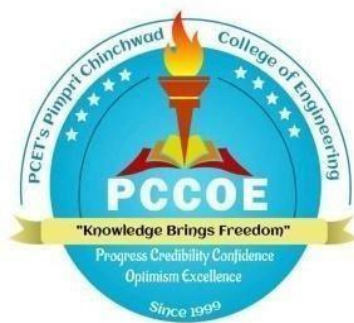


Pimpri Chinchwad Education Trust's
PIMPRI CHINCHWAD COLLEGE OF ENGINEERING
SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044
(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)



Curriculum Structure and Syllabus
of
First Year B. Tech. Mechanical Engineering
(Regulations 2023)



Effective from Academic Year 2025-26

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value-Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with ability to think and act independently in demanding situations.

EOMS Policy

“We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institute’s social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS).”

Course Approval Summary

Board of Studies - Department of Mechanical Engineering

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Engineering Mechanics	BME21ES01	17	 Chairman BoS, Mechanical Engineering PCET's, Pimpri Chinchwad College of Engineering Sector No. 26, Pradhikaran, Nigdi, Pune-44
2	Manufacturing Technology	BME21ES02	19	
3	Engineering Graphics Laboratory	BME21PC01	21	
4	Workshop Practice 1	BME21VS01	23	
5	Programming & problem- Solving laboratory 1	BME21VS02	25	
6	Engineering Thermodynamics	BME22ES03	37	
7	Engineering Thermodynamics Lab	BME22ES04	39	
8	Fundamentals of Electromechanical Systems	BME22ES05	40	
9	Fundamentals of Electromechanical Systems Lab	BME22ES06	42	
10	Programming & Problem-Solving lab 2	BME22VS03	43	
11	Workshop Practice 2	BME22VS04	44	

Board of Studies – Applied Science and Humanities

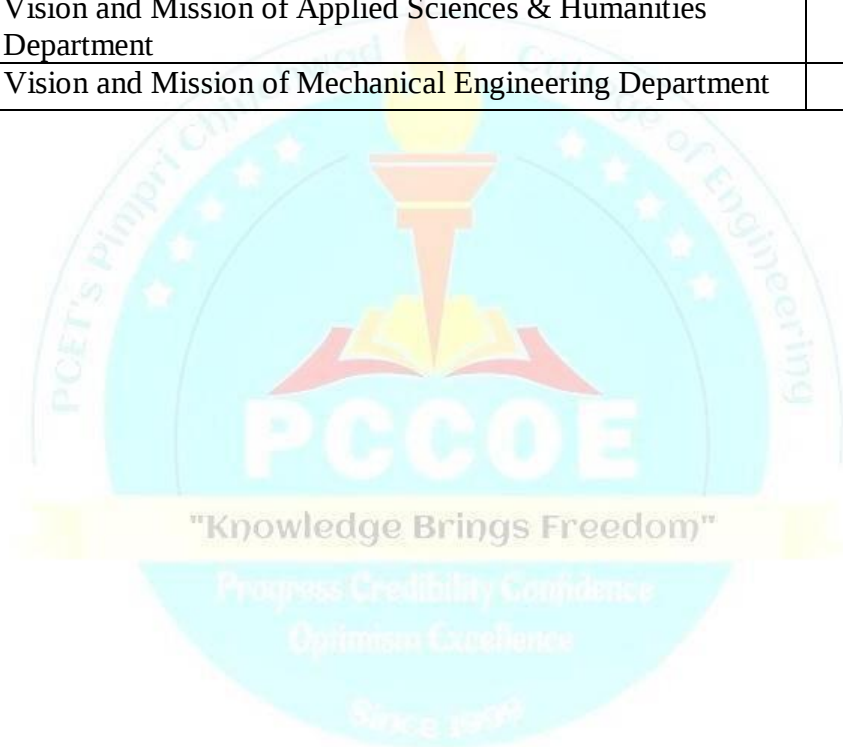
Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Linear Algebra & Univariate Calculus	BSH21BS01	11	 Chairman BoS, Applied Sciences & Humanities PCET's, Pimpri Chinchwad College of Engineering Sector No. 26, Pradhikaran, Nigdi, Pune-44
2	Linear Algebra & Univariate Calculus Laboratory	BSH21BS02	12	
3	Engineering Physics	BSH21BS03	13	
4	Engineering Physics Laboratory	BSH21BS04	15	
5	Indian Knowledge System	BSH21IK01	26	
6	Life Skill I	BSH21CC01	28	
7	Multivariate Calculus	BSH22BS07	31	
8	Multivariate Calculus Laboratory	BSH22BS08	32	
9	Engineering Chemistry	BSH22BS05	33	
10	Engineering Chemistry Laboratory	BSH22BS06	35	
11	AEC (Eng/Ger/Jap /Business story telling)	BSH22AE01/02/03/04	45/47/49/51	
12	Life Skill II	BSH22CC02	54	

Approved by Academic Council:
 Chairman, Academic Council
 Pimpri Chinchwad College of Engineering


Chairman
 Academic Council
 PCET's, Pimpri Chinchwad College of Engineering
 Sector No. 26, Pradhikaran, Nigdi, Pune-44

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CURRICULUM FRAMEWORK (2023 Regulations)

LIST OF ABBREVIATIONS

Sr. No.	Abbreviation	Type of Course
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	PCC	Program Core Course
4	PEC	Program Elective Course
5	MDM	Multidisciplinary Minor
6	OEC	Open Elective Course
7	VSEC	Vocational and Skill Enhancement Course
8	AEC	Ability Enhancement Course
9	EEM	Entrepreneurship/Economics/Management Course
10	IKS	Indian Knowledge System
11	VEC	Value Education Course
12	ELC	Experiential Learning Courses
13	CC/LLC	Co-curricular courses / Liberal Learning Courses

COURSE WISE CREDIT DISTRIBUTION

Sr. No.	Type of Course	No. of Courses	Total Credits	
			No.	%
1	Basic Science Course	8	14	35
2	Engineering Science Course	6	12	30
3	Programme Core Course	1	2	5
4	Vocational and Skill Enhancement Course	4	4	10
5	Ability Enhancement Course	1	2	5
6	Indian Knowledge System	1	2	5
7	Co-Curricular Courses	2	4	10
Total		23	40	100

SEMESTER-WISE COURSE DISTRIBUTION

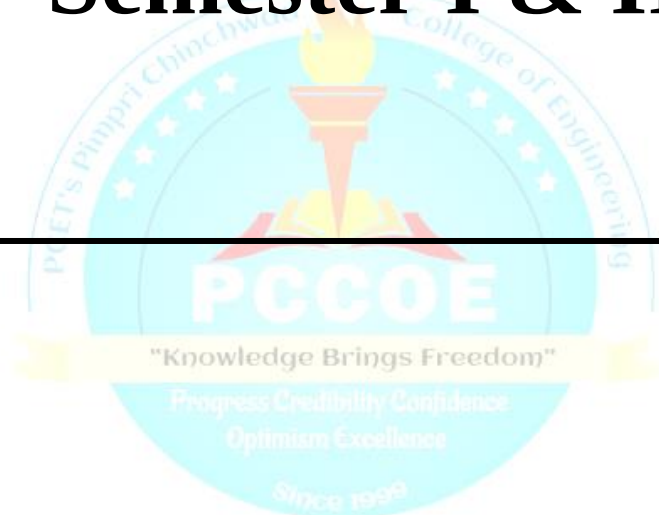
Course Distribution: Semester Wise										
Sr. No.	Type of Course	No. of Courses / Semester								Total
		1	2	3	4	5	6	7	8	
1.	Basic Science Course	4	4							8
2.	Engineering Science Course	2	4							6
3.	Programme Core Course	1	-							1
4.	Vocational and Skill Enhancement Course	2	2							4
5.	Ability Enhancement Course	-	1							1
6.	Indian Knowledge System	1	-							1
7.	Co-Curricular Courses	1	1							2
Total		11	12							23

SEMESTER-WISE CREDIT DISTRIBUTION

Credit Distribution: Semester Wise										
Sr. No.	Type of Course	No. of Credits / Semester								Total
		1	2	3	4	5	6	7	8	
1.	Basic Science Course	7	7							14
2.	Engineering Science Course	5	7							12
3.	Programme Core Course	2	-							2
4.	Vocational and Skill Enhancement Course	2	2							4
5.	Ability Enhancement Course	-	2							2
6.	Indian Knowledge System	2	-							2
7.	Co-Curricular Courses	2	2							4
Total		20	20							40

Curriculum Structure

Semester I & II



CURRICULUM STRUCTURE

First Year B. Tech. Mechanical Engineering- Semester – I

First Year B. Tech Mechanical Engineering (Academic Regulations 2023)																		
(With effect from Academic Year 2025-26)																		
Semester-I																		
Course Type	Course Code	Course Name	Credit Scheme				Teaching Scheme (Hrs/Week)					Evaluation Scheme and Marks						
			L	P	T	Total	L	P	T	O	Total	FA		SA	TW	PR	OR	Total
												FA1	FA2					
BSC	BSH21BS01	Linear Algebra & Univariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSC	BSH21BS02	Linear Algebra & Univariate Calculus Laboratory	-	1	-	1	-	2	-	-	2	-	-	-	25	25	-	50
BSC	BSH21BS03	Engineering Physics	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSC	BSH21BS04	Engineering Physics Laboratory	-	2	-	2	-	4	-	-	4	-	-	-	50	50	-	100
ESC	BME21ES01	Engineering Mechanics	2	-	1	3	2	-	1	1	4	20	20	60	-	-	-	100
ESC	BME21ES02	Manufacturing Technology	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
PCC	BME21PC01	Engineering Graphics Laboratory	-	2	-	2	-	4	-	1	5	-	-	-	100	-	-	100
VSEC	BME21VS01	Workshop Practice I	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
VSEC	BME21VS02	Programming & Problem-solving Laboratory I	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
IKS	BSH21IK01	Indian Knowledge System	2	-	-	2	2	-	-	-	2	25	25	-	-	-	-	50
LLC	BSH21CC01	Life Skill I	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-	100
Total			10	9	1	20	10	18	1	05	34	75	75	150	375	75	-	750

L-Lecture, **P**-Practical, **T**-Tutorial, **O**-Other, **FA**-Formative Assessment, **SA**-Summative Assessment, **TW**-Term Work, **OR**-Oral, **PR**-Practical

CURRICULUM STRUCTURE

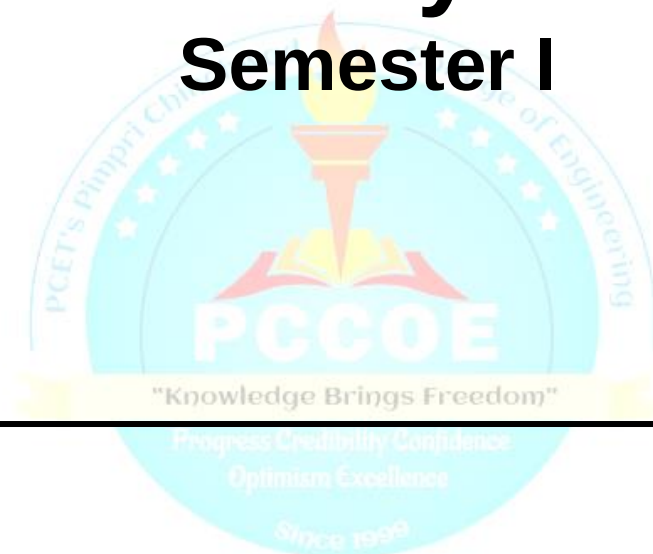
First Year B. Tech. Mechanical Engineering Semester – II

First Year B. Tech Mechanical Engineering (Academic Regulations 2023)																	
(With effect from Academic Year 2025-26)																	
Semester II																	
Course Type	Course Code	Course Name	Credit Scheme				Teaching Scheme (Hrs./Week)					Evaluation Scheme and Marks					
			L	P	T	Total	L	P	T	O	Total	FA		SA	TW	PR	OR
												FA1	FA2				
BSC	BSH22BS07	Multivariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-
BSC	BSH22BS08	Multivariate Calculus Lab.	-	1	-	1	-	2	-	-	2	-	-	-	25	25	-
BSC	BSH22BS05	Engineering Chemistry	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-
BSC	BSH22BS06	Engineering Chemistry Lab.	-	2	-	2	-	4	-	-	4	-	-	-	50	50	-
ESC	BME22ES03	Engineering Thermodynamics	2	-	1	3	2	-	1	1	4	20	20	60	-	-	-
ESC	BME22ES04	Engineering Thermodynamics Lab	-	1	-	1	-	2	-	-	2	-	-	-	25	-	25
ESC	BME22ES05	Fundamentals of Electromechanical Systems	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-
ESC	BME22ES06	Fundamentals of Electromechanical Systems Lab	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-
VSEC	BME22VS04	Workshop Practice 2	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-
VSEC	BME22VS03	Programming & Problem-Solving Laboratory 2	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-
AEC	BSH22AE 01 /02 /03 /04	AEC (Eng/Ger/ Jap/Business story telling)	1	1	-	2	1	2	-	-	3	10	10	30	-	-	-
LLC	BSH22CC02	Life Skill II	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-
Total			9	10	1	20	9	20	1	4	34	60	60	180	350	75	25

L-Lecture, **P**-Practical, **T**-Tutorial, **O**-Other, **FA**-Formative Assessment, **SA**-Summative Assessment, **TW**-Term Work, **OR**-Oral, **PR**-Practical

Course Syllabus

Semester I



Program:	B. Tech. (Mechanical)				Semester: I			
Course:	Linear Algebra & Univariate Calculus				Code:BSH21BS01			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	20		30	50
Prior knowledge of 1. Elementary Mathematics. 2. Elementary Calculus.								
Course Objectives: This course aims at enabling students, 1.To strengthen the concept of univariate calculus and mathematical modeling of physical systems using ordinary differential equations. 2.To get acquainted with advanced techniques for solving problems related to calculus and ordinary differential equations								
Course Outcomes: After learning the course, the students should be able to: 1.Apply the concept of linear algebra for the solution of the system of equations, linear dependence/independence of vectors and finding Eigen values and Eigen vectors. 2.Evaluate the problems of indeterminate forms, Taylor's and Maclaurin's expansions using successive differentiation 3.Formulate the mathematical models related to orthogonal trajectories, electrical circuits and one-dimensional heat flow and solve using ordinary differential equations. 4.Solve higher-order linear differential equations and Apply it to evaluate the current for electrical circuits.								
Detailed Syllabus								
Unit	Description							Duration [Hrs]
I	Matrices: Rank, System of linear equations with applications in electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.							8
II	Differential Calculus: Indeterminate Forms, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.							7
III	Ordinary Differential Equations: Exact differential equations, Differential equations reducible to Exact form. Applications: Orthogonal trajectories, Kirchoff's law of electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).							8
IV	Linear Differential Equations: Linear differential equation of n^{th} order with constant coefficients, General method, Shortcut methods, Method of variation of parameters, Application of linear differential equations in engineering viz. mass spring system, electrical circuits etc.							7
Total								30
Text Books: 1. Higher Engineering Mathematics by B.V. Ramana, 34e, Tata McGraw-Hill. 2. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.								
Reference Books: 1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd. 2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd. 3. Advanced Engineering Mathematics by M. D. Greenberg, 2e, Pearson Education. 4. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi								
e-sources: NPTEL Course lectures links 1. https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5								

Program:	B.Tech. (Mechanical)			Semester: I			
Course:	Linear Algebra & Univariate Calculus Laboratory			Code: BSH21BS02			
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	-	25	50
Prior knowledge: 1. Elementary Algebra. 2. Elementary Calculus							
Course Objectives: This course aims to enable students, 1. To equip with the ability to apply MATLAB for solving engineering problems involving matrices, ordinary differential equations, and differential calculus. 2. To develop skills in applying mathematical concepts to solve real-world problems through project implementation.							
Course Outcomes: After learning the course, the students will be able to: 1. Develop MATLAB programs to solve problems related to matrices, differential calculus, and ordinary differential equations. 2. Prepare a well-structured technical Mini Project report and deliver an effective presentation with clarity and comprehensive understanding of the topic							
Detailed Syllabus							
Expt. No.	List of Experiments using MATLAB						
1	Introduction to MATLAB and basic commands						
2	Conversion of matrices into systems of linear equations						
3	Conversion and solution of systems of linear equations into matrix form						
4	Linearly dependent/independent vectors, eigenvalues, and eigenvectors						
5	Evaluation of Indeterminate Forms,						
6	Expanding functions by using Taylor's and Maclaurin's Theorems						
7	Successive Differentiation						
8	Solution of Exact & Non-Exact Differential Equations						
9	Solve higher-order linear differential equations						
10	Apply the method of linear differential equations to determine the current or charge in the given electrical circuit						
11	Apply the method of linear differential equations to determine the temperature distribution using the principles of heat conduction (Fourier's Law of Heat Conduction)						
12	Mini Project* (14 hrs.)						
*Mini Project Guidelines: Students must prepare a mini-project based on topics such as matrices, ordinary differential equations, differential calculus, or other relevant mathematical concepts.							
General Guidelines: 1. The project group shall consist of not more than 4 students per group. 2. The project report should include mathematical analysis or applications, and, where applicable, software performance parameters. 3. The project output must be submitted in the prescribed standard format.							
References: 1. Introduction to MATLAB for Engineers and Scientists by Sandeep Nagar, Springer. 2. INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS by David Houcque, version 1.2, Northwestern University. 3. An Introduction to Differential Equations using MATLAB by Rizwan Butt, Alpha Science International Ltd.							

Program:	B. Tech. (Mechanical)				Semester: I			
Course:	Engineering Physics				Code:BSH21BS03			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of:

1. Atoms, molecules and nuclei.
2. Current, electricity and magnetism.
3. Electromagnetic induction is essential.

Course Objectives: This course aims at enabling students,

1. To build strong conceptual understanding of Semiconductor Physics and Quantum Physics.
2. To explore advances in Physics with introduction of Nanotechnology and Superconductivity.
3. To provide consciousness about the importance of Physics principles in various engineering applications.

Course Outcomes: After learning the course, the students should be able to:

1. Apply basics of semiconductor physics to explain the behaviour of charge carriers inside a semiconductor.
2. Distinguish wave behaviour of a matter particle for the manipulation of the processes at quantum scale.
3. Apply the fundamental principles of quantum physics to understand the basic concepts of quantum computing and superconductivity.
4. Summarize properties, preparation methods of nanomaterials and explore their applications in various engineering fields.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	Semiconductor Physics Formation of bands in solids, electrical conductivity of conductors (qualitative) and semiconductors (intrinsic and extrinsic with derivation). Hall effect (with derivation) and its applications, Fermi level in metal and semiconductors, Fermi Dirac probability distribution function (at $T=0K$ and $T>0K$), position of Fermi level (intrinsic and extrinsic), variation of Fermi level with temperature and doping concentration. Working of PN junction diode on the basis of energy band diagram, Solar cell (principle, working, IV characteristics).	7
II	Quantum Mechanics Wave particle duality of radiation and matter, de Broglie hypothesis, de Broglie wavelength in terms of kinetic energy, concept of wave packet, phase and group velocity (definition), properties of matter waves, Heisenberg's uncertainty principle, wave function and its physical significance, normalisation condition, well behaved wave function, Schrödinger's time independent wave equation, applications of independent wave equation to the problem of (i) particle in rigid box, (derivation for energy and wave function), (ii) particle in non-rigid box (qualitative). Tunnelling effect.	8
III	Introduction to Quantum Computing and Superconductivity: Quantum Computing: Classical to Quantum (Bits vs Qubits), limitations of classical computers, advantages of quantum computing. Superposition, entanglement, quantum interference, measurement in quantum systems, Qubits (definition and physical realization of qubits, representation using Dirac notation ($ 0\rangle$, $ 1\rangle$), quantum gates (Pauli-X, Hadamard, CNOT, SWAP), quantum circuits, comparison with	8

	classical logic gates. Applications of quantum computing. Superconductivity: Introduction, critical temperature, properties of superconductors: zero electrical resistance, persistent current, Meissner effect, critical magnetic field, isotope effect, BCS theory, type I and II superconductors, low T _c and high T _c superconductors, AC and DC Josephson effect, DC-SQUID-construction, working and applications, applications of superconductivity-superconducting magnets, maglev trains.	
IV	Introduction to Nanoscience Introduction, surface to volume ratio, quantum confinement, properties of nanomaterials- optical, electrical, mechanical, magnetic; methods of preparation of nanomaterials- bottom-up and top-down approaches, physical methods- high energy ball milling, physical vapor deposition; chemical method - colloidal route for synthesis of gold nanoparticle, applications of nanomaterials in medical, electronics, energy, automobile, space, defence.	7
Total		30
Text Books: 1. A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2024, S. Chand & Company Pvt. Ltd. 2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd. 3. Nanotechnology -Principles & Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company. 4. Quantum Computation and Quantum Information by Nielsen and Chuang, Cambridge University Press.		
Reference Books: 1. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press. 2. Introduction to Solid States Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd. 3. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education. 4. Heat and Thermodynamics, Anand Amoy Manna, Pearson Publishers 2011.		
e-sources: 1. NPTEL Semiconductor Devices and Circuits Instructor: Prof. Neeraj Khare, IIT Delhi Link: https://nptel.ac.in/courses/117102062 Instructor: Prof. Shashank Tripathi, IIT Kanpur Link: https://nptel.ac.in/courses/115104112. 2. NPTEL Course: Quantum Physics Instructor: Prof. D. K. Ghosh, IIT Bombay Link: https://nptel.ac.in/courses/115101107 Instructor: Prof. V. Balakrishnan, IIT Madras Link: https://nptel.ac.in/courses/122106034 3. NPTEL Course: Introduction to quantum computing Instructor: Prof. Prabha Mandayam: Associate Professor at IIT Madras, Link: https://nptel.ac.in/courses/106106232 4. NPTEL Course: Superconductivity Instructor: Prof. P. S. Anil Kumar, IISc Bangalore Link: https://nptel.ac.in/courses/115108078 Instructor: Prof. Arghya Taraphder, IIT Kharagpur Link: https://archive.nptel.ac.in/courses/115/105/115105131/ 5. NPTEL Course: Introduction to Nanoscience and Technology Instructor: Prof. V. Ramgopal Rao, IIT Bombay Link: https://nptel.ac.in/courses/118102003 Instructor: Prof. M. K. Radhakrishnan Link: https://nptel.ac.in/courses/117108047		

Program:	B. Tech (Mechanical)			Semester: I			
Course:	Engineering Physics Laboratory			Code:BSH21BS04			
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Course Objectives:

1. To provide better understanding of concepts, principles of Physics by giving hands on experience.
2. To develop an insight in scientific experimental methodologies.

Course Outcomes:

1. To demonstrate concepts of optics by performing experiments using optical instruments.
2. To analyse experimental data, understand the significance of results and draw conclusions about semiconductor material properties and device performance.
3. To conduct experiments related to magnetism and sound; interpret result within the framework of physical theories.
4. To apply core concepts from engineering physics, such as mechanics, electricity and magnetism, optics, or materials science for a focused mini project.

Detailed Syllabus

Expt. No.	Title of Experiments
	Group A
1	Newton's Rings (To demonstrate the phenomenon of interference of light in wedge shaped film)
2	Newton's Rings (To determine the radius of curvature of Plano-convex lens)
3	Diffraction Grating (To determine the wavelength of different colours)
4	Diffraction Grating (To determine the wavelength of monochromatic source of light)
5	Malus Law (To verify the Malus Law of polarization of light)
6	Double Refraction: Birefringence (To determine refractive indices and type of crystal)
7	LASER (To determine the size of grating element using LASER)
8	Ultrasonic Interferometer (To determine the compressibility of given liquid)
9	Solar Cell (To determine Fill Factor using IV characteristics)
10	Energy Band Gap (To determine band gap of given semiconductor)
11	Four Probe Method (To determine the resistivity of a given sample)
12	Four Probe Method (To determine the energy band gap of a given sample)
	Group B
1	Hall effect (To demonstrate the Hall effect in semiconductors)
2	Hall effect (To determine the Hall coefficient, mobility and charge carrier in a given semiconductor)
3	Quincke's method (To determine the magnetic susceptibility of MnSO ₄ .H ₂ O solution)
4	Quincke's method (To determine the magnetic susceptibility of FeCl ₃ solution)
5	Sound Absorption Coefficient (To determine the sound absorption coefficient of the given materials)
6	Optic Fibre Cable (To determine the numerical aperture and acceptance angle)
7	Solar Cell (To determine Fill Factor using IV characteristics for series and parallel

	combination)
8	Industry-Driven or Faculty-Initiated Experiment
9	Mini project

Reference Books:

1. Lasers & nonlinear Optics-B. B. Laud-Third edition, New Age International (P)Ltd. Publishers.
2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education Pvt. Ltd.
3. Sensors Handbook- Sabrie Soloman, Second edition, Mc Grew Hill Publications,
4. Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
5. An introduction to Laser' s theory and applications, Dr. M. N. Avdhanulu, Dr. P.S. Hemne, S. Chand & Co. Pvt. Ltd.
6. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.



Program:	B. Tech. (Mechanical)				Semester: I			
Course:	Engineering Mechanics				Code: BME21ES01			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
3	2	-	1	1	20	20	60	100

Prior knowledge of : ---

Course Objectives: This course aims at enabling students,

1. To provide adequate knowledge of mechanics to formulate and analyze problems based on real life situations.
2. To impart fundamental knowledge of analysis of structures, equilibrium of force system.
3. To make aware about basic concepts of statics and dynamics for particles and rigid bodies.
4. To build conceptual understanding of principles of kinetics and kinematics to solve various engineering problems.
5. To explain the significance of centroid, center of gravity, and moment of inertia.

Course Outcomes: After learning the course, the students should be able to:

1. Determine the resultant and equilibrium of different types of force systems for mechanical applications.
2. Illustrate the force analysis on trusses and frames.
3. Determine motion parameters of particles.
4. Compute motion parameters of rigid bodies.
5. Compute the inertial resistance offered by plane lamina.

Detailed Syllabus:

Unit	Description	Duration [Hrs]
I	Force System: Introduction and Principle of statics, force systems, resolution and composition of forces, resultant of concurrent forces, moment of a force, Varignon's theorem, couple, resultant of general force system, free body diagram, equilibrium of three forces in a plane, equilibrium of concurrent forces.	9
II	Analysis of Structures: Introduction, Truss, Types of Frames, Support reactions, Analysis of structures by method of joint, analysis of structures by method of section.	9
III	Dynamics of Particle: Kinematics of particle: Position, Velocity and Acceleration – Rectilinear motion, curvilinear motion, tangential and normal components, radial and transverse components. Kinetics of Particle: Newton's second Law and momentum methods, principle of work energy, Principle of impulse and Momentum.	9
IV	Dynamics of Rigid Bodies Basic terms, Kinematics of Rigid Bodies, Translation and fixed axis rotation, general principles in dynamics; Equations of Motion, Angular Momentum, D'Alembert's principle and its applications in plane motion; Work energy principle and its application in plane motion of connected bodies; Kinetics of rigid body rotation.	9
V	Centroid and Moment of Inertia: Centroid of plane lamina, applications of centroid, moment of inertia (MI), perpendicular axis theorem, parallel axis theorem, MI of standard shapes (I, C, T), MI of composite figures.	9
Total		45

Text Books:

1. Vector Mechanics for Engineers: Static and Dynamics, Beer & Johnston, Mazurek, Cornwell, Self, Tata McGraw-Hill

Reference Books:

1. Engineering Mechanics - Meriam and Cragg, Wiley Publications, 9th Edition, (2020).
2. Engineering Mechanics -Singer Harper & Row, Hill Publishers, 3rd Edition, (1975).
3. Engineering Mechanics -Timoshenko and Young, McGraw Hill Publications, 5th Edition, (2013).
4. Introduction of Engineering Mechanics- S. Rajshekaran and G Sankarasubramanian, Vikas Publications, 1st Edition, (2011).



Program:	B. Tech. (Mechanical)				Semester: I			
Course:	Manufacturing Technology				Code: BME21ES02			
Credits	Teaching Scheme (Hrs. /Week)				Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50
Prior knowledge of: Type of materials, Basic structure and properties of materials is essential.								
Course Objectives: Students are expected to study, 1. Comprehensive knowledge of conventional manufacturing processes used within the manufacturing industry. 2. Impart insights of manufacturing processes by describing the principles of operations, tools, merits and limitations.								
Course Outcomes: After completion of this course, the students will be able to, 1. Identify the appropriate materials and manufacturing processes used within industries for fabrication of a particular part. 2. Describe the principle of operation involved in casting processes and its applications. 3. Compare different forming operations used for different products. 4. Comprehend the machining and joining processes used in manufacturing industries for different applications.								
Detailed Syllabus								
Unit. No.	Suggested List of Experiments						Duration Hrs	
I	Materials and Manufacturing Processes: Introduction to materials and their properties, Manufacturing processes: concept of manufacturing, need, classification, capabilities, applications, and limitations.						7	
II	Casting Processes: Introduction to casting process, classification of casting processes, sand casting process, pattern and mold making, melting, solidification, casting defect and their remedy, applications of casting processes.						7	
III	Metal forming processes: Sheet metal forming: blanking, punching, bending, deep drawing, spin forming, types of press machines, strip layout, force calculation. Bulk metal forming: types and working principle of rolling, extrusion, drawing, forging etc. Forming defects and their remedy, applications of forming processes.						8	
IV	Machining and Joining Processes: Introduction to single point and multipoint cutting operations: lathe, drilling, milling. Introduction to finishing operations: broaching, grinding, lapping, buffing, honing. Introduction to Joining processes: welding, brazing, soldering, adhesive bonding. Defects associated with machining and joining processes.						8	
Total						30		

Text Books:

1. Production Engineering and production technology, P. C. Sharma, S. Chand Publication, 8th Edition, 2019.
2. Manufacturing Engineering & Technology, Serope Kalpak Jian, Steven Schmid, 9th Edition, Pearson, 2020.

Reference Books:

1. Manufacturing Technology, Volume I & II, P. N. Rao, McGraw Hill Education (India) Private Limited. 5th Edition, 2019.
2. Workshop Technology, Chapman, Vol. 1, 2, 3. CRC Press, 25 September 2019.
3. Manufacturing Science, Amitabha Ghosh, Ashok Kumar Mallik, East-West Press Pvt. Ltd 2nd Edition, 2010.
4. Fundamentals of Modern Manufacturing, Mikell P Groover, 4th Edition, John Wiley & Sons, 15 Jul 2020.

Online Resources:

1. <https://archive.nptel.ac.in/courses/112/107/112107219/>



Program:	B. Tech. (Mechanical)				Semester: I			
Course:	Engineering Graphics Laboratory				Code: BME21PC01			
Credits	Teaching Scheme (Hrs. /Week)				Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	Other	TW	OR	PR	Total
2	-	4	-	1	100	-	-	100

Prior knowledge of: No Prerequisites

Course Objectives:

1. Develop imagination of physical objects for engineering communication.
2. Develop the interpretation of drawing skills.

Course Outcomes: After completion of this course, the students will be able to,

1. Interpret and draw 2D and 3D views of engineering objects.
2. Demonstrate proficiency using modern drafting tools to create engineering drawings.

Detailed Syllabus

Expt. No.	List of Experiments	Duration Hrs
1	Part A: Introduction to engineering drawing Introduction to drawing instrument and their uses, Bureau of Indian Standards (BIS) for engineering drawing, types of lines and their applications. Part B: Free hand sketching Free hand sketching of any existing/innovative products/ components Part C: Introduction to Computer aided drafting Graphical User Interface (GUI) of CAD software, basic commands of CAD software (Draw tools, Modify tools, Dimensions and Properties).	15
2	Part A: Orthographic projections Introduction to first and third angle projection methods, Orthographic projection of given pictorial view by first angle method of projection, types of sections, sectional orthographic projection (only full sectional orthographic view) Part B: Interpretation of given views, Missing views. Part C: Drafting orthographic projections and missing views using CAD tools	15
3	Part A: Development of lateral surface of solids Development of cut section of prism, pyramid, cylinder and cone using single cutting plane. Part B: Intersection of Solids Intersection of combination of regular solid Cone, Cylinder, Prism and Pyramids. Part C: Drafting lateral surfaces of solids and intersection of solids using CAD tools	15
4	Part A: Isometric view Isometric axes, scale, difference between isometric projection and isometric view, isometric view of simple solids and its dimensioning. Part B: Drafting of Isometric view using CAD tools	15
Total		60

List of Drawing Sheets:

Sheet no. 1 to 7 shall be submitted on A2 size drawing sheet. (ANY 8)

1. Orthographic projections (min.3 problems two hand drawing and one using CAD)
2. Missing View (min 3 problems two hand drawing and one using CAD)
3. Development of lateral surface of solids (min.3 problems two manual drawing and one using CAD)
4. Intersection of solids (min.3 problems two manual drawing and one using CAD)
5. Isometric views (min.3 problems two manual drawing and one using CAD)
6. Free hand sketching of any existing/innovative product

7. Free hand sketching of Mechanical Elements
8. Mini Project: 3D model of existing/innovative product
9. Model making for existing/ innovative product

Text Books:

1. Engineering Drawing with an introduction to AutoCAD- Dhananjay A. Jolhe, Revised Edition 2017, Tata McGraw Hill publishing company Ltd. New Delhi, India
2. Engineering Drawing, Plane and solid geometry- N. D.Bhatt, 54th edition 2023, Charotor publication house.

Reference Books:

1. Engineering Drawing- M.B Shah and B.C Rana, 2nd edition 2009, Pearson Publications.
2. Engineering Graphics- P.J. Shah, Revised edition 2019, S Chand Publications.
3. Fundamentals of Engineering Drawing- Warren J. Luzzader, 11th edition 2015, Prentice Hall of India New Delhi.
4. A text book of Engineering Drawing- R.K. Dhawan, Revised Edition 2019, S. Chand and company ltd. New Delhi, India



Program:	B. Tech. (Mechanical)			Semester: I			
Course:	Workshop Practice 1			Code: BME21VS01			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of –No

Course Objectives: This course aims at enabling students,

1. To introduce different materials in engineering practices with respect to their workability, formability and machinability.
2. To introduce various machine tools and demonstrations on machining.
3. To develop skills through hands on experience.

Course Outcomes: After learning the course, the students should be able to:

1. Identify appropriate machining parameters and use machine.
2. Use hand tools and basic measuring instruments used in carpentry, welding, fitting and sheet metal operation
3. Explain advanced manufacturing processes
4. Follow the safety practices on the shop floor

Detailed Syllabus

Unit	Description	Duration [Hrs]
1	Introduction to safety measures.	2
2	Demonstration of Manufacturing processes (Machining: Turning, Drilling, Milling and grinding using one simple machine component and sheet metal operations): Working, operation and types	4
3	Demonstration of sand casting and plastic molding: Preparation of sand mold and molding of simple plastic component	4
4	Finishing, inspection and assembly of machine components using different tools (Finishing, assembly) and measuring instruments. (For jobs made during preceding practical)	4
5	Inspection of component manufactured during preceding practical by using various measuring instruments such as Vernier caliper, micrometre, height gauge etc.	4
6	Demonstration of Advanced Manufacturing processes (Additive manufacturing using one simple machine component, USM/EDM/ECM demo using video)	4
7	Pattern Making-1 Job involving joint and wood turning used to manufacture pattern for casting under consideration.	6
8	Fitting – 1 Job involving fitting to size, male female fitting with drilling and tapping.	6
9	Joining – 1 Job involving welding (Arc), soldering, brazing etc.	6
Total		40

Note:

1. Assignment on experiment No. 1 is mandatory.
2. Any four from experiment No. 2 to 6.
3. Any Two from experiment No. 7 to 9.

Submission: Two jobs as mentioned above and write up of demonstration with sketches/illustration.

Text Books:

1. Elements of Workshop Technology, Vol.I and II, Hajra Chaudhary, Media promoters and publishers Pvt.Ltd.,2013
2. Manufacturing Technology Volume I& II, P.N. Rao, McGraw Hill Education (India) Private Limited, Fifth Edition 2018

3. Fundamentals of Manufacturing Engineering, D.K. Singh, Ane's Books.Pvt.Ltd.1stEdition,2008.
4. WorkshopTechnology.Vol.1&2, Raghuvanshi, B.S., Dhanpat Rai & Co.(P)Ltd, Delhi.,2009

Online Resource:

<https://www.vlab.co.in/broad-area-mechanical-engineering>



Program:	B. Tech. (Mechanical)			Semester: I			
Course:	Programming & Problem-solving Laboratory 1			Code: BME21VS02			
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50
Platform / Software: MATLAB							
Course Objectives: This course aims at enabling students, 1. To develop algorithmic solutions for simple problems by using programming statements and expressions. 2. To construct computer programs with control structures, user defined function and visualize the solution using plots and contours 3. To reinforce a structured, top-down approach to formulate, analyse and visualize solutions of complex engineering problems.							
Course Outcomes: After learning the course, the students should be able to: 1. Solve simple engineering problems through programming in python. 2. Analyze the engineering problems using control flows and data visualization 3. Infer meaningful conclusions from the statistical/graphical output of a computer program written for solving a scientific problem and assess its market relevance							
Detailed Syllabus:							
Unit	Description						Duration [Hrs]
I	Introduction to the Programming Language Interfaces, Keywords, Variable, Script files, Operators, Builtin functions and Constants, Creating, addressing and operation with vectors and matrices: Create and Combine Arrays and grids, determine size, shape and order, resize, reshape and rearrange, indexing), <i>examples/numerical</i>						10
II	Simple Analysis of Engineering Problems Branches, Conditional Statements, Loops, user defined functions, 2d plotting, Counter & Vector plots, <i>example/ numerical</i>						10
III	Complex Analysis of Engineering Problems Symbolic Math Toolbox, Compile computer program to solve engineering problems from Engineering Mechanics, Engineering Physics, Engineering design, Thermal and Fluid Engineering; Minor-project: create a program to solve/recreate real-life or engineering problems or events using programming.						10
Total						30	
Text Books: 1. “MATLAB. A Practical Introduction to Programming and Problem-Solving”, Dorothy C. Attaway, Butterworth-Heinemann, 6th Edition, 2022 2. “Beginning MATLAB and Simulink – From beginner to Pro,” S. Eshkabilov, Edition Second, Academic Press, 2022 “Essential MATLAB for Engineers and Scientists,”D. T. Valentin, Academic Press, Edition Eight, 2022.							
Reference Books: 1. “Applied Numerical Methods with MATLAB for Engineers and Scientists,” Steven C. Chapra, Tata Mc-Graw Hill Publishing Co-Ltd, 2008, 2023. 2. “Applied Numerical Methods Using MATLAB,” W. Y. Yang, W. Cao, T-S Chung, and J. Morris, Wiley-Interscience, 2020							

Program:	B. Tech. (Mechanical)				Semester: I		
Course:	Indian Knowledge System (IKS)				Code: BSH22IK01		
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	Other	FA		Total
					FA1	FA2	
2	2	-	-	-	25	25	50

Prior knowledge: NIL

Course Objectives: This course aims at enabling students,

1. To familiarize with the concepts of Indian Knowledge System
2. To get acquainted with the applications of Indian Knowledge System

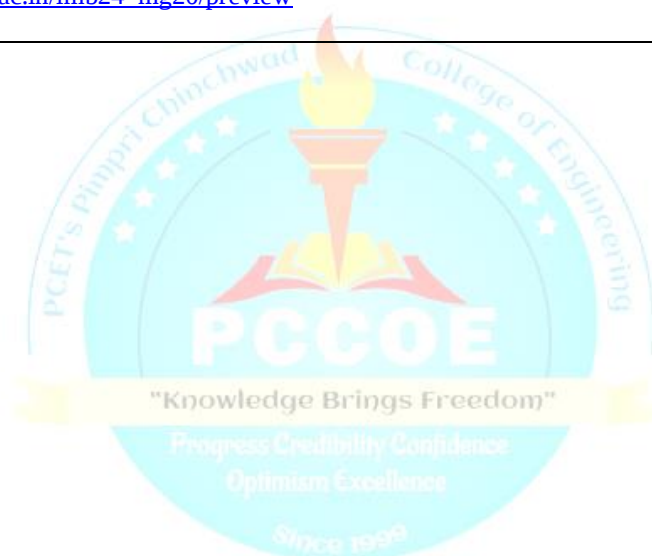
Course Outcomes: After learning the course, the students should be able to:

1. Explain the historical evolution, institutional frameworks, and modes of transmission of the Indian Knowledge System.
2. Describe key scientific and technological contributions of ancient India.
3. Apply ethical and leadership insights from Indian literary and art traditions.
4. Use traditional ecological knowledge to promote sustainable practices.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	Unit 1: History and Development of the Indian Knowledge System • Origins and Evolution: Vedic, Post-Vedic, Classical, and Medieval contributions to IKS • Introduction to Vedas and <i>Shat</i> Darshanas as foundational sources of Indian philosophy • Transmission of Knowledge: Oral tradition, Shruti-Smriti, Guru-Shishya Parampara and Early Texts • Institutional Framework: Ancient Indian universities (Takshashila, Nalanda, Vikramshila, Vallabhi) • Revival: Modern relevance, and efforts towards restoration	7
II	Unit 2: Scientific and Technological Contributions of IKS • Contributions to Mathematics (Baudhayana, Aryabhata, Brahmagupta & Bhaskaracharya -II) • Astronomy and Cosmology (Surya Siddhanta, Jyotish Shastra, Astronomical Observatories) • Metallurgy, Material Science, and Engineering (Iron Pillar, Wootz Steel, Zinc Distillation) • Civil Engineering and Architecture (Vastu Shastra, Water Management Systems, Temple and City Planning) • Ayurveda and Traditional Healthcare Systems	8
III	Unit 3: Literary, Performing and Artistic Traditions and festivals of India • Contributions of Indian Literature to Ethics and Leadership (Ramayana, Mahabharata) • Folk Traditions and Oral Narratives: Preserving local culture and wisdom • Performing Arts and Knowledge Expression (Natya Shastra, Temple Art, Music and Dance Forms) • Indian festivals as vibrant expressions of cultural values, community bonding, and	7

	sustainable environmental practices	
IV	Unit 4: Indigenous Technologies, Sustainability, and Ecology in IKS • Environmental Ethics and Sustainability Practices in Ancient India • Techniques for Conserving Water (Stepwells, Temple Tanks, and Dams) • Agricultural Knowledge Systems (Crop Rotation, Indigenous Seeds, Zero Budget Natural Farming) • Indigenous Knowledge in Disaster Management and Climate Adaptation • Insights from IKS for Contemporary Sustainable Development	8
Total		30
Textbooks: 1. Mahadevan, B., Bhat, Vinayak Rajat, Nagendra Pavan R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications", PHI Learning Private Ltd., Delhi. 2. Dharampal (2021), "Indian Science and Technology in the Eighteenth Century", ISBN10:8175310936.		
Reference Books: 1. Kapil Kapoor, Avadhesh Kumar Singh.(2005), "Indian Knowledge Systems" (Vol. 1 and Vol.2), ISBN-10:9788124603369.		
E-sources: 1. https://onlinecourses.swayam2.ac.in/ntr24_ed78/preview 2. https://onlinecourses.swayam2.ac.in/imb24_mg20/preview 3. https://iksindia.org/		



Program:	B Tech (Mechanical)			Semester: I			
Course:	Life Skills I			Code: BSH21CC01			
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	OR	TW	PR	Total
2	-	04	-	-	100	-	100

Prior knowledge: Nil

Course Objectives: This course aims at enabling students:

1. To equip them with essential competencies that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.
2. To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.

Course Outcomes: After learning the course, the students will be able to:

1. Demonstrate self-awareness and inner harmony conducive to understanding the essence of happiness.
2. Exhibit proficient interpersonal skills in fostering and sustaining healthy relationships with self & others.
3. Employ diverse strategies for rational decision-making and problem solving.
4. Display enhanced emotional intelligence through the recognition and management of emotions in various contexts.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	Happy You, Happy Life! Foundations of a Happy Mind • Yoga, Meditation, Music, Dance and Visual Art : Therapeutic techniques to improve mental clarity. • Healthy Eating: Cultivate mindful eating and maintain a nutritious & balanced diet. • Significance of Physical Activity in Daily Routine: The impact of physical activity to maintain positive outlooks towards life. Self-Awareness & Goal Setting • Big Five Personality Traits (OCEAN Model): Measures five broad traits: Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism • Know Your Personality: Discover personal traits for deeper insight through personality test • SMART Goals: Set effective and achievable personal goals.	15
II	Building Relationships Intrapersonal Intelligence: Empathy, respecting boundaries & conflict resolution Personal Relationships: • Relationship Web & Recipe: Reflection on personal connections and support systems and explore what “ingredients” build strong personal bonds • Attachment Styles and Their Impact: Introduction to secure, anxious, avoidant, and disorganized attachment styles, reflection on how early experiences shape current relationship patterns and strategies to move toward healthier attachment behaviors • Handling Transitions: Managing changes like drifting apart, evolving roles, or ending relationships Professional Relationships:	15

	• Professional Etiquette and Conduct: Learning accountability and punctuality in workplace interactions, practice appropriate tone, email/meeting/messaging manners & etiquette, and collaboration ethics • Networking and Relationship Mapping: Identify mentors, peers, and professional contacts, build supportive academic and career networks	
III	The Reflective Engineer • Critical & Creative Thinking: Apply logical reasoning and original ideas to find effective and practical solutions. • Convergent & Divergent Thinking: Identify when to focus on a single solution or generate multiple ideas based on the nature of the task. • Perspective Thinking: Develop the ability to understand and consider viewpoints different from your own. • Ethical Decision-Making and Problem-Solving: Make fair, values-driven decisions while employing effective problem-solving strategies in both individual and team settings.	15
IV	You CAN DO IT... • Understanding and Managing Emotions: Self-regulation, assertiveness, aggression, emotional dependency versus interdependency and over thinking • Stress Management: Types of stress and healthy coping mechanisms. • Peer Pressure & Addiction: Types of peer pressure and strategies to resist negative influences.	15
Total		60
References: Books: 1. The 7 Habits of Highly Effective Teens" by Sean Covey Publisher: Simon & Schuster, 2017 2. How to Win Friends and Influence People" by Dale Carnegie Publisher: Simon & Schuster. 2020 3. Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman Publisher: Bantam Books, 2021. 4. Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books, 2019. 5. The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg Publisher: Random House, 2016		
E Sources: 1. Psychology Today (www.psychologytoday.com): Psychology Today publishes articles and insights from psychologists and mental health experts that can be useful for improving life skills and emotional intelligence. 2. Lifehack (www.lifehack.org): Lifehack shares practical tips, techniques, and advice on personal development, productivity, and life skills improvement. 3. Coursera (www.coursera.org): Coursera offers online courses on various life skills topics, often provided by universities and experts, to help individuals develop essential skills		

Course Syllabus

Semester II



Program:	B. Tech. (Mechanical)					Semester: II		
Course:	Multivariate Calculus					Code: BSH21BS07		
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50
Prior knowledge of 1. Elementary Mathematics 2. Elementary Calculus is essential.								
Course Objectives: This course aims at enabling students, 1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation area, volume 2. To make students acquainted with advanced techniques to evaluate integrals								
Course Outcomes: After learning the course, the students should be able to: 1. Apply the concepts of partial differentiation to evaluate Jacobians, determine maxima and minima, and estimate errors and approximations 2. Evaluate derivatives and integrals of multivariable functions. 3. Represent the Fourier series for continuous and discrete periodic time domain functions in signal form 4. Compute definite improper integrals using Gamma, Beta function, and DUIS 5. Apply multiple integration techniques to determine Area, Volume								
Detailed Syllabus								
Unit	Description:							Duration [Hrs]
I	Partial Differentiation: Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. Application of Partial derivatives: Jacobian for explicit function, Errors and Approximations, Maxima and Minima of two variable functions.							8
II	Fourier Series: Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and engineering applications.							7
III	Integral Calculus: Beta and Gamma functions, differentiation under the integral sign (DUIS).							7
IV	Multiple Integral: Double integration, conversion into polar form, application of double integration to the area, Triple integration, Dirichlet's theorem, application of triple integration to Volume.							8
Total							30	
Text Books: 1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill) 2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)								
Reference Books: 1. Higher Engineering Mathematics, 22e, by H. K. Das (S. Chand Publication, Delhi). 2. Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd) 3. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning) 4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education) 5. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi)								
e-sources: 1. NPTEL Multivariable Calculus course https://nptel.ac.in/courses/111107108 2. NPTEL Video for Fourier series http://nptel.iitm.ac.in								

Program:	B.Tech. (Mechanical)			Semester: II			
Course:	Multivariate Calculus Laboratory			Code: BSH22BS08			
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	-	25	50

Prior knowledge:

1. Elementary Algebra.
2. Elementary Calculus
3. Basics of MATLAB/Open Source

Course Objectives: This course aims to enable students,

1. To equip with the ability to apply MATLAB for solving engineering problems involving partial differentiation, integral calculus, multiple integrals, and Fourier series.
2. To develop skills in applying mathematical concepts to solve real-world problems through project implementation.

Course Outcomes: After learning the course, the students will be able to:

1. Develop MATLAB programs to solve problems related to partial differentiation, integral calculus, multiple integrals, and Fourier series.
2. Prepare a well-structured technical Mini Project report and deliver an effective presentation with clarity and comprehensive understanding of the topic.

Detailed Syllabus

Expt. No.	List of Experiments using MATLAB
1	Computation of Higher and Mixed Order Partial Derivatives
2	Evaluation of Maxima and Minima
3	Evaluation of Jacobians
4	Representation of a function as a Fourier Series
5	Representation of the Fourier Series through Harmonic Analysis for the given Data
6	Evaluation of Gamma & Beta Function
7	Evaluation of Integrals using Differentiation Under the Integral Sign (DUIS)
8	Evaluation of Double and Triple Integrals
9	Area using Double Integral
10	Volume using Triple Integral
11	Mini Project* (14 hrs.)

***Mini Project Guidelines:**

Students must prepare a mini-project based on topics such as partial differentiation, integral calculus, multiple integrals, and Fourier series, or other relevant mathematical concepts.

General Guidelines:

1. The project group should consist of not more than 4 students per group.
2. The project report should include mathematical analysis or applications, and, where applicable, software performance parameters.
3. The project output must be submitted in the prescribed standard format.

References:

1. Higher Engineering Mathematics by H. K. Dass, 22nd edition, S. Chand Publication, Delhi.
2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.
3. Advanced Engineering Mathematics by Peter V. O'Neil, 7e, Thomson Learning.
4. Advanced Engineering Mathematics by M. D. Greenberg, 2e, Pearson Education.
5. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi
6. Introduction to MATLAB for Engineers and Scientists by Sandeep Nagar, Springer.
7. Introduction to MATLAB for engineering students by David Houcque, version 1.2, Northwestern University.

Program:	B. Tech. (Mechanical)				Semester: II		
Course:	Engineering Chemistry				Code: BSH22BS05		
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks		
	Lecture	Practical	Tutorial	Other	FA		SA
					FA1	FA2	
2	2	-	-	1	10	10	30
							50

Prior knowledge of:

1. Structure of water.
2. Volumetric analysis.
3. Fossil and derived fuels.
4. Corrosion and its effects.
5. Electrochemical series.
6. Classification and properties of polymers

Course Objectives: This course aims at enabling students,

1. To familiarize students with instrumental methods for qualitative and quantitative analysis and explore the importance of green chemistry.
2. To build consciousness about the recent development in alternative energy sources and batteries
3. To make student acquainted with chemical and electrochemical mechanism of corrosion and corrosion control
4. To lead students to investigate the advancement in engineering materials

Course Outcomes: After learning the course, the students should be able to:

1. Analyze the water quality, interpret techniques of water purification and compare green over traditional synthesis of polycarbonate.
2. Recognize the fuel quality and understand the scope of derived alternate fuels
3. Apply the preventive methods of corrosion to real-life problems.
4. Understand the chemical structure and properties of various polymers, nanomaterials and their uses.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	Water Technology and Green Chemistry: a) Hardness of water, its types, units of hardness and hardness calculation. Chemical analysis of water by determination of hardness by EDTA method. Alkalinity of water and its determination. Numerical on EDTA method and alkalinity. Disadvantages of hard water in boilers. Water softening techniques: Permutit and Ion exchange method. Dissolved oxygen (DO), biological oxygen demand (BOD) and Chemical oxygen demand (COD). b) Introduction of Green Chemistry: Definition, goals, principles and green synthesis of Polycarbonate.	8
II	Fuels and combustion: a) Fuels: definition, calorific value and its units. Calorific value (CV), gross calorific value (GCV), net calorific value (NCV). Determination of calorific value - Bomb calorimeter, Boy's colorimeter and numerical. i) Solid fuels: coal, proximate and ultimate analysis of coal, numerical based on analysis of coal. ii) Liquid fuels: composition of petroleum, refining of petroleum. Synthesis, properties, advantages and disadvantages of Power alcohol and Biodiesel. iii) Gaseous fuels: Hydrogen gas as a future fuel, production by steam reforming of methane and by electrolysis of water. Challenges in storage and transportation of H ₂ gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	7
III	Corrosion and Corrosion control: a) Corrosion: introduction, types of corrosion, mechanism of atmospheric	7

	corrosion and wet corrosion. Galvanic series. Factors affecting corrosion: nature of metal and nature of environment. Different types of corrosion: Pitting corrosion, concentration cell corrosion, stress corrosion and soil corrosion. b) Corrosion control: methods of prevention of corrosion - cathodic and anodic protection, metallic coatings and its types - anodic and cathodic coatings. Methods to apply metallic coatings - hot dipping, cladding, electroplating and cementation.	
IV	Chemistry of Polymers and Novel Carbon Compounds: a) Polymers: definition, classification of polymers on the basis of thermal behavior, properties of polymers: degree of polymerization, crystallinity, T _g & T _m and factors affecting T _g . Polymerization and its types. Advanced polymeric materials: Structure, properties and applications of liquid crystal polymer – Kevlar, conducting polymers - Polyacetylene, electroluminescent polymer – PPV and biodegradable polymers – PHBV. b) Nanomaterials: definition, types of nanomaterials and properties of nanomaterials. Quantum dots: Types, properties and applications of QDs. Structure properties and applications of Graphene and Carbon Nano Tubes (CNTs).	8
Total		30
Text Books: 1. Engineering Chemistry by S.S. Dara, S. Chand Publications (2010). 2. Engineering Chemistry by B.S. Chauhan, Univ Sc Press. (2015). 3. A Text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co. (2015). 4. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014). 5. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co. (2016). 6. Engineering Chemistry by Wiley India (2012). 7. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education. 8. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).		
Reference Books: 1. Hydrogen as a fuel by Ram D. Gupta, C. R. C. Publication (2009). 2. Polymer Science by V. R. Gowariker,, New Age International Publication (2015).* 3. Nanotechnology by T. Gregory, Springer Verlag New York (1999). 4. Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003) 5. Engineering Chemistry by Wiley India Pvt. Ltd, First edition 2011.		
e-sources: https://nptel.ac.in/ https://www.coursera.org/ https://link.springer.com/ https://www.sciencedirect.com/ https://pubchem.ncbi.nlm.nih.gov/ https://directory.doabooks.org/		

Program:	B. Tech. (Mechanical)						Semester: II
Course:	Engineering Chemistry Laboratory						Code: BSH22BS06
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100
Prior knowledge of 1. Theory of acids and bases 2. Molarity, normality and molality 3. Titration method							
Course Objectives: 1. To help students to procure conceptual clarity of Engineering Chemistry through laboratory experiments. 2. To develop experimental skills to acquire insight into societal and environmental issues.							
Course Outcomes: After completion of this course, the students will be able to, 1. Volumetric analysis for determination of quality of water. 2. Apply various instrumental methods for quantitative and qualitative chemical analysis. 3. Demonstrate the skill for synthesis of engineering materials. 4. Learn the chromatographic separation technique and impact of corrosion. 5. Explore mini projects which are relevant to societal and environmental issues, to develop research attitudes.							
Guidelines: 1] Under Group A category, students have to perform all experiments from the list given below. 2] Under Group B category, students have to perform a mini project or case studies.							
Detailed Syllabus							
Expt. No.	Group A: Suggested List of Experiments						
1	Safety in the Engineering Chemistry Laboratory.						
2	Determination of total hardness of water sample by EDTA method.						
3	Determination of type of alkalinity of given water sample and extent of alkalinity.						
4	To determine the chloride ion (Cl ⁻) present in a given water sample by argentometric method.						
5	To determine the dissociation constant of a weak acid (acetic acid) using a pH meter.						
6	Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid.						
7	Proximate analysis of Coal.						
8	To estimate the amount of Fe (II) present in the given solution potentiometrically.						
9	To determine the maximum wavelength of absorption of KMnO ₄ , verify Beer's law and find concentration of the unknown sample.						
10	To determine the electrochemical equivalent (ECE) of Cu.						
11	To prepare the Phenol formaldehyde resin.						
Group B: Mini project Activity and Case studies							
Topics for Mini project: (Student has to choose one of the topics from list given below but not limiting to)							
1	Adsorption studies of methylene blue on bio adsorbents prepared from agricultural waste.						
2	Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles.						
3	Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV.						
4	Green synthesis of chemical compounds.						
5	One-pot synthesis of biologically active compounds.						
6	Microwave assisted chemical reactions.						
7	Soil analysis of agricultural soil samples.						
8	Adulterants in food materials.						
9	Determination of acid value of oils.						

10	Detection of presence of carbohydrates, fats and proteins in given foodstuffs.
11	Preparation of biodiesel.
12	Water audit of water samples.
13	Separation of mixture by chromatographic techniques.
Topics for Case Studies: (Student must choose three topics from list given below but not limiting to)	
1	Water audit of samples from different water bodies in and around PCMC area.
2	Impact of corrosion in our daily life.
3	Application of principles of green chemistry in manufacture of pharmaceuticals.
4	Production of renewable fuels from non-petroleum resources.
5	Hydrogen powered cars – the wave of the future. Current state of affairs of hydrogen run cars in India.
6	Need and applications of biodegradable polymers – a step towards cleaner world.
References: 1. Vogels Text book of Qualitative Chemical Analysis by J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas, 6 e, Pearson Education Ltd. 2. Applied Chemistry Theory and Practice by O. P. Virmani and A. K. Narula, 2e, New age International (P) Ltd.	



Program:	B. Tech. (Mechanical)				Semester: II			
Course:	Engineering Thermodynamics				Code: BME22ES03			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
3	2		1	1	20	20	60	100

Prior knowledge of:

Fundamental concepts of physics like Volume, Pressure, Velocity, Work, Energy, Concepts of mathematics like derivative, integration, nature of curves, slope of curve, Construction and working of common mechanical devices/ machines is essential

Course Objectives:

1. To understand of the fundamental concepts and Laws of thermodynamics
2. To differentiate between energy and energy transfer, heat and work transfer
3. To be able to apply of the laws of thermodynamics
4. To understand the equations and processes governing the ideal gas behavior
5. To be able to use the steam tables/ Mollier chart for reading properties of steam.
6. To apprehend the concept of Exergy and its application to open and closed systems

Course Outcomes:

- 1 Identify work transfer by using the operation definition
- 2 Apply the first law of Thermodynamics to various processes and systems and draw inferences.
- 3 Identify the Possibility /type of processes and cycles
- 4 Estimate heat transfer, work transfer & other important thermodynamic entities for the Ideal gas processes
- 5 Use steam tables and Mollier Chart for solving problems related to steam processes
- 6 Estimate the exergy of simple thermodynamic systems

Detailed Syllabus

Unit	Description:	Duration [Hrs]
I	Basic Ideas and definitions: Role of thermodynamics in mechanical Engineering, Thermodynamic System, Boundary, Types of system, State of system, Properties of system, Viewpoints, Classification of properties, Thermodynamic Equilibrium, State Postulate-1, Thermodynamic Process, Quasi-static Process, Thermodynamic cycle, The operational definition of work Interaction, types of work transfer, Complexity of system, State Postulate-2	6
II	The first Law of thermodynamics: Analysis of Joule's Experiment for obtaining definition of Change of energy and Heat transfer, Closed system formulation of First law, Special case: closed system undergoing cycle, Open system formulation of First law of thermodynamics, Special case: Steady Flow Energy equation (SFEE), Application of SFEE to typical Engineering Devices, Application of first law to day-to-day life examples, concept of PMM-I, Zero'th Law of thermodynamics	8
III	The Second Law and Entropy: Limitations of the First Law, H.E, H.P., and Refrigerator, Kelvin-Planck, Clausius Statements, and their equivalence, Reversible process, cycle, Carnot Theorem, and its corollaries, Efficiency of Reversible cycle, PMM-II, Criteria for the possibility of a cycle, Entropy as a property of	9

	the system, Criteria for the possibility of a process, Entropy Generation and its significance, Entropy change calculation (General case, Incompressible, Simple compressible system (Tds equations, and T.E.R.s), How the second law overcomes the first law limitations, Carnot cycle for Heat Engine. (T-v and T-s diagram)	
IV	Working Substance I-Ideal Gas: Definition, Laws pertaining to Ideal Gas, Specific Heat, Joules Experiment on Ideal Gases, Various process (Constant P/T/V/H and Polytropic, p-v and T-s diagrams): Evaluation of Work transfer, Heat transfer and Entropy change. P-v diagram of Carnot Cycle with Ideal Gas.	8
V	Working Substance II-Steam: Concept of Pure Substance, Formation of steam at constant pressure (T-v and T-s diagram), Formation of steam at constant temperature (p-v diagram), generation of h-s diagram from T-ds equation (Mollier Chart), Criteria for identification of phases of water substance, Deviation of steam from Ideal gas behavior, use of steam tables and Mollier Chart, Properties of Wet steam: dryness fraction, Separating, Throttling and Combined separating-throttling Calorimeter, various steam processes.	8
VI	Availability: Concept of Dead state, Definition of Availability/Exergy, Exergy as a property of system, Exergy associated with K.E. and P.E., Exergy by Heat and work transfer, Exergy of Closed system, Principle of Exergy Destruction, Irreversibility and second law efficiency.	6
Total		45
Note: Tutorial on each unit to cover variety of numerical		
Text Books: 1. Y. Cengel & Boles: Thermodynamics – An Engineering Approach, Tata McGraw-Hill, 2019 2. P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications 2017 3. Mahesh M. Rathore, Thermal Engineering, Tata McGraw-Hill 2010		
Reference Books: 1. Michael Moran, Howard Shapiro, Fundamentals of Engineering Thermodynamics, John Wiley 2020 2. Claus Borgnakke, Richard E. Sonntag, Fundamentals of Engineering Thermodynamics, John Wiley, 2020 3. M. Achuthan, Engineering Thermodynamics, PHI Learning Pvt. Ltd., 2009 4. Steam Tables and Mollier Chart		
e-sources: IIT Bombay X: Thermodynamics: https://www.edx.org/learn/thermodynamics/iitbombay-thermodynamics		

Program:	B Tech (Mechanical)					Semester: II	
Course:	Engineering Thermodynamics Lab					Code: BME22ES04	
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	25	-	50
Prior knowledge: Engineering Physics, Engineering Mathematics							
Course Objectives: 1 To validate the fundamental principles and laws of thermodynamics by using experimental methods or inductive logic. 2 To estimate thermodynamic properties of various working fluids by experimental methods 3 To conduct experiments for obtaining the performance parameters of various devices. 4 To utilize software tools for analyzing thermodynamics processes and cycles							
Course Outcomes: After learning the course, the students will be able to: 1 Experimentally verify the first laws of thermodynamics and draw inferences. 2 Estimate the performance of the heat engine, heat pump, refrigerator by experimental method 3 Analyze various thermodynamics processes and cycles by using software tools 4 Estimate the thermodynamic properties of working fluids experimentally							
Detailed Syllabus							
Expt. No.	Suggested List of Experiments (Any 8)						
1	Joule’s experiment on the first law of thermodynamics						
2	Demonstration of various steady flow devices/systems and concept of PMM-I						
3	Experimental Analysis of Open and closed system for verification of First Law (Hair dryer, geyser, Table fan etc.)						
4	Performance analysis of Heat Pump and Refrigerator (Actual COP)						
5	Assignment on analysis of HP, Refrigerator and heat engine						
6	Assignment on identification of the possibility of thermodynamic processes and cycles						
7	Analysis of Property variation of steam with pressure and temperature using EES / other software tools						
8	Plotting & Comparison of various ideal-gas processes using EES / other software tools						
9	Analysis of Carnot cycle using EES / other software tools						
10	Measurement of Specific heats of air						
11	Measurement of Specific heats of water						
12	Determination of Dryness fraction using separating and throttling calorimeter						
13	Assignment on measurement devices						
14	Determination of Latent heat of Fusion of Solid-Liquid Phase Change Material (PCM)						
15	Demonstration of TEG/TEC Module						
References:							
Text Books: 1. Y. Cengel & Boles: Thermodynamics – An Engineering Approach, Tata McGraw-Hill , 2019 2. P. K. Nag, Engineering Thermodynamics, Tata McGraw Hill Publications 2017 3. Mahesh M. Rathore, Thermal Engineering, Tata McGraw-Hill 2010							
Reference Books: 1. Michael Moran, Howard Shapiro, Fundamentals of Engineering Thermodynamics, John Wiley 2020 2. Claus Borgnakke, Richard E. Sonntag, Fundamentals of Engineering Thermodynamics, John Wiley , 2020 3. M. Achuthan, Engineering Thermodynamics, PHI Learning Pvt. Ltd., 2009 4. Steam Tables and Mollier Chart							

Program:	B. Tech. (Mechanical)					Semester: II		
Course:	Fundamentals of Electromechanical Systems					Code: BME22ES05		
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-		1	10	10	30	50
Prior knowledge of: -Nil								
Course Objectives: This course aims at enabling students to, 1. Learn the fundamentals of electromechanical systems along with actuators and machines 2. Learn the various types and concepts of sensors 3. Learn the basics of robotics.								
Course Outcomes: After learning the course, the students will be able to: 1. Demonstrate the fundamentals of electromechanical systems 2. Identify the electrical actuator for any application 3. Recognize the different types of sensors and their applications 4. Describe the basic concepts of robotics.								
Detailed Syllabus								
Unit	Description:							Duration [Hrs]
I	Fundamentals: Introduction of independent sources, Resistors, Capacitors, Inductors, Ohm's law, Kirchhoff's voltage and current laws, Faraday's law, Norton's theorem, Thevenin's Theorem, Superposition theorem, Nodes-Branches and loops, Series elements and Voltage Division, Parallel elements and Current Division, Star-Delta transformation.							8
II	Electrical Actuators and Machines: Classification of actuators; DC motors: PMDC and BLDC; AC motors: induction motor; Special purpose motors: Stepper motor and Servo motor; Selection of motors and its applications; electro-mechanical solenoid; D.C. Machine: D.C. generator; AC Machine: Single phase transformer.							8
III	Introduction to Sensors and Arduino: Diodes, Transistors, Op-amps, Types of signals, Basic digital electronic principles. Classification of sensors; Position sensors: Potentiometer, LVDT, Digital encoder, Ultrasonic Sensor, Proximity sensors: Optical, Inductive, Capacitive; Temperature sensor: RTD, Thermocouples, Thermister, pyrometer, Basics of Arduino.							7
IV	Introduction to Robotics: History, Laws of Robotics, Specifications of Robots, Structure of a robot, Robot Anatomy and Configurations, Precision and Accuracy, Classification and Applications, Dexterity and Compliance of Robots.							7
							Total	30
Text Books: 1. Basic Electrical Engineering, V. N. Mittal and Arvind Mittal, Tata McGraw-Hill, 2nd Ed, 2017. 2. Basic Electrical Engineering, V.K. Mehta and Rohit Mehta, S. Chand & Company Ltd., 2023 3. Mechatronics: Electronics Control Systems in Mechanical and Electrical Engineering, William Bolton, 7th Ed, 2019. 4. Robotics Technology and Flexible Automation, S. R. Deb and Sankha Deb, McGraw Hill Education, 2017.								
Reference Books: 1. Introduction to Mechatronics and Measurement Systems, Alciatore and Hiestand, Mc-Graw Hill, 5th Ed, 2019 2. Mechatronics – An Introduction, Robert H. Bishop, CRC press, 2017. 3. Mechatronics – Principles, concepts and applications, Mahalik, Tata Mc-Graw Hill publication, New Delhi, 2003. 4. Basic Electrical Engineering, D.C. Kulshreshtha, Mc-Graw Hill, 2nd Ed, 2019. 5. Electrical and Electronic Technology, Edward Hughes, Pearson-Prentice Hall, 10th Ed, 2016.								

e-sources:

1. https://onlinecourses.nptel.ac.in/noc23_de12/preview
2. <https://archive.nptel.ac.in/courses/108/105/108105112/>
3. https://onlinecourses.nptel.ac.in/noc21_me27/preview
4. https://onlinecourses.nptel.ac.in/noc23_me120/preview



Program:	B. Tech. (Mechanical)			Semester: II			
Course:	Fundamentals of Electromechanical Systems Laboratory			Code: BME22ES06			
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of: No

Course Objectives: Students are expected to study,

1. Learn the importance of safety measures in the lab environment while working with electrical and mechatronics system
2. Gain the practical experience in working with mechatronics, electrical and robotics system enhancing their technical skills.

Course Outcomes: After completion of this course, the students will be able to,

1. Apply the basic concepts of electrical engineering
2. Develop a simple mechatronics system by using sensors /actuators
3. Explore various applications of robotics

Detailed Syllabus

No.	
1	To build a switch board with switches, plug points, fuse and regulators
2	To verify Kirchhoff law/ Thevenin's Theorem for DC network
3	Perform load test on DC Shunt Motor to determine the efficiency.
4	Perform speed control of DC Shunt Motor to plot characteristics.
5	To determine efficiency and regulation of single-phase transformer by direct loading test.
6	Study and Demonstration of various sensors in engineering applications
7	To sense the Temperature and measure the Distance using suitable sensors and Arduino
8	Demonstrate an Interfacing of any actuator with Arduino
9	Demonstration of Robots / Industrial Visit

Assignment on the study of electricity bill of LT consumer (Compulsory)

Text Books:

1. V.N. Mittal and Arvind Mittal, Basic Electrical Engineering, 2nd Ed, Tata McGraw-Hill, 2017.
2. V.K. Mehta and Rohit Mehta, Basic Electrical Engineering, S. Chand & Company Ltd., 2023
3. William Bolton, Mechatronics: Electronics Control Systems in Mechanical and Electrical Engineering, 6th Ed, 2019.
4. K.P. Ramchandran, G.K. Vijayaraghavan, M.S. Balasundaram, Mechatronics: Integrated Mechanical Electronic Systems, Willey Publication, 2008.
5. S. R. Deb and S. Deb, Robotics Technology and Flexible Automation, McGraw Hill Education, 2017.

Reference Books:

1. Alciatore and Histan, Introduction to Mechatronics and Measurement Systems, 5th Ed, Mc-Graw Hill, 2019
2. Robert H. Bishop, Mechatronics – An Introduction, CRC press, 2017.
3. Mahalik, Mechatronics – Principles, concepts and applications, Tata Mc-Graw Hill publication, New Delhi, 2003.
4. D.C. Kulshreshtha, Basic Electrical Engineering, 1st Ed, Mc-Graw Hill, 2012.
5. Edward Hughes, Electrical and Electronic Technology, 10th Ed, Pearson-Prentice Hall, 2016.
6. S. K. Saha, Introduction to Robotics, McGraw-Hill Education, 2017.
7. J. Craig, Introduction to Robotics: Mechanics and Control, 4th Ed, Pearson Education, 2022.
8. S.B. Niku, Introduction to Robotics, Analysis, Control, Applications, 2nd Ed, Wiley Publication, 2020.

E-Sources:

1. https://onlinecourses.nptel.ac.in/noc23_de12/preview
2. <https://archive.nptel.ac.in/courses/108/105/108105112/>
3. https://onlinecourses.nptel.ac.in/noc21_me27/preview
4. https://onlinecourses.nptel.ac.in/noc23_me120/preview

Program:	B. Tech. (Mechanical)					Semester: II	
Course:	Programming & Problem-solving Laboratory 2 (Python)					Code: BME22VS03	
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50
Prior knowledge of Students are expected to have a good understanding of basic computer literacy, basic concepts of physics and mathematics.							
Platform / Software: Python							
Course Objectives: Students are expected to study, 1. To demonstrate basic programming skills in python using typical built-in functions, operators and control flow. 2. To handle experimental/literature data and visualize using various commands/libraries. 3. To reinforce a structured, top-down approach to formulate, analyze and visualize solutions of complex engineering problems							
Course Outcomes: After completion of this course, the students will be able to, 1. Solve problems through basic programming to design, write, test, and debug computer programs using relevant built-in functions and control flow. 2. Analyze the experimental/literature data using array operations, plotting and visualization. 3. Illustrate comprehensive solution through computer programming for various problems in Engineering and Technology							
Detailed Syllabus							
Description							Duration (Hrs)
1. Basics of Programming Language Interface, Operators, Datatype, Input & Output, Built in Functions & Constants (Libraries in Python - math, numpy), Control Statements: if-elif-else / break / continue / pass, Control Loops: for / while, Functions: <i>examples/numericals</i>							10
2. Data Handling and Data Visualization Array - String, Lists, Tuple, Set, Dictionary; Functions; Plotting and Data visualization, <i>example/ numerical.</i>							10
3. Engineering Problem Solving Scientific Python (SciPy) Library, Compile computer program to solve problems from Engineering Physics, Mechanics of Materials, Engineering Design, Engineering Thermodynamics, Fluid Mechanics, Heat Transfer; Mini-Project							10
Text Books: 1. “Core Python programming”, Dreamtech Press, Second Edition, R. Nageswara Rao, 2006, 2. “Python programming using problem solving approach”, Reema Thareja, Oxford University Press, 2019 1. “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Sarah Guido and Andreas C. Muller, 2016							
Reference Books: 1. “Programming with Python,” Springer Nature Singapore, T. R. Padmanabhan, 2017 2. Introduction to Python Programming,” CRC Press, Gowrishankar S., and Veena A. 3. “Python for Mechanical and Aerospace Engineering”, Alexander Kenan, 2020							
E-Sources: 1. https://padhai.onefourthlabs.in/courses/data-science 2. https://www.coursera.org/learn/python?specialization=python							

Program:	B. Tech. (Mechanical)					Semester: II	
Course:	Workshop Practice–2					Code: BME22VS04	
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50
Prior knowledge of Hand tools and accessories, Basic measurement instruments (caliper, micrometer, dial gauge, etc.), Machine tools, Safety practices on the shop floor are essential.							
Course Objectives: Students are expected to study, 1. Get hands on experience of working on various machine tools and welding machine. 2. Select appropriate machining parameters and measure the geometrical features. 3. Get acquainted with automation in machining processes							
Course Outcomes: After completion of this course, the students will be able to, 1. Operate different conventional machines such as lathe machine, grinding machine, drilling machine etc. 2. Identify and use the suitable joining process for part under consideration. 3. Use different G codes and M codes to execute CNC part program 4. Explain various elements of cost to manufacture the given product.							
Detailed Syllabus							
Expt. No.	List of Experiments						Duration Hrs
I	Manufacture of one useful industrial component/part using various lathe operations.						08
II	Manufacture of one useful industrial component on the milling machine using an indexing mechanism.						06
III	Fabrication of utility component by using suitable joining process (Welding/Soldering/ Brazing)						08
IV	Manufacturing of job using CNC turning or vertical machining center (VMC).						08
Note: Students are expected to understand cost involved in manufacturing of above products.							
Submission: Workbook with sketches/illustration and Completed Jobs on lathe, milling, CNC/ VMC and joining processes							
References: 1. All about machine tools, Henrich Gerling, New Age International Publishers, 3 rd Edition 2021. 2. Manufacturing Technology Volume I&II, P.N.Rao, McGrawHill Education (India) Private Limited, Fifth Edition 2018 3. CAD/CAM: Principles and Applications, PNRao, Tata McGraw-Hill Education, 2017.							
E Resources https://www.vlab.co.in/broad-area-mechanical-engineering							

Program:	B. Tech. (Mechanical)				Semester: II			
Course:	English				Code: BSH22AE01			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	1	2	-	-	10	10	30	50

Prior knowledge of:

Basic knowledge of English Language is essential.

Course Objectives: This course aims at enabling students:

1. To develop basic LSRW skills for effective communication.
2. To develop a sense of confidence among students to present themselves at professional as well as societal level.
3. To enhance the language competence with responsible use of AI

Course Outcomes: After learning the course, the students will be able to

1. **Understand** the role of effective listening skills, grammar and vocabulary in effective communication.
2. **Formulate** grammatically correct sentences and Enrich their vocabulary
3. **Demonstrate** reading skills to comprehend various documents
4. **Communicate** effectively and enhance their phonetic skills.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	Listening Skills: Importance of Listening Skills, Types of Listening: Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills.	3
II	Writing Skills: Grammar & Vocabulary: Common Errors in English, Modal Auxiliaries. Processes of Word Formation, Words often Confused, Elements of Effective Writing, Writing Styles (Formal & Informal), Paragraph Writing (Descriptive, Technical). Professional Writing: Job Application, Leave Application, Enquiry and Complaint Letter. Report Writing. AI application in writing	4
III	Reading Skills: Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension: Factual / Expository / Informative texts, Case Studies, Reading Research Articles. Lesson:1 The Story of An Hour by Kate Chopin, Lesson: 2 The Classical Student by Anton Chekhov	4
IV	Speaking Skills: Basic Sounds-IPA, Word Stress, Intonation, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking, etc) Art of Asking and Responding to Questions, Impromptu Speaking, Art of Extempore & Presentations, Role Play, Delivering Welcome Speech, Vote of Thanks, Group Discussion	4
Total		15

Lab Session	Activities	Duration
1	Listening 1: Listen to the audio and answer the questions (IELTS) Cambridge Assessment - Free Tool	2
2	Listening 2: Listen to the audio and Summarize (Ted Talks)	2
3	Grammar: Correct the sentences and understand the business usages.	2
4	Vocabulary: Different ways to improve vocabulary - AI-based activities for vocabulary enrichment	2
5	Writing Skills 1: Formal writing such as Job Application, Leave Application, Enquiry and Complaint Letter. Writing a personalized letter followed by applying AI for polishing of grammar and vocabulary.	2
6	Writing Skills 2: Different Styles of writing and Paragraph Writing (Descriptive, Technical)	2
7	Writing Skills 3: Report Writing; Progress, Accident Report, Event Report - Using AI to formulate a structured report and learning how to customize it for maximum relevance.	2
8	Reading Activity 1: Communication Case Studies	2
9	Reading Activity 2: IELTS based Comprehension Skills	2
10	Reading Activity 3: Research Articles and Technical Documents	2
11	Reading Activity 4: Literary Reading and Discussion	2
12	Speaking Activity 1: IPA Pronunciation and Phonetics Exercises	2
13	Speaking Activity 2: Delivering speeches and Mastering the Art of Public Speaking	2
14	Speaking Activity 3: Preparing and Participating Group Discussions / Elevator Speeches	2
15	Speaking Activity 4: Oral/PPT Presentation with Q&A Session	2
Total		30
Text Books: Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015		
Reference Books: - Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005 - David F. Beer, Writing and Speaking in the Technology Professions: A Practical Guide, Wiley-IEEE Press; 2nd Edition, 2003 - Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011 - Clifford Whitcomb, <u>Leslie E. Whitcomb</u>, Effective Interpersonal and Team Communication Skills for Engineers, Wiley-Blackwell; Nil edition, 2013. - Krishnaswami, N and Sriraman, T, Creative English for Communication, Macmillan.Saran Freeman, Written Communication in English, Orient Longman		
e-sources: https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vWLA1-FXdmtGD4TbPCXo- https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1		

Program:	B. Tech. (Mechanical)				Semester: I			
Course:	German				Code:BSH22AE02			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	1	2	-	-	10	10	30	50

Prior knowledge of: English Language is essential.

Course Objectives: This course aims at enabling students,

1. To get familiar with the basics of German language and develop their interest in the language.
2. To identify the desired information while reading and listening simple German texts.
3. To acquire basic knowledge of German speaking countries.
4. To frame simple sentences in German.

Course Outcomes: After learning the course, the students should be able to:

1. Demonstrate an understanding of simple texts in German.
2. Apply basic grammar rules to frame simple sentences in German.
3. Develop simple dialogues in German reflecting situations encountered in daily life.
4. Construct simple texts in German.

Detailed Syllabus

Unit	Description: Times new Roman- Font size-11	Duration [Hrs]
I	Introduction to German Language Topics: Greetings; Alphabet; Numbers; Days; Months; Seasons; Personal details; Family; Hobbies; Self-introduction; Things of day-to-day use; Food & Beverages; Buying goods of day-to-day use; Clock time; Basic knowledge of German speaking countries Listening skills: Listen and understand spellings, numbers, clock time, details of persons, short easy day-to-day conversations in German Reading skills: Read and comprehend from visiting cards, brief profiles, simple instruction boards and advertisements, short easy texts, short messages, short letters, and emails in German, read texts aloud and respond by answering questions accordingly	4
II	Basic German Grammar and Sentence Structure • Personal Pronouns: Nominative • Verbs and Verb-Conjugation: Regular, irregular, separable, modal auxiliaries • Types of Articles: Definite, indefinite, negative, possessive • Cases: Nominative, accusative • Prepositions: With accusative case • Types of the sentences: Declarative, interrogative, imperative • Tenses: Present tense Solving simple grammar exercises to get used to basic sentence structure in German	4
III	Speaking Skills • Spelling and pronouncing words correctly • Giving brief self-introduction in German • Asking for personal details and providing the required information • Requesting for things of day-to-day use and reacting on requests in appropriate manner • Carry out short easy German dialogues with expressions	3

IV	Writing Skills • Writing short easy sentences in German • Using German punctuation and orthographic rules correctly in given texts • Taking dictation for words and simple sentences • Correcting errors in given texts • Writing simple texts, short messages, letters emails on given topics	4
Total		15
Lab	Activities	Duration (Hrs)
1	Vocabulary: Exercises to recall and enhance vocabulary	2
2	Listening 1: Listen to the audio and repeat (phonetics)	2
3	Listening 2: Listen to the audio and select the correct option	2
4	Reading 1: Read short easy texts and fill up the information in table	2
5	Reading 2: Read short easy texts and mark true or false	2
6	Reading 3: Read short easy texts and answer the questions	2
7	Grammar 1: Solve simple grammar exercises	2
8	Grammar 2: Construct correct sentences by applying grammar rules	2
9	Speaking 1: Spell and pronounce the words correctly	2
10	Speaking 2: Give your short introduction	2
11	Speaking 3: Frame simple questions, requests and reply	2
12	Writing 1: Fill up simple data in registration forms	2
13	Writing 2: Correct errors in given draft	2
14	Writing 3: Fill in the sentences and rewrite the texts, short messages, emails, and letters	2
15	Presentation: Basic geographical information of India and German speaking countries in German	2
Total		30
Text Books: 1. Menschen A1.1: Sandra Evnas, Angela Pude, Franz Pecht, Hueber Verlag Ismaning Germany, 2016		
Reference Books: 1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015 2. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag, Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018 3. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005		
e-sources: 1. NPTEL Course lectures (IIT Madras) link: https://onlinecourses.nptel.ac.in/noc25_hs121/preview 2. DW Learn link: https://learngerman.dw.com/en/beginners/s-62078399 3. Goethe-Institut Link: https://www.goethe.de/en/spr/ueb/ele.html 4. Easy German link: https://www.easygerman.org		

Program:	B. Tech. (Mechanical)				Semester: II			
Course:	Japanese				Code:BSH22AE03			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	1	2	-	-	10	10	30	50

Prior knowledge of:

English/Marathi/Hindi language for learning Japanese language.

Course Objectives:

1. To be aware of Japanese Scripts (Hiragana, Katakana) and basic Kanjis
2. To familiarize themselves with the Japanese language and use basic greetings in day-to-day life.
3. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions.
4. To develop language skills namely Listening, Speaking, Reading and Writing skills for socializing, at basic level.

Course Outcomes:

1. **Recognize** Japanese scripts through oral and written communication.
2. **Interact** with the people using Japanese greetings in to their day-to-day life.
3. **Demonstrate** the basic Kanjis with meanings.
4. **Construct** simple demonstrative sentences.

Detailed Syllabus

Unit	Description:	Duration [Hrs.]
I	Introduction: Hiragana Script. Listening: Short video skit on self-introduction "Freedom" Speaking: Song of greetings. Reading: Hiragana words Writing: Japanese scripts (Hiragana) Test on Hiragana	5
II	Introduction: Katakana script Listening: English words Speaking: Song on body parts. Reading: Katakana words Writing: Locating countries on map, Word hunt.	4
III	Introduction to Kanjis Writing: Learn to write kanjis with stroke order.	3
IV	わたしはマイク。ミラーです。 Listening: Conversation based on L-1 Speaking: Self introduction Reading: Lesson reading no.-1 Writing: Writing about yourself. Grammar: Introduction to 1. Particles (は、か、も、か) 2. Verbs (です、ではありません)	3
Total		15

Lab sessions	Activities	Duration Hrs.)
1	Writing Skill 1: Hiragana script	2
2	Speaking skill 1: Japanese greetings	2
3	Reading Skill 1: Reading and recognizing 'Hiragana' words	2
4	Listening Skill 1: Listening and writing 'Hiragana' words	2
5	Reading Skill 2: Reading 'Katakana' words	2
6	Writing Skill 2: World map activity	2
7	Speaking Skill 2: Self introduction	2
8	Listening Skill 3: Listening and identifying the numbers.	2
9	Reading Skill 3: Reading Numbers with writing practice.	2
10	Speaking Skill 3: Practicing Japanese Greetings.	2
11	Writing Skill 3: Creating Kanjis chart using strokes, 'Kun Yomi' and 'On Yomi'	2
12	Listening Skill 4: Conversation in the office	2
13	Speaking Skill 4: Dialogues between people of different nationalities.	2
14	Reading Skill 4: Chapter-1 reading	2
15	Writing Skill 4: Basic sentence formation using grammar.	2
Total		30

Text Books:

1. Minna no Nihongo Part I and II Publication: GOYAL PUBLISHERS & DISTRIBUTORS PVT. LTD. ,Author: TsuruoYoshiko (Compiled), Edition:2018
2. Nihongo Shoho Publication: JALTAP, Author: JALTAP(With permission of Japan Foundation, Tokyo), Edition:April 2008

Reference Books:

1. Genki MOMO Author: Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P) Ltd., Edition: October2007
2. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P)Ltd., Edition: October2007
3. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P)Ltd., Edition:October2007

e-sources:

1. Japanesepod101.com
2. <https://www.nihongonomori.com>
3. onlinecourses.nptel.ac.in/noc19_hs52/preview
4. onlinecourses.nptel.ac.in/noc24_hs121/preview

Program:	B. Tech. (Mechanical)				Semester: II			
Course:	Business Storytelling				Code:BSH22AE04			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	1	2	-	-	10	10	30	50

Prior knowledge of:

Basic knowledge of the English Language is essential.

Course Objectives:

This course aims at enabling students:

1. To understand storytelling as one of the tools of influential communication.
2. To strengthen their creativity, critical thinking and social skills.
3. To use stories to face leadership, management and professional challenges.

Course Outcomes:

After learning the course, the students will be able to:

1. **Identify** nuances of storytelling method as an influential communication
2. **Demonstrate** the ability to engage and inspire others through the development of narratives, tone and style
3. **Apply** storytelling techniques to communicate effectively in a business context
4. **Develop** stories to build, maintain professional relationships, deliver messages and motivate others toward action.

Detailed Syllabus

Unit	Description	Duration [Hrs.]
I	Concept and Scope: "Knowledge Brings Freedom" What is a story? A Brief History & Importance of Storytelling, Basics of Storytelling- Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling Activity: Analysis of Steve Jobs Commencement Speech at Stanford(2005)	3
II	Process of Storytelling: Elements of a Story - Context and Relevance, Style and Detailing, Plot, and Characters, The Flow of the Story-Relevance-Action-Result, Know the Purpose- Inspire Action, Educate People, Showcase Values, Build Collaboration, Know your Audience - Educational, Social Background and Age, Developing Narratives: Characteristics of a Narrative, Data Visualization, Presenting a Word Picture, Triggering Emotions of the Audience, Choosing Media - Audio, Written, Oral and Digital Storytelling Activity: Analysis of Short Story: 'The Three Hermits by Leo Tolstoy', 'The Last Painting by O'Henry	4

III	Types of Stories: Customer Story, Origin Story, Event Story, Product Stories, Storytelling Techniques for Presentations, Using Power Words Effectively, Using Narratives to Manage Conflicts, Using a Narrative Interpret the Past and Shape the Future, Storytelling in Marketing, Story Strategies-Using Anchor Stories Case Studies- Brand Storytelling-Steve Jobs/Jack Maa- Product Presentation, Lido Anthony "Lee" Iacocca	4
IV	Crafting a Story: Crafting a Story from A Picture/an Idea/Situation/Artifacts, Storyline-Beginning/Motive/Struggle/Achievement, Six-word Story-Memoirs to Being with, Detailing Of Character and the Context, Delivering a Story– Tone / Emotions / Voice Modulation Activity- Developing and Delivering Presentation through Storytelling on the Given Situation/context	4
Total		15
Lab Session	Activities	Duration
1	Basic of Storytelling: Using Five Senses in storytelling activity and Elements of Storytelling	2
2	Analysis of a Short Story: ‘The Three Hermits by Leo Tolstoy’, and The Last Painting by O’ Henry.	2
3	Character Study: Create a detailed character profile of a fictional character, including their background, motivations, and personality traits. Write a short story or scene that showcases this character in action	2
4	Personal Storytelling: Write and present a short personal story that highlights a challenge you've faced and how you overcame it	2
5	Collaborative Storytelling: Partner with another student to create a collaborative story. Take turns writing alternating sections, focusing on maintaining a consistent tone and narrative flow.	2
6	Historical Business Story: Research and narrate a significant historical event or moment in a well-known business's journey, focusing on how storytelling played a role in shaping public perception	2
7	Social Impact Story: Develop a story that demonstrates how a business initiative or project positively impacted a community or addressed a social issue	2
8	Customer Success Story: Craft a narrative that showcases a customer's journey with your fictional business	2
9	Change Management Story: Design a narrative that communicates a change initiative within a company, addressing challenges, resistance, and the ultimate benefits of the change	2
10	Investor Pitch Story: Craft a persuasive story for a startup pitch. Highlight the problem, solution, market opportunity, and potential for growth in a captivating way	2

11	Leadership Story: Compose a story that illustrates effective leadership qualities and strategies. Highlight a leader's ability to motivate, inspire, and guide a team toward success	2
12	Cultural Storytelling: Explore how storytelling can bridge cultural gaps in a global business context. Share a story that demonstrates cultural sensitivity and understanding	2
13	Ethical Dilemma Story: Present a complex ethical dilemma faced by a business or individual. Use storytelling to explore various perspectives and potential solutions	2
14	Analysis of AI-generated stories: Analyzing an AI-generated story and adding your perspective and details to it.	2
15	Crisis Turnaround Story: Narrate a scenario where a business successfully navigated a crisis through strategic communication and storytelling, ultimately regaining trust and reputation.	2
Total		30

Text Books:

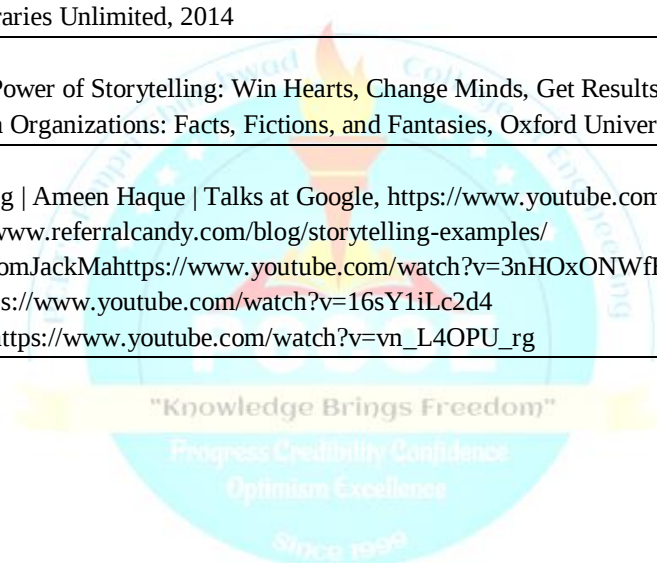
Kendall Haven, Story Smart, Libraries Unlimited, 2014

Reference Books:

1. Rob Biesenbach, Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results, East lawn Media, 2018.
2. Yiannis Gabriel, Storytelling in Organizations: Facts, Fictions, and Fantasies, Oxford University Press, 2011.

e-sources:

1. The Art of Business Storytelling | Ameen Haque | Talks at Google, <https://www.youtube.com/watch?v=77FUr6ZsWjY>
2. MarketingStorytelling-<https://www.referralcandy.com/blog/storytelling-examples/>
3. 5examplesofgreatstorytellingfromJackMa<https://www.youtube.com/watch?v=3nHOxONWfEs>
4. Sixwordsstory-NicoleKahn<https://www.youtube.com/watch?v=16sY1iLc2d4>
5. KevinHart-Tellinggreatstorieshttps://www.youtube.com/watch?v=vn_L4OPU_rg



Program:	B Tech (Mechanical)				Semester: II		
Course:	Life Skills II				Code: BSH22CC02		
Credits	Teaching Scheme (Hrs. /Week)				Evaluation Scheme and Marks		
	Theory	Practical	Tutorial	OR	TW	PR	Total
02	-	04	-	-	100	-	100

Prior knowledge: Nil

Course Objectives:

1. To equip them with essential competencies that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.
2. To develop students' vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.

Course Outcomes: After learning the course, the students will be able to:

1. Demonstrate the ways to nurture their hobbies.
2. Apply essential skills for successful and happy life management.
3. Develop skills and a growth mindset to be successful in personal and professional life.
4. Demonstrate adaptability and flexibility for any environment.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	Nurturing Your Hobbies and Personal Growth Understanding the Role of Hobbies in Personal Growth • Identifying Personal Interests and Hidden Talents: Identify your interests and hidden talents by using self-assessments and exploring different hobbies. • Creative vs. Physical Hobbies - Finding Your Balance: Explore the differences and benefits of creative (e.g., art, music) vs physical (e.g., dance, sports) hobbies, encourage trying both types for holistic development • Turning Hobbies into Skills and Achievements: Build various skills from hobbies through regular practice and track your progress using a personal portfolio. • SWOT Analysis & Reflected Best Self Exercise (RBSE)	15
II	Life Management • Digital and Global Citizenship: Understand your role & responsibility in the global and online community. • Social & Environmental Responsibility: Engage in community service and eco-friendly habits to support a sustainable world. • Diversity and Inclusion: Practice inclusive behavior by respecting cultural, gender, and individual differences. • Financial Literacy: Understand the basics of managing finances in a digital economy, including online banking and e-commerce.	15
III	Lead Yourself - Growth Mindset • Understanding Growth Mindset vs. Fixed Mindset: Carol Dweck's	15

	theory of mindset - How beliefs about intelligence and abilities influence motivation, learning habits, and confidence • Building Resilience and Perseverance: Understand how to bounce back from challenges and know when to keep trying or change your approach. • Self-Leadership and Taking Initiative: Practice taking responsibility for goals, time, and choices by setting priorities and acting independently. • Overcoming Fear of Failure: Recognize failure as part of the learning process and use techniques to reduce fear and build a positive attitude. • Learning Agility: Improve ability to adapt by learning from experience and tracking growth through regular self-review activities.	
IV	From Procrastination to Progress: Adapting with Purpose • Understanding Adaptability in a Changing World: Learn how staying open to change helps in succeeding in new roles, environments, and situations. • Flexibility in Teamwork and Collaboration: Practice working with different people and adapting your role based on team needs and work styles. • Managing Time and Setting Priorities: Build practical strategies for organizing tasks, managing schedules, and balancing academic, personal, and social commitments. • Understanding and Overcoming Procrastination: Identify common causes of procrastination and learn actionable techniques (e.g., habit stacking, the 5-minute rule) to build momentum	15
Total		60
References Books: 1. "Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books 2. "The Financial Diet: A Total Beginner's Guide to Getting Good with Money" by Chelsea Fagan and Lauren VerHage 3. "Grit: The Power of Passion and Perseverance" by Angela Duckworth Publisher: Scribner, 2018		
E Sources: 1. Skills You Need (www.skillsyouneed.com): This website offers comprehensive information and practical guidance on a wide range of life skills, including communication, time management, problem-solving, and more 2. Mind Tools (www.mindtools.com): Mind Tools provides resources on personal effectiveness, leadership, communication skills, and other essential life skills to enhance professional and personal development 3. TED Talks (www.ted.com): TED Talks offer inspiring and informative speeches by experts and thought leaders covering various life skills topics, including resilience, emotional intelligence, and personal growth 4. Very well Mind (www.verywellmind.com): This website covers mental health, emotional well-being, and self improvement topics that contribute to overall life skills development		

Vision and Mission of Applied Sciences and Humanities (AS & H) Department

Vision

To provide value-added quality education that promotes essential technical skills, critical-thinking, communication skills and human values to make impactful contributions to the society.

Mission

Being a student-centric department, our mission is –

1. To develop a strong base of engineering sciences through innovative and experiential learning.
2. To provide excellent harmony of conducive environment and moral support for joyful learning.
3. To strive for overall development of students by providing the right platform to nurture all personality traits.
4. To create research attitude and endeavor innovation, creativity.

Vision and Mission of Mechanical Engineering Department

Vision

To be the department of sustainable academic excellence, fostering innovation, skill development, and work ethics leading to globally competent mechanical engineers.

Mission

1. Nurture cohesive learning environment and develop matching ecosystem.
2. Cultivate excellent work ethics and right attitude among students by imparting essential skills and knowledge.
3. Instill a sense of creativity, social responsibility and environmental awareness among students.

