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 2026)

Effective from Academic Year 2026-27

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, and Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an 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 Applied Sciences and Humanities:

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1.	Linear Algebra & Univariate Calculus	BSH31BS01	10	
2.	Linear Algebra & Univariate Calculus – Laboratory	BSH31BS02	12	
3.	Engineering Chemistry	BSH31BS06	14	
4.	Engineering Chemistry Laboratory	BSH31BS07	17	
5.	Constitution of India	BSH31VE01	24	
6.	Indian Knowledge System	BSH31IK01	26	
7.	Communicative English	BSH31AE01	28	
8.	Life Skill 1	BSH31CC01	31	
9.	Multivariate Calculus	BSH32BS12	35	
10.	Multivariate Calculus laboratory	BSH32BS13	37	
11.	Engineering Physics	BSH32BS05	39	
12.	Engineering Physics Laboratory	BSH32BS04	42	
13.	Universal Human Values	BSH32VE02	49	
14.	Professional English/Ger/Jap/Business story telling)	BSH32AE02/ 03/04/05	52/54/56 /58	
15.	Life Skills 2	BSH32CC02	60	

Board of Studies - Department of Mechanical Engineering

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1.	Fundamentals of Electromechanical Systems	BME31ES01	18	
2.	Basic Mechanical Engineering	BME31ES02	20	
3.	Engineering Graphics	BME31PC01	22	
4.	Material Science	BME32ES03	43	
5.	Engineering Mechanics	BME32ES04	45	
6.	Computer-Aided Machine Drawing (CAMD)	BME32VS01	47	

Approved by Academic Council:

Chairman, Academic Council
Pimpri Chinchwad College of Engineering

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CURRICULUM FRAMEWORK

(2026 Course)

LIST OF ABBREVIATIONS

Sr. No.	Abbreviation	Type of Course
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	PCC	Programme Core Course
4	PEC	Programme 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	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	4	12	30
3	Program Core Course	1	3	7.5
4	Vocational and Skill Enhancement Course	1	1	2.5
5	Value Education Course	2	4	10
6	Ability Enhancement Course	2	2	5
7	Indian Knowledge System	1	2	5
8	Co-Curricular Courses	2	2	5
Total		**21**	**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	2	-	-	-	-	-	-	4
3.	Program Core Course	1	-	-	-	-	-	-	-	1
4.	Vocational and Skill Enhancement Course	-	1	-	-	-	-	-	-	1
5.	Value Education Course	1	1	-	-	-	-	-	-	2
6.	Ability Enhancement Course	1	1	-	-	-	-	-	-	2
7.	Indian Knowledge System	1	-	-	-	-	-	-	-	1
8.	Co-Curricular Courses	1	1	-	-	-	-	-	-	2
Total		**11**	**10**	**-**	**-**	-	-	-	-	21

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	Program Core Course	3	-	-	-	-	-	-	-	3
4	Vocational and Skill Enhancement Course	-	1	-	-	-	-	-	-	1
5	Value Education Course	2	2	-	-	-	-	-	-	4
6	Ability Enhancement Course	1	1	-	-	-	-	-	-	2
7	Indian Knowledge System	2	-	-	-	-	-	-	-	2
8	Co-Curricular Courses	1	1	-	-	-	-	-	-	2
Total		**21**	**19**	**-**						40

CURRICULUM STRUCTURE

First Year B. Tech Mechanical Engineering (Academic Regulations 2026)																		
(With effect from Academic Year 2026-27)																		
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	BSH31BS01	Linear Algebra & Univariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSC	BSH31BS02	Linear Algebra & Univariate Calculus – Laboratory	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
BSC	BSH31BS06	Engineering Chemistry	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BSC	BSH31BS07	Engineering Chemistry Laboratory	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
ESC	BME31ES01	Fundamentals of Electromechanical Systems	2	1	-	3	2	2	-	1	5	10	10	30	50	-	-	100
ESC	BME31ES02	Basic Mechanical Engineering	2	-	-	2	2		-	1	3	10	10	30	-	-	-	50
PCC	BME31PC01	Engineering Graphics	1	2	-	3	1	4	-	1	6	10	10	30	50	-	-	100
VEC	BSH31VE01	Constitution of India	2	-	-	2	2	-	-	-	2	25	25	-	-	-	-	50
IKS	BSH31IK01	Indian Knowledge System	2	-	-	2	2	-	-	-	2	25	25	-	-	-	-	50
AEC-I	BSH31AE01	Communicative English	-	1	-	1	-	2	-	-	2	-	-	-	30	-	20	50
CC	BSH31CC01	Life Skills 1	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
Total			**14**	**7**	**0**	**21**	**14**	**14**	**0**	**5**	**33**	**110**	**110**	**180**	**280**	**0**	**20**	**700**

L- Lecture, **P**- Practical, **T**- Tutorial, **O**- Other i.e. self-directed learning, (self- study), FA-Formative Assessment, **SA**-Summative Assessment, **TW**-Term Work, **OR**-Oral, **PR**-Practical

CURRICULUM STRUCTURE

First Year B. Tech Mechanical Engineering (Academic Regulations 2026)																		
(With effect from Academic Year 2026-27)																		
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**	**Total**
												FA1	**FA2**					
BSC	BSH32BS12	Multivariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSC	BSH32BS13	Multivariate Calculus laboratory	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
BSC	BSH32BS05	Engineering Physics	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BSC	BSH32BS04	Engineering Physics Laboratory	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
ESC	BME32ES03	Material Science	3	1	-	4	3	2		1	6	20	20	60	50	-	-	150
ESC	BME32ES04	Engineering Mechanics	2	1	-	3	2	2	-	1	5	10	10	30	50	-	-	100
VSEC	BME32VS01	Computer-Aided Machine Drawing (CAMD)	-	1	-	1		2			2	-	-	-	50	-	-	50
VEC	BSH32VE02	Universal Human Values	2	-	-	2	2	-	-	-	2	25	25	-	-	-	-	50
AEC-I	BSH32AE02/ 03/04/05	(Eng-II/Ger/Jap/Business story telling)	-	1	-	1	-	2	-	-	2	-	-	-	30	-	20	50
CC	BSH32CC02	Life Skills 2	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
		Total	**12**	**7**	**0**	**19**	**12**	**14**	**0**	**4**	**30**	**85**	**85**	**180**	**330**	**0**	**20**	**700**

L-Lecture, **P**-Practical, **T**-Tutorial, **O**- Other i.e. self-directed learning, (self- study), FA-Formative Assessment, **SA**-Summative Assessment, **TW**-Term Work, **OR**-Oral, **PR**-Practical

Note: Refer separate document Exit Policy (If required)

Curriculum

Semester I

Program:	B. Tech. (Mechanical Engineering)						Semester: I	
Course:	Linear Algebra & Univariate Calculus						Code:	BSH31BS01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	CIE		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	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 to the system of linear equations, linear dependence of vectors, eigenvalues, and eigenvectors.
2. Use successive differentiation in indeterminate forms, Taylor's and Maclaurin's expansions.
3. Solve first-order differential equations and higher-order linear differential equations.
4. Apply first-order differential equations and higher-order linear differential equations to solve problems involving growth and decay, electrical circuits, and one-dimensional heat flow.

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, and eigenvectors.	8
II	**Differential Calculus:** exponential indeterminate forms, Taylor's series, Maclaurin's series, successive differentiation, and Leibnitz's theorem.	7
III	**Ordinary Differential Equations:** Exact differential equations and differential equations reducible to exact form. **Applications:** Growth and decay, Kirchoff's law of electrical circuits (L-R and R-C circuits), and one-dimensional conduction of heat (steady state).	8
IV	**Linear Differential Equations:** Linear differential equation of nth 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:

1.NPTEL Course lectures links:

https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

Program:	B. Tech. (Mechanical Engineering)					Semester: I	
Course:	Linear Algebra & Univariate Calculus Laboratory					Code:	BSH31BS02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge:
1. Elementary Algebra.
2. Elementary Calculus

Course Objectives: This course aims to enable students,
1. Apply open-source software to solve engineering problems involving matrices, differential calculus, and ordinary differential equations.
2. 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 programs for matrices, differential calculus, and ordinary differential equations.
2. Develop project using relevant mathematical concepts to address societal issues.

Detailed Syllabus

Expt. No.	List of Experiments using open-source software-(16 hrs.)
I	Conversion of matrices into systems of linear equations.
II	Conversion and solution of systems of linear equations into matrix form.
III	Determine linear dependence/independence of vectors and compute eigenvalues and eigenvectors.
IV	Evaluation of Indeterminate Forms.
V	Expand functions using Taylor's and Maclaurin's series.
VI	Perform successive differentiation of functions.
VII	Solve exact and non-exact differential equations.
VIII	Solve higher-order linear differential equations.
IX	Apply differential equation techniques to determine current or charge in electrical circuits.
X	Apply differential equation methods to analyze temperature distribution based on Fourier's Law of heat conduction.

Mini Project* - (14 hrs.)

***Mini Project Guidelines:**

Students must prepare a mini-project based on topics such as matrices, differential calculus, ordinary differential equation, linear differential equation, 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

Program:	B. Tech. (Mechanical Engineering)						Semester: I	
Course:	Engineering Chemistry						Code: BSH31BS06	
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
3	3	-	-	1	20	20	60	100

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 introduce students to analytical spectroscopy techniques and sustainable materials by their fundamental principles and practical applications.
2. To lead students to investigate the advancement in engineering materials.
3. To familiarize students with instrumental methods for qualitative and quantitative analysis of water and explore the importance of green chemistry.
4. To build consciousness about the recent development in alternative energy sources and batteries
5. To make students acquainted with chemical and electrochemical mechanisms of corrosion and corrosion control.

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

1. Utilize the principles of spectroscopic techniques for structure identification and sustainable materials in engineering applications.
2. Describe the structure, properties and performance of speciality polymers and nanomaterials in technological applications.
3. Analyze water softening techniques and green chemistry principles for environmental sustainability.
4. Use preventive methods of corrosion in real-life problems.
5. Apply fundamentals of fuel combustion and battery technology to assess their energy efficiency.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**AI in Engineering Chemistry:** For visualizing molecules, Understanding DFT, ab initio methods, Hardness & alkalinity calculation, Boiler problem analysis, Green solvent identification, Conducting polymer mechanism, Case study analysis of corrosion, GCV/NCV calculations, Battery reactions (Li-ion, fuel cells) Ethical AI usage. Tools: SMILES, InChI, Wolfram Alpha, ChatGPT, Perplexity AI, Excel + AI, Chem Draw, Molview, Gemini, Claude. **A) Sustainable materials**: Definition & importance of sustainability in engineering, Green concrete, green coatings and FRP. **B) Spectroscopic Techniques:** Electromagnetic spectrum, absorption and emission spectroscopy – Lambert's law, Beers law, Beer-Lambert's law. UV-Visible Spectroscopy, IR Spectroscopy, and X-ray Diffraction – Principles, Instrumentation, and Applications.	10

II	**Advanced Engineering Materials and Nanotechnology:** **A) Advanced Engineering Materials:** Conducting Polymers: Characteristics and Classification with examples-mechanism of conduction in trans-polyacetylene and applications of conducting polymers, Biodegradable Polymers: PHBV, Liquid crystal polymer-Kevlar., E waste management **B] Nanomaterials:** Introduction, classification of nanomaterials based on dimensions, structure, properties and applications of graphene and carbon nanotubes, quantum dots (semiconductor nanoparticles),and their applications in sensors , transistors, energy storage, thin film deposition techniques (nanoparticle synthesis), sustainable nanomaterials.	9
III	**Water technology & Green Chemistry:** **A)Water Technology:** Hardness & alkalinity of water with their estimation. Boiler troubles: Boiler corrosion, Sludges, Scales, and Caustic embrittlement. External treatment methods- Softening of water by Zeolite & ion-exchange processes. Desalination of water – Reverse osmosis. **B)Green Chemistry:** 12 principles, Green solvents in PCB & chips cleaning.	9
IV	**Corrosion Science:** a) Corrosion: introduction, types of corrosion, mechanism of atmospheric 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. 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. Causes and effects of corrosion – theories of chemical and electrochemical corrosion – mechanism of electrochemical corrosion, Corrosion control methods- Cathodic protection – Sacrificial anode and impressed current methods.	8
V	**Energy Sources and Conversion Technologies:** **A. Fuel and combustion:** Calorific value of fuel – GCV, NCV Determination of calorific value - Bomb calorimeter, Boy‟s colorimeter and numerical. Classification- solid fuels: - Coal analysis of coal proximate and ultimate analysis and their significance. Liquid fuels Petroleum and its refining, Knocking – octane and cetane rating, Gaseous fuels Hydrogen as future fuel, Alternative fuels: Power alcohol and biodiesel advantages, Combustion: chemical reactions, calculations on air requirement for combustion. **B) Battery Technology:** Electrochemical principles, Li ion , solid state Sodium ion battery, Charging and discharging reaction, fuel cell, battery safety.	9
	Total	**45**

Text Books:

1. Chawla, S. (2015). *A Textbook of Engineering Chemistry*. New Delhi: Dhanpat Rai & Co.
2. Dara, S. S. (2010). *Engineering Chemistry*. New Delhi: S. Chand Publications.
3. Jain, P. C., & Jain, M. (2016). *Engineering Chemistry*. New Delhi: Dhanpat Rai Publishing Co.
4. Jensen, F. (2017). *Introduction to Computational Chemistry* (3rd ed.). John Wiley & Sons.

5. Kulkarni, S. K. (2014). *Nanotechnology: Principles and Practices* (3rd ed.). Springer.
6. Palanna, O. G. (2017). *Engineering Chemistry*. Mc Graw-Hill Education.
7. Dr. Shikha Baskar, (2012). *Engineering Chemistry*. Wiley India Pvt. Ltd.

Reference Books:

1. Ram D. Gupta, Hydrogen as a fuel C. R. C. Publication (2009).
2. V. R. Gowariker, Polymer Science New Age International Publication (2015).
3. T. Gregory, Nanotechnology Springer Verlog New York (1999).
4. Charles P. Poole, Frank Owens, Introduction to Nanotechnology, John Wiley & Sons (2003)
5. Engineering Chemistry by Wiley India Pvt. Ltd, First edition 2011.

E Sources:

1. https://nptel.ac.in/courses/104102113
2. https://nptel.ac.in/courses/122106030
3. https://www.coursera.org/learn/corrosion

Program:	B. Tech. (Mechanical Engineering)					Semester: I	
Course:	Engineering Chemistry Laboratory					Code:	BSH31BS07
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of:

1. Volumetric analysis: Principles of titration, use of indicators, standard solutions, and end-point detection. **Computer-Aided Machine Drawing**
2. Instrumental Techniques: Working principles of pH meter, conductivity meter, and UV-Visible spectrophotometer (Beer–Lambert law), Molarity, normality and molality.
3. Acid–base equilibria, dissociation constant (Ka), and buffer solutions.
4. Handling chemicals, glassware usage, measurement accuracy, and safety precautions.

Course Objectives:

1. To analyze water quality parameters such as hardness, alkalinity, and chloride content using standard methods.
2. To develop proficiency in volumetric and instrumental analytical techniques for quantitative chemical analysis.
3. To demonstrate synthesis and characterization of polymers and advanced materials.
4. To evaluate fuel properties and material characteristics through experiments like proximate analysis and electrochemical studies.

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

1. Apply volumetric and instrumental methods for quantitative and qualitative analysis of materials
2. Demonstrate the process of polymer synthesis and corrosion resistance improvement for metals.

Detailed Syllabus

Expt. No.	List of Experiments
1	Determination of total hardness of water sample by EDTA method.
2	Determination of type of alkalinity of given water sample and extent of alkalinity.
3	To determine Chloride (Cl^-) content in a given water sample by Argentometric method.
4	To determine the dissociation constant of a weak acid (acetic acid) using a pH meter.
5	Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid.
6	Proximate analysis of Coal.
7	To estimate the amount of Fe (II) present in the given solution potentiometrically.
8	To determine the maximum wavelength of absorption of KMnO4, verify Beer's law and find concentration of the unknown sample.
9	To perform electroplating of copper for enhancing corrosion resistivity and determination of its electrochemical equivalent (ECE).
10	To prepare the Phenol formaldehyde resin.
11	To prepare Natural Fiber Composite.

References:

1. Vogels Text book of Qualitative Chemical Analysis by J. Mendham, R, C, Denny, 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 Engineering							Semester:			I
Course:	Fundamentals of Electromechanical Systems							Code:			BME31ES01
Credits	Teaching Scheme Hrs./week				Evaluation Scheme and Marks						
	Lecture	Practical	Tutorial	Other	FA 1	FA 2	SA	TW	OR	PR	Total
3	2	2	-	1	10	10	30	50	-	-	100

Prerequisites: Nil

Course Objectives:

1. To develop understanding of fundamental electrical laws, circuit theorems, and analysis techniques used in electromechanical systems.
2. To impart knowledge of electrical machines, sensors, and transducers for selection, operation, and engineering applications.

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

1. Apply fundamental laws and network theorems to basic electrical circuits.
2. Apply the operating principles of DC machines to measure performance.
3. Explain the basic construction and working principles of AC machines
4. Select the different types of sensors and their applications

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; andstar-delta transformation. Basics of analog & digital signals, diodes, transistors & op-amps.	8
II	**DC Machines:** Introduction to DC Machines, Construction of DC Machines, Working Principle, Types of DC Machines, Speed–torque characteristics of DC motors, Losses in DC machines, PMDC and BLDC; Special purpose motors: Stepper motor and servomotor: selection of motors and its applications, DC generator.	7
III	**AC Machine**: Introduction to AC Machines, Classification of AC machines: Transformers, AC motors, AC generators. Single-Phase Transformer: Construction, operating principle, EMF equation, voltage, and current ratios. Losses, efficiency, and regulation. AC Motors**:** Principle of rotating magnetic field, types of AC motors: induction motor, synchronous motor. Three-Phase Induction Motor**:** Construction, Working Principle, and Advantages of induction motors	8
IV	**Sensors and transducers:** Classification of sensors: Position sensors: Potentiometer, LVDT, digital encoder, ultrasonic sensor; proximity sensors: optical, inductive, capacitive;temperature sensors: RTD, thermocouples,thermistor, pyrometer, strain gauges, load cells, flow sensors, level sensors,LiDAR:applications of sensors.	7

	Total	**30**
List of Experiments (1, 2, 6, 7 are compulsory; Any 5 from the remaining practical)		
Sr. No	**List of Experiments**	**Duration Hrs.**
1	**Design and assemble** a single-phase electrical switchboard incorporating switches, plug points, a protective fuse, and a fan regulator, and **test its functionality**.	**4**
2	**Study and analyse** the electricity bill of a Low Tension (LT) consumer to understand tariff structure, energy consumption, demand charges, and power factor implications.	**4**
3	**Verify Kirchhoff's Laws and/or Thevenin's Theorem** for a given DC electrical network through experimental validation using a multimeter.	**2**
4	**Conduct a load test on a DC shunt motor** to determine its efficiency and evaluate performance under varying load conditions.	**2**
5	**Perform speed control of a DC shunt motor** using suitable methods and **plot speed–torque and speed–current characteristics**.	**2**
6	**Select an appropriate electric motor** for a specified loading and operating condition based on torque, speed, power rating, and duty cycle.	**4**
7	**Estimate transformer losses and efficiency** and analyze their impact on performance.	**4**
8	**Determine the efficiency and voltage regulation** of a single-phase transformer using the **direct loading test**.	**2**
9	**Study and demonstrate the working principles and applications** of commonly used sensors in engineering systems.	**2**
10	**AI-based temperature prediction** using appropriate temperature sensors & Arduino.	**2**
11	**Measure distance and displacement** using suitable sensors and evaluate their performance for engineering applications.	**2**
12	**Measure flow, flow velocity, and rotational speed** using appropriate sensors and interpret the obtained results.	**2**
	Total	**30**
	Total (Theory + Lab)	**60**

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, 6th Ed, 2019.

Reference Books:

1. Introduction to Mechatronics and Measurement Systems, Alciatore and Histand, Mc-Graw Hill, 5th Ed, 2019
2. Mechatronics – An Introduction, Robert H. Bishop, CRC press, 2017.
3. Basic Electrical Engineering, D.C. Kulshreshtha, Mc-Graw Hill, 2nd Ed, 2022.

e-Resources:

https://archive.nptel.ac.in/courses/108/105/108105112/

https://onlinecourses.nptel.ac.in/noc21_me27/preview

Program:	B Tech Mechanical Engineering						Semester:		I		
Course:	Basic Mechanical Engineering						Code:		BME31ES02		
Credits	Teaching Scheme Hrs./week				Evaluation Scheme and Marks						
	Lectures	Practical	Tutorial	Other	FA 1	FA 2	SA	TW	OR	PR	Total
2	2	-	-	1	10	10	30	-	-	-	50

Prerequisites: Nil

Course Objectives:

1. To introduce the fundamental concepts of mechanical engineering and its role in multidisciplinary engineering applications.
2. To develop fundamentals of basic principles of thermodynamics and heat transfer used in industrial and domestic systems.
3. To familiarize students with basic manufacturing processes used in modern industries.
4. To provide basic knowledge of automobile systems and emerging mobility technologies such as Electric Vehicles, Hybrid Electric Vehicles and solar vehicles.

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

1. Identify the basic mechanical elements and the power transmission drives based on their applications.
2. Apply the fundamentals of thermodynamics and heat transfer for industrial and domestic applications.
3. Classify different manufacturing processes and materials for different applications.
4. Comprehend the automotive system for combustion vehicle, EV's, HEV's and solar vehicles.

Detailed Syllabus

Unit	Description	Duration (Hrs.)
I	**Basics of Design Engineering** Introduction to mechanical engineering: use of mechanical engineering in day-to-day life and its interdisciplinary use, introduction to design thinking. Machine elements and power transmission drives: classification, function and applications of shaft, axle, key, bearing and coupling, belt drive, chain drive and gear drive. Mechanisms: four bar and slider crank mechanism with its inversions.	07
II	**Basics of Thermal Engineering** Thermodynamic System, Boundary, Types of system, State of system, energy interactions: heat transfer, work transfer, mass transfer, functioning of steady flow devices (heat/ work/ neither heat nor work transfer devices), Zeroth law of thermodynamics, modes of heat transfer, Thermophysical properties like specific heat, latent heat, calorific value etc, household refrigerator, split and central air conditioning system.	08
III	**Basics of Manufacturing** Introduction to manufacturing processes: classification and applications, sand casting and die casting, plastic moulding: injection and blow moulding, sheet metal operations, and forging (hot working and cold working). Introduction to industry 4.0	08
IV	**Introduction to Mobility Engineering** Classification of automobile, specifications of two-wheeler, four-wheeler and multi axle vehicles, types of chassis layout and drives, working of I.C. Engine (two and four stroke), gear boxes, single plate clutch, drum and disc brakes, drive train system, simple	07

	numerical on gear train. Concept and environmental importance of electric vehicles, construction and working of EV, hybrid electric vehicles and solar vehicles, challenges and future scope of EV's and HEV's.	
	Total	**30**

Text Books:

1. Basic Mechanical Engineering- Basant Agarwal and C. M. Agarwal, First edition 2008, Wiley publication.
2. Engineering Thermodynamics- P. K. Nag, Sixth edition 2017, Tata McGraw-Hill publishing Co. Ltd.
3. Manufacturing Processes for Engineering Materials – Serope Kalpakjian Steven R. Schmid, 6th edition 2018, Pearson publication.
4. Automobile Engineering Vol-1 & 2, Kripal Singh, 2020, Standard Publishers and Distributors Pvt Ltd.

Reference Books:

1. Design of Machine Elements- V.B. Bhandari, Fourth edition 2017, Tata McGraw-Hill publishing Co. Ltd.
2. Theory of Machine- S.S.Ratan, Fifth edition 2019, Tata McGraw-Hill publishing Co. Ltd.
3. Thermal Engineering- Arora and Domkunwar Dhanpat Rai and Sons.
4. Elements of Workshop Technology- Hajra, Chaudhari Volume I, Fourteenth edition 2008 Media Promoters and Publishers, Mumbai.
5. Automobile Engineering Volume I- Dr. Kripal Singh, Eleventh edition 2008, Standard Publishers Distributors.
6. Automotive Electrical Equipment- P. L. Kohli, First edition 2001, McGraw Hill Education (India) Pvt Ltd.

e-Resources:

1. NPTEL course on Basics of Mechanical Engineering - 1, IIT Kanpur, by Prof.JanakranjanRamkumar
a. https://nptel.ac.in/courses/112105126
2. NPTEL course on Basics of Mechanical Engineering - 2, IIT Kanpur, by Prof.JanakranjanRamkumar
a. https://nptel.ac.in/courses/112104616
3. NPTEL course on Manufacturing Processes II, IIT Kharagpur, by Prof. A.B. Chattopadhyay
a. https://nptel.ac.in/courses/112105126
4. NPTEL course on Fundamentals of Electric vehicles: Technology & Economics, IIT Madras, by Prof. Ashok Jhunjhunwala https://nptel.ac.in/courses/108106170

Program:	B. Tech. Mechanical Engineering							Semester:		I
Course:	Engineering Graphics							Code:		BME31PC01
Credits	Teaching Scheme Hrs./week				Evaluation Scheme and Marks					
	Lectures	Practical	Tutorial	Other	FA1	FA2	SA	TW	OR	PR	Total
3	1	4	-	1	10	10	30	50	-	-	100

Prerequisites: Nil

Course Objectives:

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

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

1. Apply engineering drawing fundamentals and standards to represent objects on a two-dimensional plane.
2. Apply visualization skills to represent engineering objects in 2D and 3D forms.
3. Analyse and construct the development of lateral surfaces of solids.
4. Apply CAD tools to draw, edit, dimension, and plot 2D and 3D engineering drawings.

Detailed Syllabus

Unit	Description	Duration Hrs.
I	**Part A: Engineering Drawing Fundamentals:** Fundamentals of engineering drawing: Standard drawing practices, dimensioning techniques, and the construction of important engineering curves; the layout and standard sizes of drawing sheets, as per BIS SP 46:2003 standards; and various types of lines used in engineering drawings. The elements and system of dimensioning are the IS 11665 standard title block (170 mm x 65 mm). **Part B: Freehand sketching:** Introduction to freehand drawing techniques for the rapid representation of engineering objects. Emphasis on developing visualization skills to depict three-dimensional components and their pictorial views on a two-dimensional plane.	2
II	**Part A: Orthographic Projection:** Reference planes, types of orthographic projections, first angle projection, third angle projection, methods of obtaining orthographic views by the first angle method, sectional orthographic projections, full section, half section, and offset section. **Part B:** Interpretation of given views, missing views.	6
III	**Isometric Drawing:** Isometric view, isometric scale for isometric projection, non-isometric lines, construction of isometric view from given orthographic views, construction of isometric view of pyramid, cone, and sphere. Isometric representation of simple real-world machine components such as nuts, bolts, flanges, and pipe fittings.	4
IV	**Development of Surfaces:** Development of lateral surfaces of solids: cone, cylinder, prism, and pyramid. DLS of a truncated solid with a section by AIP.	3
	Total	15
List of Experiments **Sheets nos. 1 to 5 shall be submitted on A2-size drawing sheets.**		60

Sheet No.	List of Experiments	Duration Hrs.
1.	Lettering, System of dimensioning, and freehand sketching of Mechanical Components	08

	2.	Orthographic Projections **[Minimum Six Problems]**	**12**	
	3.	Missing View **[Minimum Six Problems]**	**10**	
	4.	Isometric Projections **[Minimum Six Problems]**	**12**	
	5.	Development of Solids **[Minimum Six Problems]**	**10**	
	6.	**Introduction to computer-aided drafting:** Introduction to GUI of CAD software, basic operation of CAD software, Draw tools, Modify tools, dimensions, and Properties	**8**	
			Total	**75**

Text Books:

1. A textbook of Engineering Drawing- R.K. Dhawan, Revised Edition 2019, S. Chand and Company Ltd.. New Delhi, India

Reference Books:

1. Engineering Drawing, Plane and Solid Geometry—N. D. Bhatt, 54th edition, 2023, Charotar Publication House.
2. Engineering Drawing- M.B. Shah and B.C. Rana, 2nd edition 2009, Pearson Publications.
3. Engineering Graphics—P.J. Shah, Revised edition 2019, S. Chand Publications.
4. Fundamentals of Engineering Drawing—Warren J. Luzzader, 11th edition, 2015, Prentice Hall of India New Delhi

e-Resources:

1. 12-week NPTEL course on Engineering Drawing and Computer Graphics Lectures (IIT, Kharagpur) – by Prof.RajaramLakkaraju. https://nptel.ac.in/courses/112105294
2. Bureau of Indian Standards – Guidelines for drawing sheet sizes, dimensioning, and line types https://www.bis.gov.in

Program:	B. Tech. (Mechanical Engineering)				Semester:		I	
Course:	Constitution of India				Code:		BSH31VE01	
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	-	25	25	-	50

Course Objectives:

1. To introduce students to the fundamental principles, philosophy, and key features of the Indian Constitution.
2. To familiarize students with the structure and functioning of government and key constitutional provisions.
3. To enable students to apply constitutional values, rights, and duties in understanding contemporary issues and responsible citizenship.

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

1. Explain the fundamental principles and key features of the Indian Constitution, including Preamble, Rights, Duties, and DPSP.
2. Describe the structure and functioning of the Executive, Legislature, and Judiciary, including the law-making process.
3. Illustrate constitutional provisions such as amendments, writs, and citizen mechanisms to address rights and governance issues.
4. Apply constitutional values to evaluate contemporary issues and challenges in civic and professional contexts.

Unit	Description	Duration [Hrs]
I	**Foundations of the Indian Constitution** ● Introduction to the Indian Constitution: brief historical background, making of the Constitution, and its significance ● The Preamble: ideals, philosophy, and interpretation ● Salient features of the Indian Constitution: sovereignty, secularism, democracy, federalism, and rule of law ● Fundamental Rights and Fundamental Duties: concepts and relevance in contemporary society ● Directive Principles of State Policy (DPSP): objectives and role in governance ● Relationship between Fundamental Rights, Duties, and DPSP	7
II	**Structure and Functioning of Government** ● Union Executive: President, Vice-President, Prime Minister, and Council of Ministers—roles and functions ● Parliament: composition and functioning of Lok Sabha and Rajya Sabha ● Legislative process: stages of law-making (bill to act) ● Judiciary: structure, independence, and concept of judicial review ● Federalism: Centre–State relations and distribution of powers	8

	● State Government: role of Governor and State Legislature (overview)	
III	**Constitutional Mechanisms and Citizen Interface** ● Amendment process of the Constitution and basic structure doctrine ● Constitutional bodies: Election Commission of India and Comptroller and Auditor General—roles and functions ● Emergency provisions: national, state, and financial emergencies ● Constitutional remedies: writs and judicial remedies for protection of rights ● Public Interest Litigation (PIL): concept and significance ● Introduction to citizen-centric mechanisms: Right to Information (RTI)	7
IV	**Constitution in Contemporary Context** ● Judicial activism and its role in safeguarding constitutional values ● Contemporary constitutional issues: freedom of speech, right to privacy, gender justice, and environmental protection ● Challenges to constitutional governance: secularism, federalism, and social justice ● Recent constitutional developments and amendments ● Basic comparative perspective: Indian Constitution and selected global practices	8

Text Books:

1. E 1. Durga Das Basu, ―Introduction to the Constitution of India ―, Prentice Hall of India, New Delhi,24th edition, 2020, ISBN-109388548868
2. Clarendon Press, Subhash C, Kashyap, ― Our Constitution: An Introduction to India‘s Constitution and constitutional Law‖, NBT, 5th edition, 2014, ISBN-9781107034624

Reference Books:

1. Maciver and Page, ―Society: An Introduction Analysis ―, Laxmi Publications, 4th edition, 2007, ISBN 100333916166
2. PM Bhakshi, ―The constitution of India‖, Universal Law Publishing - An imprint of Lexis Nexis, 14th edition, 2017, ISBN-108131262375
3. Indian Constitution by Subhash C. Kashyap, National Book Trust, New Delhi.
4. Constitution of India and Professional Ethics, Dr. G. B. Reddy &Mohd. Suhaib, Dreamtech Press.

e-sources:

1. https://www.legislative.gov.in/constitution-of-india
2. **https://legalaffairs.nalsar.ac.in/**

Program:	B. Tech. (Mechanical Engineering)						Semester: I	
Course:	Indian Knowledge System (IKS)						Code:	BSH31IK01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	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		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 Shad 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, and Bhaskaracharya II) ● Astronomy and Cosmology (Surya Siddhanta, Jyotish Shastra, Astronomical Observatories) ● Metallurgy, Material Science, and Engineering (Iron Pillar, Wootz Steel, Zinc Distillation) ● Mechanical Engineering and Architecture (Vastu Shastra, Water Management Systems, Temple and City Planning) ● Yoga, 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, Panchatantra & Nitishastra) ● 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 sustainable environmental practices	7
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, VinayakRajat, NagendraPavanan 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 Engineering)					Semester: I	
Course:	Communicative English					Code:	BSH31AE01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	30	20	-	50

Prior knowledge of: Basic English communication

Course Objectives: This course aims at enabling students to:

1. Strengthen language skills through grammar, vocabulary, and comprehension activities.
2. Enhance students' ability to communicate ideas clearly in written and spoken forms.

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

1. Interpret key ideas from listening and reading tasks to demonstrate comprehension.
2. Develop structured paragraphs and formal emails using grammar, vocabulary and writing techniques.
3. Organize information into a logical presentation framework to highlight clear and structured oral presentations.

Detailed Syllabus

Expt. No	Suggested List of Experiments	Duration (Hrs)
I.	**Apply Listening for Understanding:** Practice listening through IELTS & TOEFL-style audio clips and respond to comprehension-based questions with accuracy.	**2**
II.	**Apply Listening for Understanding:** Practice listening through audio clips of interviews and podcasts and respond to comprehension-based questions with accuracy.	**2**
III.	**Interpret Text through Guided Oral Reading:** Read and interpret short story text, *The Necklace* by Guy De Maupassant with appropriate pronunciation, pauses, and intonation, and answer questions to demonstrate comprehension.	**2**
IV.	**Apply Analytical Reading Comprehension Techniques:** Apply skimming and scanning techniques to understand and interpret unseen passages effectively, for competitive exams.	**2**

V.	**Engage in Integrated Comprehension Practice:** Listen to audio content and follow the text of Steve Jobs' speech 'Stay Hungry, Stay Foolish' and respond to comprehension questions demonstrating understanding.	**2**
VI.	**Use Grammar in Context:** Use appropriate grammar structures in contextual sentence-building and short communication tasks; Identify and Correct Common Errors.	**2**
VII.	**Use Functional and Business Vocabulary:** Refine Sentence Structures by using appropriate tense, agreement, and sentence patterns to enhance clarity and correctness. Use functional and basic business vocabulary accurately in speaking and writing tasks.	**2**
VIII.	**Practice Note-Taking and Paragraph Writing Skills:** Apply note-making techniques to organize ideas and write clear, structured paragraphs. Refine writing style and perform grammar checks with the help of Generative AI tools.	**2**
IX.	**Apply Email Etiquette and Review Professional Emails:** Apply advanced email etiquette by editing and refining emails for clarity, tone, correctness, and professionalism, including peer review and identification of common errors in workplace communication.	**2**
X.	**Draft Professional Emails for Workplace Communication:** Draft clear and formal emails for internships, job applications, and follow-ups, focusing on appropriate subject lines, structure, tone, and basic professional etiquette.	**2**
XI.	**ConstructVisually Engaging PowerPoint Presentations.** Convey ideas concisely in order to create professional decks that support rather than distract from their message.	**2**
XII.	**Deliver Persuasive Oral Presentations:** Practice techniques for maintaining eye contact, vocal variety, managing stage presence and articulating complex ideas clearly to ensure maximum audience engagement and retention.	**2**
XIII.	**Group Discussion Techniques:** Examine mock group discussions to see how different roles and structures impact the conversation.	**2**
XIV.	**Express yourself in Group Discussions:** Participate in group discussions on technical and general topics, demonstrating clarity, teamwork and communication skills.	**2**

XV.	**Deliver a Public Speech:** Apply voice modulation, paralanguage, and clarity in structured speaking tasks.	**2**
	Total	**30**

Text Books:

1. *Essential English Grammar*, **4th Edition (2015)** – Raymond Murphy, **Cambridge University Press**
2. Kee, R. (2022, March 5). *"Stay Hungry, Stay Foolish": Steve Jobs 2005 Stanford Commencement Speech (Transcript & Audio) — RoxineKee*. RoxineKee. https://www.roxinekee.com/blog/stay-hungry-stay-foolish
3. De Maupassant, G. & http://www.HorrorMasters.com. (n.d.). *The Necklace*. https://susannahfullerton.com.au/wp-content/uploads/2019/04/The-Necklace.pdf
4. *Developing Communication Skills*, Revised Edition (2017) – Krishna Mohan &Meera Banerji, Macmillan Education India

Reference Books:

1. *Practical English Usage*, 4th Edition (2019) – Michael Swan, Oxford University Press
2. *Oxford Guide to English Grammar*, Latest Edition – John Eastwood, Oxford University Press
3. *Better English Pronunciation*, 2nd Edition – J.D. O'Connor, Cambridge University Press

E Resources

- British Council – Learn English (Grammar, Listening, Speaking) https://learnenglish.britishcouncil.org
- Cambridge Dictionary & Grammar https://dictionary.cambridge.org

Program:	B. Tech. (Mechanical Engineering)					Semester: I	
Course:	Life Skills 1					Code:	BSH31CC01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of: Nil

Course Objectives: This course aims at enabling students to:

1. To help students understand self-awareness, well-being and emotional regulation for personal growth.
2. To enable students to practice critical thinking, problem-solving and goal-setting skills for academic and life success.

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

1. Identify personal strengths, lifestyle habits and well-being practices using self-assessment and reflective activities.
2. Use emotional intelligence strategies in dynamic social and academic contexts.
3. Apply cognitive thinking and problem-solving strategies to set SMART goals for personal and professional life.

Detailed Syllabus

Expt. No	Suggested List of Experiments	Duration (Hrs)
I.	Developing Self Awareness: Explore personal interests, beliefs, strengths and goals through reflective activities, self-assessment exercises, and group discussions to develop self-understanding.	**2**
II.	Explore Therapeutic Hobbies: Explore creative (art, music, writing) and physical (sports, dance, yoga) hobbies through short activity sessions and reflect on which activities help reduce stress and improve mental clarity.	**2**
III.	Evaluate Holistic Health Habits: Evaluate personal eating patterns and physical activity levels through a lifestyle tracking exercise and design a simple daily routine for healthier living.	**2**
IV.	Develop a Personal Well-being Plan: Design a short project outlining a personal well-being strategy that includes hobbies, emotional regulation practices and healthy lifestyle habits.	**2**

V.	Analyze Personal Potential (SWOT Analysis): Analyze personal strengths, weaknesses, opportunities, and threats through a guided SWOT worksheet and group discussion to identify hidden talents and areas for self-improvement.	**2**
VI.	Identify Emotional Triggers: Identify situations that cause overthinking, stress, or anxiety by analysing common academic scenarios and discussing emotional responses in small groups.	**2**
VII.	Examine Relationship Dynamics: Examine empathy, personal boundaries and attachment styles through role-play activities and reflective discussions on relationship patterns.	**2**
VIII.	Develop Assertiveness Skills: Develop assertive communication strategies through scenario-based role plays to practice expressing opinions while respecting others.	**2**
IX.	Develop Resilience to Peer Pressure: Develop resilience strategies to resist negative peer pressure or addictive behaviours through simulation exercises and discussion of real-life situations.	**2**
X.	Reflect on Personal Learning Journey: Reflect on insights gained from the life skills activities through guided journaling and group sharing to evaluate personal growth.	**2**
XI.	Apply Growth Mindset Principles: Apply growth mindset concepts by reflecting on a past failure and reframing it as a learning opportunity through guided journaling and peer discussion.	**2**
XII.	Demonstrate Thinking Patterns: Demonstrate convergent and divergent thinking by brainstorming multiple solutions to a simple engineering or real-life problem and analysing the thinking approach used.	**2**
XIII.	Apply Problem-Solving Frameworks: Apply logical reasoning frameworks to solve case-based academic or ethical problems through structured group problem-solving activities.	**2**
XIV.	Design SMART Goals: Design personal academic or career goals using the SMART framework and present an action plan to achieve them.	**2**
XV.	Present Life Skills Application Project: Present a small group project demonstrating how life skills concepts can be applied to improve personal or academic life.	**2**
	Total	**30**

Reference 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

Curriculum
Semester II

Program:	B. Tech. (Mechanical Engineering)						Semester: II	
Course:	Multivariate Calculus						Code:	BSH32BS12
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	CIE		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. Find composite function's Derivatives, value of Euler's expression, Jacobians, errors and extrema using Partial Differentiation.
2. Represent the Fourier series for continuous functions and discrete periodic time domain functions in signal form.
3. Compute definite improper integrals using Gamma, Beta function and differentiation under the integral sign.
4. Evaluate multiple integral, Area and Volume for curves and Surfaces using the concept of integration techniques.

Unit	Description	Duration [Hrs]
I	Partial Differentiation and its applications: Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. 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: Gamma function and Beta function, Differentiation Under the Integral Sign (DUIS).	7
IV	Multiple Integral and it's applications: Double integration, conversion into polar form, Triple integration, Dirichlet's theorem, applications of double & triple integration to find area and 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 Engineering)					Semester: II	
Course:	Multivariate Calculus Laboratory					Code:	BSH32BS13
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge:
1. Elementary Algebra.
2. Elementary Calculus
3. Basics of Open Source

Course Objectives: This course aims to enable students,
1. To equip with the ability to apply open source software 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 programs for partial differentiation, integral calculus, multiple integrals, and Fourier series using open-source software.
2. Develop project using relevant mathematical concepts to address societal issues.

Detailed Syllabus

Expt. No.	List of Experiments using open-source software-(16 hrs.)
I.	Computation of Higher order Partial Derivatives
II.	Evaluation of Maxima and Minima for two variable functions
III.	Computation of the Jacobian for Functions of Several Variables
IV.	Representation of a periodic function as a Fourier Series
V.	Representation of the Fourier Series through Harmonic Analysis for the given Data
VI.	Evaluation of Gamma & Beta function
VII.	Evaluation of Integrals using Differentiation Under the Integral Sign (DUIS)
VIII.	Evaluation of Double and Triple Integrals
IX.	Determine the Area of a Region using Double Integrals
X.	Determine the Volume of a Solid using Triple Integrals

Mini Project* - (14 hrs.)

***Mini Project Guidelines:**

Students must prepare a mini-project based on topics such as partial differentiation, Fourier series, integral calculus, multiple integrals 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

Program:	B. Tech. (Mechanical Engineering)						Semester: II	
Course:	Engineering Physics						Code:	BSH32BS05
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Self-Learning	FA		SA	Total
					FA1	FA2		
3	3	-	-	1	20	20	60	100

Prior knowledge of:
1. Atoms, molecules and nuclei.
2. Current, electricity and magnetism.
3. Electromagnetic induction.

Course Objectives: This course aims at enabling students,
1. Build a strong conceptual understanding of Optics, Semiconductor Physics, and Quantum Physics, Acoustics
2. Introduce recent advances in Physics, including Nanotechnology, Superconductivity and Lasers
3. Create awareness of the role of Physics principles in various engineering applications.

Course Outcomes: After learning the course, the students should be able to:
1. Interpret thin film interference, laser operation, and applications using wave optics and light–matter interaction
2. Illustrate electrical behaviour of solids using band theory and charge carriers
3. Analyse quantum behaviour of particles using wave–particle duality and the Schrödinger equation
4. Describe acoustic factors influencing building design and principles of non-destructive testing techniques for assessing material integrity
5. Apply concepts of magnetism and superconductivity to magnetic behaviour, phase transitions and superconducting phenomena with their applications
6. Describe the properties, synthesis methods, and applications of nanomaterials in modern technologies.

Detailed Syllabus

Unit	Description	Duration [Hrs.]
I	**Wave Optics and Lasers**	
	Wave Optics Interference: Interference, phase difference & path difference between waves, constructive & destructive interference, geometrical path & optical path, phase difference due to reflection at boundaries of optical interfaces, thin film, interference due to thin film of uniform thickness, conditions of maxima and minima, interference at wedge shaped film (without derivation), anti-reflection coating as an application of interference Laser: Introduction, interaction of light with matter- absorption, spontaneous emission, stimulated emission, population inversion, metastable state, active system, resonant cavity, characteristics of laser, semiconductor hetero-junction laser, carbon dioxide laser, applications of laser-industrial, defense& medical; introduction to holography	8
II	**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
III	**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 it's physical significance, normalization 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). tunneling effect	7
IV	**Acoustics and Non-Destructive Testing**	
	Acoustics: Absorption, echo, reverberation and time of reverberation, Sabine's formula, coefficient of absorption, quality of sound (pitch, timbre, loudness, intensity level) factors affecting acoustics of a building and their remedies (reverberation, adequate loudness, focusing due to walls and ceilings, echoes, echelon effect, balconies, seating arrangement, extraneous noise and sound insulation, freedom from resonance) Non-Destructive Testing: Introduction to non-destructive testing (NDT), importance of NDT techniques, types of NDT techniques - Liquid penetrant testing, Magnetic particle inspection, Eddy current testing, Thermal inspection, Acoustic Emission, Pressure and Leak Testing, Ultrasonic Testing (UT), Radiography testing (principle, advantages, limitations, and applications)	8
V	**Magnetism and Superconductivity**	
	Magnetism: Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop, magnetic hysteresis loop, giant magneto-resistance (GMR), magneto caloric effect (only statement), adiabatic demagnetization. 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 Tc and high Tc superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains	8
VI	**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, defense, introduction to quantum computing.	7
	Total	45

Text Book

1.A Textbook of Engineering Physics – M.N. Avadhanulu & P.G. Kshirsagar, S Chand Publication
2.Optics and Photonics – R. Murugeshan, S. Chand Publication
3.Concepts of Modern Physics – Arthur Beiser, McGraw-Hill (Indian Edition)
4.Nanotechnology: Principles and Practices – Sulabha K. Kulkarni, Springer

Reference Book

1. Laser Fundamentals – William Silfvast, Cambridge University Press (India edition)
2. Optical Fiber Communications – Gerd Keiser, McGraw-Hill India
3. Introduction to Quantum Mechanics – David J. Griffiths, Pearson India
4. Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
5. Quantum Mechanics – G. Aruldhas, PHI Learning
6. Nanoscience and Nanotechnology – M.S. Ramachandra Rao, Wiley India
7. Introduction to Superconductivity – Michael Tinkham, Dover India Edition

Program:	B. Tech. (Mechanical Engineering)						Semester: II	
Course:	Engineering Physics Laboratory						Code:	BSH32BS04
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	TW	OR	PR	Total
1	-	2	-	-	50	-	-	50

Prior Knowledge of

1. Basic concepts of optics (reflection, refraction, interference, diffraction).
2. Fundamentals of semiconductor physics (band gap, carriers, conductivity).
3. Basic electricity and magnetism (current, voltage, magnetic fields).
4. Fundamental knowledge of mechanics and sound waves

Course Objectives: This course aims to,

1. Enable students to apply and analyse principles of optics, acoustics, semiconductor, and magnetism through systematic experimentation and measurement.
2. Develop the ability to analyse and interpret experimental data to draw valid conclusions.

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

1. Analyse optical and acoustic parameters of materials using experimental methods
2. Interpret electrical properties of semiconductors and the magnetic susceptibility of a paramagnetic solution using experimental methods

Expt. No.	Detailed List of Experiment [Any 10]
1	Newton's Rings (To determine the radius of curvature of Plano-convex lens)
2	Diffraction Grating (To determine the wavelength of different colours)
3	Double Refraction: Birefringence (To determine refractive indices and type of crystal)
4	LASER (To determine the grating element using LASER)
5	Malus Law (To verify the Malus Law of polarization of light)
6	Ultrasonic Interferometer (To determine the compressibility of given liquid)
7	Solar Cell (To determine Fill Factor using IV characteristics)
8	Energy Band Gap (To determine band gap of given semiconductor)
9	Four Probe Method (To determine the energy band gap & resistivity of a given sample)
10	Hall effect (To determine the Hall coefficient, mobility and charge carrier in a given semiconductor)
11	Quincke's method (To determine the magnetic susceptibility of $MnSO_4$ solution)
12	Sound Absorption Coefficient (To determine the sound absorption coefficient of the given materials)
13	Optic Fibre Cable (To determine the numerical aperture and acceptance angle)

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. Experiments in Engineering Physics – M.N. Avadhanulu, A.A. Dani, P.M. Pokley,S Chand Publisher.
4. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.
5. Engineering Physics Laboratory Manual – Jayaraman,Pearson Education Publisher.

Program:	B Tech (Mechanical Engineering)						Semester:				II
Course:	Material Science						Code:				BME32ES03
Credits	Teaching Scheme Hrs./week				Evaluation Scheme and Marks						
	Lecture	Practical	Tutorial	Other	FA 1	FA 2	SA	TW	OR	PR	Total
4	3	2	-	1	20	20	60	50	-	-	150

Prerequisites: Nil

Course Objectives:

1. To provide basic fundamentals of engineering materials.
2. To familiarize learners with structure, property, and processing relationships for the selection of materials in engineering applications.

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

1. Correlate structure, property, processing, and relationship.
2. Calculate lattice parameters and density of crystalline solids.
3. Analyse degree of freedom, phases, and compositions in a binary alloy system.
4. Determine mechanical properties of materials.
5. Correlate strengthening behavior of materials with the structure of materials.
6. Justify the selection of material for the given application.

Detailed Syllabus

Unit	Description	Duration Hrs.
I.	Introduction: Material Science and Engineering, Classification of Materials—Metals, polymers, ceramics, and composites; advanced materials and their need; and criteria for material selection.	7
II.	Fundamentals of the structure of crystalline solids: fundamental concept, unit cell, crystal systems, crystallographic points, directions, and planes, single crystals, polycrystalline materials, non-crystalline solids, and imperfections.	8
III.	Structure of crystalline solids: Crystal structures in metals, density computations, Ceramic crystal structures, polymer structures, and crystallinity	7
IV.	Equilibrium Diagrams: System, Phase, Solid solution, Solubility limit, Components, Variables, Cooling curves, Binary phase diagrams, Gibbs phase rule	8
V.	Mechanical Properties of Metals: Elastic deformation, plastic deformation, tensile test properties, hardness, and toughness.	7
VI.	Strengthening Mechanisms in Metals: Basic concepts, Slip systems, Slip in Single crystals, Plastic deformation of polycrystalline materials, twinning, Grain refinement, Solid solution strengthening, Strain hardening	8
	Total	45
List of Experiments: I. Tensile test II. Compression test III. Impact test		30

IV.	Brinell hardness test	
V.	Rockwell hardness test	
VI.	Micro-Vickers hardness test	
VII.	Non-destructive test	
VIII.	Test on polymers	
	Total	**75**

Text Books:

1. Introduction to Material Science and Engineering, W. D. Callister, John Wiley, 10th Edition, 2019.
2. Material Science and Metallurgy, Dr. V. D. Kodgire, Everest Publishing House, 45th Edition, 2021.

Reference Books:

1. Mechanical Metallurgy, George E. Dieter, McGraw-Hill, 3rd Edition, 2017.
2. Material Science and Engineering: A First Course, V. Raghavan, Prentice Hall India, 6th Edition, 2015.
3. Materials for Engineering, John Martin, Woodhead Publishing Limited, CRC Press, 3rd Edition, 2006.
4. The Science of Engineering Material, Charles O. Smith, Prentice Hall, 1977.

e-Resources:

1. NPTEL Course: Nature and properties of materials (https://onlinecourses.nptel.ac.in/noc20_me13/course)
2. NPTEL Course: Properties of materials (https://onlinecourses.nptel.ac.in/noc20_mm13/course)

Program:	B. Tech. (Mechanical Engineering)				Semester: II				
Course:	Engineering Mechanics				Code:	BME32ES04			
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks				
	Lecture	Practical	Tutorial	Others	FA		SA	TW	Total
					FA1	FA2			
3	2	2	-	1	10	10	30	50	100

Pre-requisite: Nil

Course Objectives:

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 and equilibrium of force systems.
3. To make them aware of basic concepts of statics and dynamics for particles and rigid bodies.
4. To explain the significance of centroid, center of gravity, and moment of inertia.
5. To make aware of types of friction and applicable theory for friction analysis.

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

1. Compute the resultant and equilibrium of different types of force systems for mechanical applications.
2. Apply the force analysis on trusses and frames.
3. Predict motion parameters of particles and rigid bodies.
4. Determine the inertial resistance offered by plane lamina.
5. Identify the type of friction to compute the frictional resistance for a given case.

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'sTheorem,Couple,Resultant of General Force System,Free Body Diagram, Equilibrium of Three Forces in a Plane, and Equilibrium of Concurrent Forces.	7
II.	**Force Analysis of Structures** Introduction, Trusses, Types of Frames, Support Reactions, Analysis of Structures by Method of Joint, Analysis of Structures by Method of Section.	8
III.	**Dynamics of Particle and Rigid Bodies:** Kinematics: Position, velocity, and acceleration; rectilinear and curvilinear motion; kinematics of rigid bodies, including translation and fixed-axis rotation. Kinetics: Newton's Second Law and equations of motion; momentum and impulse–momentum principle; work–energy principle and applications. Rigid Body Dynamics: Angular momentum; D'Alembert's principle; work–energy principle for connected bodies; kinetics of rigid body rotation.	8
IV.	**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.	7
	Total	**30**

Lab Syllabus		
	Term work consists of the following 6 experiments & 6 assignments. **Part A:** I. Verification of law of polygon of forces. II. Determination of support reactions of simple beams. (Analytical/Graphical) III. Determination of forces in a concurrent space force system. IV. Study of Curvilinear motion V. Determination of coefficient of restitution. VI. Determination of coefficient of friction for a flat belt. **Part B:** VII. Assignments (considering application-based problems)	**30**
	Total	**60**

Text Books:

1. 1. Vector Mechanics for Engineers: Statics and Dynamics, Beer & Johnston, Mazurek, Cornwell, Self, Tata McGraw-Hill Publications (2019), 12th Edition.

Reference Books:

1. Engineering Mechanics - Meriam and Crage, Wiley Publications, 9th Edition (2021).
2. Engineering Mechanics by R. C. Hibbeler, Pearson Education, 15th Edition (2022).
3. Engineering Mechanics - Timoshenko and Younge, McGraw Hill Publications, 5th Edition (2017).
4. Introduction of Engineering Mechanics—S. Rajshekaran and G. Sankarasubramanian, Vikas Publications, 1st Edition (2017).

E-Resources

1. http://nptel.ac.in/courses/112103108
2. https://www.coursera.org/learn/engineering-mechanics-statics

Program:	B. Tech. (Mechanical Engineering)							Semester:		II	
Course:	Computer-Aided Machine Drawing (CAMD)(VSEC)							Code:		BME32VS01	
Credits	Teaching Scheme Hrs./week				Evaluation Scheme and Marks						
	Lecture	Practical	Tutorial	Other	FA 1	FA 2	SA	TW	OR	PR	Total
1	-	2	-	-	-	-	-	50	-	-	50

Prerequisites: Engineering drawing, dimensioning, Conventional manufacturing processes Engineering 2D drawings and machine elements used in mechanical engineering are essential.

Course Objectives:

1. To develop parametric and feature-based parts along with assembly models of simple mechanisms/machines.
2. To develop surface models for mechanical components.
3. To develop 2D drafting from 3D models

Course Outcomes:

1. After learning this course, the students will be able to do the following:
2. Model 3D machine components used in interdisciplinary applications.
3. Draft engineering parts and assembly using CAD tools.

Detailed Syllabus

Expt. No.	List of Experiments/CONTENT	Duration (hrs.)
I.	**Sketching** Introduction to the Graphical User Interface (GUI) of solid modeling software, 2-D sketching with geometrical and dimensional constraints.	6
II.	**Parametric solid modelling** Fundamentals: apply/modify constraints and dimensions, transform the parametric 2-D sketch into a 3D solid, and perform feature operations.	8
III.	**Assembly modelling** Defining the relationship between various parts of the machine, creating constraints, and generating an exploded view.	8
IV.	**Introduction to surface modelling** Introduction to Surface Design, Creating Wireframe Geometry, Shape Design Common Tools, Creating Surfaces, and Understanding the Operations Toolbar. Overview of AI applications in surface optimization and shape prediction.	4
V.	**Drafting** Generation of 2-D sketches from parts and assembly of a 3-D model, with appropriate dimensioning. Overview of AI-assisted automated dimensioning and drafting error detection.	4
	Total	**30**

List of Assignments

I. Assignment on parametric solid modeling of a machine component using various commands and features of the software.
II. Assignment on assembly modeling of the mechanisms/machine parts modeled in assignment 1 using proper constraints and generation of an exploded view. (min. 5 components)
III. Assignment on generation of production drawings of the parts and assembly.
IV. Assignment on surface modeling of a machine components

V. A group mini project on industrial assembly of any mechanisms/machine with drafting
Reference Books: 1. CATIA for Engineers & Designers V5-R2023, Sham Tickoo, 21st Edition, 2023. 2. Machine Drawing, Ajeet Singh, McGraw Hill Publications, New Delhi, 2012. 3. Machine Drawing, Bhatt, N. D., and Panchal, V. M. (2014),Charotar Publishing House Pvt. 4. Mastering CADCAM, Ibrahim Zeid, McGraw-Hill, 2007.

Program:	B. Tech. (Mechanical Engineering)						Semester:	II
Course:	Universal Human Values						Code:	BSH32VE02
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	-	25	25	-	50

Course Objectives: This course aims at enabling students,

1. To appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
2. To facilitate the development of a holistic perspective among students to lead their personal and professional lives in an ethical way.
3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour, and mutually enriching interaction with nature.

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

1. Illustrate the relevance of Universal Human Values using real-life examples from personal, social, and professional contexts.
2. Interpret a human being as the co-existence of ‘Self’ and ‘Body’.
3. Apply the concept of harmony in family and society to given scenarios with appropriate value-based actions.
4. Apply Universal Human Values to promote coexistence with nature in personal and professional life.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Introduction to Value Education:** • Understanding Value Education • Self-exploration as the Process for Value Education • Continuous Happiness and Prosperity • Right Understanding • Current Scenario • Method to fulfil the Basic Human Aspirations	4
	Sharing Session: • Sharing about Oneself • Exploring Human Consciousness • Exploring Natural Acceptance	3
II	• Harmony in the Human Being: • Human being: the Co-existence of the Self and the Body • Needs of the Self and the Body • The Body as an Instrument of the Self • Understanding Harmony in the Self • Harmony of the Self with the Body • Programme to Ensure Self-Regulation and Health	4

	• Sharing Session: • Exploring the Difference between Needs of Self and Body • Exploring Sources of Imagination in the Self • Exploring Harmony of Self with the Body • AI Integration: Personal Habit Analysis	4
III	**Harmony in the Family and in Society:** • Harmony in the Family • 'Trust'—the Foundational Value in Relationship • 'Respect'—the Right Evaluation • Other feelings (Values) in Human-to-Human Relationship • Understanding Harmony in Society • Vision for the Universal Human Order • Five Dimensions of Human Order	4
	Sharing Session: • Exploring the Feeling of Trust • Exploring the Feeling of Respect and Exploring Systems to • Fulfil Human Goal	3
IV	**Harmony in Nature/Existence:** • Understanding Harmony in Nature, • Realizing Existence as Coexistence at All Levels • The Holistic Perception of Harmony in Existence **Implications of Holistic Understanding: A Look at Professional Ethics:** • Definitiveness of (Ethical) Human Conduct • Humanistic Constitution and Universal Human Order • Competence in Professional Ethics • Holistic Technologies, Production Systems and Management Models -Typical Case Studies • Strategies for Transitioning towards Value-Based Life and Profession.	4
	Sharing Session: • Exploring the Four Orders of Nature • Exploring Co-existence in Existence • Exploring AI for Holistic Technologies • Exploring Humanistic Models in Education • Exploring Steps of Transition towards Universal Human Order	4
	Total	**30**

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2019, A Foundation Course in HUMAN VALUES and Professional Ethics- Presenting a universal approach to value education through self-exploration, Excel Books

Reference Books: P.L. Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

1. A. Nagaraj, 1999, JeevanVidya: EkParichaya, JeevanVidyaPrakashan, Amarkantak,
2. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
3. E. G. Seebauer& Robert L. Berry, 2000, Fundamentals of Ethics for Scientists &Engineers , Oxford University Press
4. M. Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics and Human Values, Eastern Economy Edition, Prentice Hall of India Ltd.
5. B. P. Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
6. B. L. Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

e-sources:

1. http://madhyasth-darshan.info/postulations/knowledge/knowledge-of-humane-conduct/
2. https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
3. https://youtu.be/OgdNx0X923I

Program:	B. Tech. (Mechanical Engineering)					Semester: II	
Course:	Professional English					Code:	BSH32AE02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	30	20	-	50

Prior knowledge of: Basic English communication

Course Objectives: This course aims at enabling students to:
1. Apply professional branding principles to technical career documentation and digital profiles
2. Employ strategic oral communication tactics during formal recruitment and networking scenarios.

Course Outcomes: After learning the course, the students will be able to:
1. Network professionally by applying self-introduction, profile building, and workplace communication etiquette.
2. Compose professional career documents such as resumes, cover letters, and workplace reports using appropriate language and format.
3. Articulate ideas clearly across contexts such as debates, interviews and presentations by analyzing own and peer performance.

Detailed Syllabus

Expt. No	Suggested List of Experiments	Duration (Hrs)
I.	**Develop a Self-Introduction and Elevator Pitch:** Develop and deliver a structured self-introduction suitable for professional networking.	**2**
II.	**Write a Professional 'About Me' Column:** Write a well-structured "About Me" section in correct and formal language for a professional profile, ensuring clarity, coherence, and appropriate tone.	**2**
III.	**Create a Complete Skills Profile for Professional Networking:** Draft a complete 'Skills' profile by effectively presenting strengths and achievements; critically evaluate peer profiles against recruiter checklists.	**2**
IV.	**Display Professional Tact and Diplomacy in Workplace Interactions:** Role-play scenarios: delivering constructive criticism on a peer's work, responding to negative feedback from a supervisor, communicating a project setback to a client. Analyse language choices for tone and professionalism.	**2**
V.	**Telephone & Video Call Etiquette for the Workplace:** Practise professional communication in phone calls and virtual meetings (Teams/Zoom): opening and closing calls, active listening without visual cues, handling technical difficulties gracefully and maintaining politeness & professionalism in hybrid work environments.	**2**
VI.	**Analyse Resume/CV Drafts:** Evaluate resumes based on clarity, relevance, formatting, and use of action verbs, and	**2**

	suggest improvements. Understand what develops ATS friendly resumes.	
VII.	**Construct a Professional Resume/CV:** Construct a structured and well-formatted resume that highlights educational background, technical skills, projects, and achievements using appropriate language and formatting conventions.	**2**
VIII.	**Construct a Role-Specific Cover Letter:** Construct a tailored cover letter aligning personal skills and experiences with job requirements using persuasive language.	**2**
IX.	**Learn Strategies for Workplace Meetings & Minutes:** Participate in a simulated team meeting; practise agenda-setting and turn-taking. Write formal minutes from the discussion.	**2**
X.	**Draft Technical & Business Reports**: Practise writing short technical reports, progress reports, and business memos tailored to engineering workplace contexts. Focus on structure, objectivity, conciseness, and appropriate use of data/visuals in written communication.	**2**
XI.	**Using English effectively in Debates:** Participate in debates to express and justify opinions logically and confidently	**2**
XII.	**Interview Techniques (STAR Method):** Apply structured interview techniques to respond effectively to questions with clarity and relevance.	**2**
XIII.	**Mock Interviews:** Evaluate interview responses based on clarity, confidence, and content, and provide constructive feedback.	**2**
XIV.	**Deliver a Short Talk on a Given Topic:** Deliver a structured short talk on a general or technical topic, focusing on content organisation, clarity of expression, confidence, and effective verbal and non-verbal communication.	**2**
XV.	**Present an Integrated Professional Task:** Present a business proposal or idea and participate in a group demonstrating integrated communication skills.	**2**
	Total	**30**

Text Books:

1. Sharma, S. D. *A Text-Book of Professional Communication Skills and ESP for Engineers and Professionals*. Sarup& Sons, 2021.
2. Bovee, Courtland L., and John V. Thill. *Business Communication Today*. 14th ed., Pearson Education, 2022
3. *Communication Skills in English for Engineers and Technologists*, Latest Edition (2025/26) – Arati A. Agrawal, CBS Publishers & Distributors Pvt. Ltd.

Reference Books:

1. *The Handbook of Communicating Science and Engineering*, 2023 Edition – Felice Frankel, MIT Press
2. *Business Communication Today*, 14th Edition (2022) – Courtland L. Bovee& John V. Thill, Pearson Education
3. *Professional Engineering Communication*, Latest Edition (IEEE PCS Series), IEEE Press / Wile

E Resources

- "Learn English: Careers." *British Council*, 2026,https://learnenglish.britishcouncil.org/careers.
- "Resumes, CVs and Cover Letters." *Engineering Career Resource Center*, University of Michigan, 2026,https://career.engin.umich.edu/resumes-cvs-cover-letters/.

Program:	B. Tech. (Mechanical Engineering)						Semester: II	
Course:	German						Code:	BSH32AE03
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	TW	OR	PR	Total
1	-	2	-	-	30	20	-	50

Prior knowledge of:
English Language is essential.

Course Objectives: This course aims at enabling students to,

1. Get familiar with the basics of German language and develop their interest in the language.
2. Develop basic German language skills for understanding and using simple expressions in everyday situations.
3. Use digital and AI-supported tools to practice German and support independent learning.

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

1. Interpret relevant information from spoken and written German communication.
2. Construct simple German sentences using basic vocabulary and grammatical structures.
3. Apply digital and AI-assisted tools for German phonetic skills.

Detailed Syllabus

Lab	Activities	Duration (Hrs)
I.	**Reading and Matching:** Identify and match German words and expressions with pictures, practice pronunciation, and use the vocabulary in simple spoken and written sentences.	2
II.	**Listening for Key Information:** Listen to short conversations multiple times, note key details, verify answers in pairs, and respond to follow-up comprehension tasks.	2
III.	**Pronunciation Practice:** Practice German sounds through guided repetition, reading aloud, peer correction, and short speaking exercises.	2
IV.	**True/False Comprehension:** Read short texts, evaluate statements, justify answers, and reformulate incorrect statements correctly.	2
V.	**Reading and Form Completion:** Read personal profiles or short texts, extract relevant information, and complete structured forms followed by discussion.	2
VI.	**Vocabulary Mind Map: C**ollect topic-based vocabulary, org anize it into mind maps, and use the words in short oral or written tasks.	2
VII.	**Grammar Gap-Fill Task:** Complete grammar exercises, identify rules used, and apply structures in new example sentences.	2
VIII.	**Sentence Construction Activity:** Construct sentences using target verbs, expand them with additional information, and practice speaking in pairs.	2
IX.	**Error Detection and Correction:** Analyze sentences, identify grammatical errors, correct them, and explain the corrections collaboratively.	2
X.	**Self-Introduction Presentation:** Prepare, practice, and present a short self-introduction followed by peer interaction and feedback.	2
XI.	**Question–Answer Interaction:** Practice asking and answering personal questions through guided drills, pair conversations, and role-switch activities.	2

XII.	**Dialogue Role-Play: Read model dialogues, adapt them to new situations, rehearse, and perform role-plays in groups.**	**2**
XIII.	**Pronunciation Practice using AI:** Record speech using AI tools, compare feedback, improve pronunciation, and perform short speaking tasks.	2
XIV.	**Dialogue Building Using AI:** Generate dialogues using AI support, edit language structures, rehearse, and perform communicative role-plays.	2
XV.	**AI-Supported Profile Writing:** draft a short profile, review AI suggestions critically, revise the text, and share final versions for discussion.	2
	Total	**30**

Text Books:

1. Menschen A1.1: Sandra Evnas, Angela Pude, Franz Pecht, Hueber VerlagIsmaning 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
5. Deustschlandlabor: https://learngerman.dw.com/de/das-deutschlandlabor/c-53074503

Program:	B. Tech (Mechanical Engineering)			Semester:				II
Course:	Japanese					Code:		BSH32AE04
Teaching Scheme (Hr/Week)				Evaluation Scheme				
Credit	Lecture	Practical	Tutorial	FA		TW	Oral	Total
				FA1	FA2			
1	-	2	-			30	20	50

Prior Knowledge of: 1. English/Marathi/Hindi language for learning Japanese language.

Course Objectives: This course aims at enabling students

1. To be aware of Japanese Scripts (Hiragana, Katakana) and basic Kanjis
1. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions.
2. To develop language skills namely Listening, Speaking, Reading and Writing skills for socializing, at basic level.

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

1. Identify Japanese scripts through oral and written communication.
2. Demonstrate the basic Kanjis with meanings in the given sentence.
3. Construct simple demonstrative sentences for daily use.

Unit	Description	Hrs.
I	Introduction to Japanese Scripts: 'Hiragana','Katakana' Practice Hiragana characters using stroke order sheets and guided writing exercises.	12
II	Introduction to basic Kanjis: Write basic Kanji with stroke order, meaning, and On/Kun readings.	8
III	**Basic Grammar:** Use of grammar and vocabulary.	10

Practical/Lab sessions

Lab sessions	Activities	Duration (Hrs)
1	Introduction to 'Hiragana'	2
2	Hiragana practice	2
3	Hiragana listening practice	2
4	Introduction to Katakana	2
5	Katakana practice	2
6	Vocabulary practice	2
7	Introduction to Kanjis	2
8	Kanji practice	2
9	Recognizing Kanjis.	2
10	Kanji chart preparation	2
11	Introduction to Basic Grammar	2
12	Vocabulary Development	2
13	Sentence Construction	2
14	Dialogue Practice	2
15	Reading and Grammar Identification	2
	Total	**30**

Textbook:

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 pe rmission of Japan Foundation, Tokyo), Edition:April 2008

Reference Books:

1. MOMO Author: Japan Foundation, NewDelhi, 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

Program:	B. Tech. (Mechanical Engineering)					Semester: II	
Course:	Business Storytelling					Code:	BSH32AE05
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	30	20	-	50

Prior knowledge of: Basic knowledge of the English language is essential.

Course Objectives: This course aims at enabling students:
1. To develop understanding of storytelling elements and communication techniques.
2. To enable effective communication of ideas through creative writing and storytelling activities.

Course Outcomes: After learning the course, the students will be able to
1. Illustrate storytelling elements and techniques to improve comprehension.
2. Construct business narratives to present products, services, and organizational initiatives.
3. Analyze storytelling strategies impacting communication and decision-making in business contexts.

Sr. No.	Suggested List of Experiments/Activity	Duration [Hrs]
I.	**The Bridging Session:** Discuss storytelling elements with reference to the short story *The Bet* by Anton Chekhov to illustrate their role in story writing.	2
II.	**Rewriting a Turning Point:** Draft an alternate version of the given story by changing just that part.	2
III.	**Basics of Storytelling:** Using Five Senses in a storytelling activity and elements of storytelling	2
IV.	**Dialogue Writing:** Writing dialogues for given situations to practice creating natural conversations that reveal character emotions and advance the narrative.	2
V.	**What Else?** Analysis of a self-written story using AI for perspective, detail and improvement.	2
VI.	**Story from News:** Convert a news headline into a narrative.	2
VII.	**Product Journey Story:** Journey of a product from Idea, Design, Market Launch, Failure/Success to Customer Feedback.	2
VIII.	**Customer Success Story:** Craft a narrative that showcases a customer's journey with your fictional business.	2
IX.	**Business Origin Story:** Research and narrate a significant origin of a well-known business, focusing on how storytelling played a role in shaping its image in public.	2

X.	**Social Impact Story:** Develop a story that demonstrates how a business initiative or project positively impacted a community or addressed a social issue.	2
XI.	**Data to Story:** Convert statistical data into narrative	2
XII.	**Analysis of Story of Leaders:** Highlight a leader's ability to motivate, inspire, and guide a team toward success.	2
XIII.	**Technical Narration:** Simplify technical concepts through storytelling for non-technical audiences.	2
XIV.	**Ethical Decision-Making Scenario:** Present a complex ethical dilemma faced by a business or individual. Use storytelling to explore various perspectives and potential solutions	2
XV.	**Crisis Communication Case:** Examine a business crisis scenario and analyze how effective communication strategies can help restore trust and reputation.	2
	Total	**30**

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.
3. Kendall Haven, Story Smart, Libraries Unlimited, 2014
4. Sandeep Das, How Business Storytelling Works, Penguin Random House, 2023

Program:	B. Tech. (Mechanical Engineering)					Semester: II	
Course:	Life Skills 2					Code:	BSH32CC02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of: Basic understanding of concepts covered in Life Skills I.

Course Objectives: This course aims at enabling students to:

1. To introduce students to adaptability, inclusive behaviour, social responsibility and professional etiquette.
2. To enable students to practice ethical decision-making, life management skills and career planning strategies for effective professional development.

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

1. Describe the role of adaptability, social responsibility, and professional etiquette in academic and workplace situations.
2. Apply ethical reasoning, time management and basic financial planning to achieve academic and personal goals.
3. Prepare a structured career development plan according to the industry trends through professional networking

Detailed Syllabus

Expt. No	Suggested List of Experiments	Duration (Hrs)
I.	Demonstrate Learning Agility: Demonstrate adaptability by responding to changing scenarios through simulation activities and reflection.	**2**
II.	Practice Social Responsibility: Participate in eco-friendly or community service activities and study the Goonj case study to promote sustainable practices and community responsibility.	**2**
III.	Learn Inclusive Behaviour: Engage in role plays and discussions to respect cultural and individual differences.	**2**
IV.	Demonstrate Workplace Etiquette: Demonstrate punctuality, accountability and professional communication through simulated workplace scenarios.	**2**
V.	Collaborate on a Sustainability Challenge: Work in teams to design a small eco-friendly initiative while demonstrating inclusive	**2**

	behaviour, adaptability and professional communication.	
VI.	Analyze Ethical Decision-Making: Analyze ethical dilemmas through case studies to identify fair and responsible decisions.	**2**
VII.	Organize Tasks Using Time Management Techniques: Organize academic tasks using priority-setting tools such as schedules or to-do lists.	**2**
VIII.	Implement Anti-Procrastination Strategies: Practice habit stacking and the 5-minute rule to overcome procrastination.	**2**
IX.	Demonstrate Financial Literacy Skills: Demonstrate basic financial management through budgeting exercises and use AI tools to analyse spending patterns and digital transactions.	**2**
X.	Life Management Scenario: Work in groups to solve a real-life scenario involving ethical choices, task planning, budgeting and managing procrastination.	**2**
XI.	Develop Strategic Professional Identity: Develop a short professional self-introduction highlighting personal strengths and professional skills.	**2**
XII.	Map Professional Relationships: Identify mentors, peers and career connections through a network map to see how relationships create opportunities.	**2**
XIII.	Examine Industry Trends: Examine emerging industry trends and relate them to personal career goals.	**2**
XIV.	Design a Personal Career Development Plan: Design a project outlining career goals and skill development strategies.	**2**
XV.	Present a Professional Development Portfolio: Present a portfolio demonstrating the role of adaptability and ethics in professional life.	**2**
	Total	**30**

Reference 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 establish as a premier Mechanical engineering department in Maharashtra in the coming five years by providing quality education, fostering innovation with ethical values to serve the society.

Mission

1. Fostering value-based education to achieve academic excellence with the right attitude and professional ethics.
2. Inculcating a culture of research and innovation, with an aim of serving society in a sustainable manner.
3. Developing skilled Mechanical engineers with an ability to provide solutions to meet national and global challenges in accordance with the needs of the society.