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. Information Technology
(Regulations 2023)

Effective from Academic Year 2025-26

Institute Vision

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

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with 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 Information Technology

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Digital Electronics and Logic Design	BIT21ES01	17	Chairman BoS, Information Technology PCET's, Pimpri Chinchwad College of Engineering Sector No. 26, Pradhikaran, Nigdi, Pune-44
2	Discrete Mathematics	BIT21ES02	19	
3	Digital Electronics Laboratory	BIT21ES03	21	
4	Python Programming Laboratory	BIT21VS01	23	
5	Principles of Programming Languages	BIT22ES01	36	
6	Programming Laboratory	BIT22ES02	38	
7	Data Communication	BIT22PC01	40	
8	Web Development Laboratory	BIT22VS01	42	

Board of Studies – Applied Science and Humanities

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Linear Algebra & Univariate Calculus	BSH21BS01	11	Chairman BoS, Applied Sciences & Humanities PCET's, Pimpri Chinchwad College of Engineering Sector No. 26, Pradhikaran, Nigdi, Pune-44
2	Linear Algebra & Univariate Calculus Laboratory	BSH21BS02	12	
3	Engineering Chemistry	BSH21BS05	13	
4	Engineering Chemistry Laboratory	BSH21BS06	15	
5	Indian Knowledge System	BSH21IK01	25	
6	Life Skill I	BSH21CC01	27	
7	Multivariate Calculus	BSH22BS07	30	
8	Multivariate Calculus Laboratory	BSH22BS08	31	
9	Engineering Physics	BSH22BS03	33	
10	Engineering Physics Laboratory	BSH22BS04	35	
11	AEC I(Eng/Ger/Jap /Business story telling)	BSH22AE01/ 02/03/04	44/46/48/ 50	
12	Life Skill II	BSH22CC02	53	

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

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

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CURRICULUM FRAMEWORK
(Regulations 2023)

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	Co-Curricular Courses/Liberal Learning Courses

COURSE WISE CREDIT DISTRIBUTION

Sr.No.	Type of Course	No. of Courses	Total Credits	
			No.	%
1	Basic Science Course	8	14	35
2	Engineering Science Course	5	12	30
3	Programme Core Course	1	2	5
4	Vocational and Skill Enhancement Course	2	4	10
5	Ability Enhancement Course	1	2	5
6	Indian Knowledge System	1	2	5
7	Co-Curricular Courses	2	4	10
Total		20	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	3	2							5
3.	Programme Core Course	-	1							1
4.	Vocational and Skill Enhancement Course	1	1							2
5.	Ability Enhancement Course	-	1							1
6.	Indian Knowledge System	1	-							1
7.	Co-Curricular Courses	1	1							2
Total		**10**	**10**							**20**

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	7	5							12
3.	Programme Core Course	-	2							2
4.	Vocational and Skill Enhancement Course	2	2							4
5.	Ability Enhancement Course	-	2							2
6.	Indian Knowledge System	2	-							2
7.	Co-Curricular Courses	2	2							4
Total		**20**	**20**							**40**

Curriculum Structure
Semester I & II

CURRICULUM STRUCTURE

First Year B. Tech. (Information Technology) Semester – I

First Year B. Tech Information Technology (Regulations 2023) (With effect from Academic Year 2025-26) Semester I																	
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**					**Evaluation Scheme and Marks**						
											FA		**SA**	**TW**	**PR**	**OR**	**Total**
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**O**	**Total**	**FA1**	**FA2**					
BSH21BS01	Linear Algebra &Univariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSH21BS02	Linear Algebra &Univariate Calculus Laboratory	-	1	-	1	-	2	-		2	-	-	-	25	25	-	50
BSH21BS05	Engineering Chemistry	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSH21BS06	Engineering Chemistry Laboratory	-	2	-	2	-	4	-		4	-	-	-	50	50	-	100
BIT21ES01	Digital Electronics and Logic Design	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BIT21ES02	Discrete Mathematics	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BIT21ES03	Digital Electronics Laboratory	-	2	-	2	-	4	-		4	-	-	-	50	50	-	100
BIT21VS01	Python Programming Laboratory	-	2	-	2	-	4	-		4	-	-	-	100	-	-	100
BSH21IK01	Indian Knowledge System	2	-	-	2	2	-	-		2	25	25	-	-	-	-	50
BSH21CC01	Life Skill I	-	2	-	2	-	4	-		4	-	-	-	100	-	-	100
	Total	**11**	**9**	**-**	**20**	**11**	**18**	**-**	**4**	**33**	**75**	**75**	**150**	**325**	**125**	**-**	**750**

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

CURRICULUM STRUCTURE

First Year B. Tech. (Information Technology) Semester – II

First Year B. Tech Information Technology (Regulations 2023) (With effect from Academic Year 2025-26)																	
Semester II																	
Course Code	**Course Name**	**Credit Scheme**				**Teaching Scheme (Hours/Week)**					**Evaluation Scheme and Marks**						
		L	**P**	**T**	**Total**	**L**	**P**	**T**	**O**	**Total**	**FA**		**SA**	**TW**	**PR**	**OR**	**Total**
											FA1	**FA2**					
BSH22BS07	Multivariate Calculus	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSH22BS08	Multivariate Calculus Laboratory	-	1	-	1	-	2	-		2	-	-	-	25	25	-	50
BSH22BS03	Engineering Physics	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BSH22BS04	Engineering Physics Laboratory	-	2	-	2	-	4	-		4	-	-	-	50	50	-	100
BIT22ES01	Principles of Programming Languages	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BIT22ES02	Programming Laboratory	-	2	-	2	-	4	-		4	-	-	-	50	50	-	100
BIT22PC01	Data Communication	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BIT22VS01	Web Development Laboratory	-	2	-	2	-	4	-		4	-	-	-	100	-	-	100
BSH22AE01/ 02/03/04	AEC I (Eng/Ger/Jap /Business story telling)	1	1	-	2	1	2	-		3	10	10	30	-	-	-	50
BSH22CC02	Life Skill II	-	2	-	2	-	4	-		4	-	-	-	100	-	-	100
	Total	**10**	**10**	**-**	**20**	**10**	**20**	**-**	**4**	**34**	**60**	**60**	**180**	**325**	**125**	**-**	**750**

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

Course Syllabus

Semester I

Program:	B. Tech.(Information Technology)						Semester: I	
Course:	Linear Algebra & Univariate Calculus						Code:	BSH21BS01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	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 modelling of physical systems using ordinary differential equations.
2. To get acquainted with advanced techniques for solving problems related to calculus and ordinary differential equations.

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

1. Apply the concept of linear algebra for the solution of the system of equations, linear dependence/independence of vectors and finding Eigen values and Eigen vectors.
2. Evaluate the problems of indeterminate forms, Taylor's and Maclaurin's expansions using successive differentiation
3. Formulate the mathematical models related to orthogonal trajectories, electrical circuits and one-dimensional heat flow and solve using ordinary differential equations.
4. Solve higher-order linear differential equations and Apply it to evaluate the current for electrical circuits.

Detailed Syllabus

Unit	Description: Times new Roman- Font size-11	Duration [Hrs]
I	Matrices: Rank, System of linear equations with applications in electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.	8
II	Differential Calculus: Indeterminate Forms, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.	7
III	Ordinary Differential Equations: Exact differential equations, Differential equations reducible to Exact form. Applications: Orthogonal trajectories, Kirchoff's law of electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).	8
IV	Linear Differential Equations: Linear differential equation of 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.(Information Technology)					Semester: I	
Course:	Linear Algebra & Univariate Calculus Laboratory					Code:	BSH21BS02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	25	-	25	50

Prior knowledge:

1. Elementary Algebra.
2. Elementary Calculus

Course Objectives: This course aims to enable students,

1. To equip with the ability to apply MATLAB for solving engineering problems involving matrices, ordinary differential equations and differential calculus.
2. To develop skills in applying mathematical concepts to solve real-world problems through project implementation.

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

1. Develop MATLAB programs to solve problems related to matrices, differential calculus, and ordinary differential equations.
2. Prepare a well-structured technical Mini Project report and deliver an effective presentation with clarity and comprehensive understanding of the topic.

Detailed Syllabus

Expt. No.	List of Experiments using MATLAB
1	Introduction to MATLAB and basic commands
2	Conversion of matrices into systems of linear equations
3	Conversion and solution of systems of linear equations into matrix form
4	Linearly dependent/independent vectors, eigenvalues, and eigenvectors
5	Evaluation of Indeterminate Forms,
6	Expanding functions by using Taylor's and Maclaurin's Theorems
7	Successive Differentiation
8	Solution of Exact & Non-Exact Differential Equations
9	Solve higher-order linear differential equations
10	Apply the method of linear differential equations to determine the current or charge in the given electrical circuit
11	Apply the method of linear differential equations to determine the temperature distribution using the principles of heat conduction (Fourier's Law of Heat Conduction)
12	Mini Project* (14 hrs.)

***Mini Project Guidelines:**

Students must prepare a mini-project based on topics such as matrices, ordinary differential equations, differential calculus, or other relevant mathematical concepts.

General Guidelines:

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

References:

1. Introduction to MATLAB for Engineers and Scientists by Sandeep Nagar, Springer.
2. INTRODUCTION TO MATLAB FOR ENGINEERING STUDENTS by David Houcque, version 1.2, Northwestern University.
3. An Introduction to Differential Equations using MATLAB by Rizwan Butt, Alpha Science International Ltd.

Program:	B. Tech. (Information Technology)					Semester: I		
Course:	Engineering Chemistry					Code:	BSH21BS05	
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of:

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

Course Objectives: This course aims at enabling students,

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

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

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

Detailed Syllabus

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

	storage and transportation of H2 gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	
III	**Corrosion and Corrosion control:** 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. b) Corrosion control: methods of prevention of corrosion - cathodic and anodic protection, metallic coatings and its types - anodic and cathodic coatings. Methods to apply metallic coatings - hot dipping, cladding, electroplating and cementation.	7
IV	**Chemistry of Polymers and Novel Carbon Compounds:** a) Polymers: definition, classification of polymers on the basis of thermal behavior, properties of polymers: degree of polymerization, crystallinity, Tg & Tm and factors affecting Tg. Polymerization and its types. Advanced polymeric materials: Structure, properties and applications of liquid crystal polymer – Kevlar, conducting polymers - Polyacetylene, electroluminescent polymer – PPV and biodegradable polymers – PHBV. b) Nanomaterials: definition, types of nanomaterials and properties of nanomaterials. Quantum dots: Types, properties and applications of QDs. Structure properties and applications of Graphene and Carbon Nano Tubes (CNTs).	8
	Total	**30**

Text Books:

1. Engineering Chemistry by S.S. Dara, S. Chand Publications (2010).
2. Engineering Chemistry by B.S. Chauhan, Univ Sc Press. (2015).
3. A Text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co. (2015).
4. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014).
5. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co. (2016).
6. Engineering Chemistry by Wiley India (2012).
7. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education.
8. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).

Reference Books:

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

e-sources:

1. https://nptel.ac.in/
2. https://www.coursera.org/
3. https://link.springer.com/
4. https://www.sciencedirect.com/
5. https://pubchem.ncbi.nlm.nih.gov/
6. https://directory.doabooks.org/

Program:	B. Tech. (Information Technology)						Semester: I	
Course:	Engineering Chemistry Laboratory						Code:	BSH21BS06
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks				
	Theory	Practical	Tutorial	TW	OR	PR	Total	
2	-	4	-	50	-	50	100	

Prior knowledge of

1. Theory of acids and bases
2. Molarity, normality and molality
3. Titration method

Course Objectives:

1. To help students to procure conceptual clarity of Engineering Chemistry through laboratory experiments.
2. To develop experimental skills to acquire insight into societal and environmental issues.

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

1. Volumetric analysis for determination of quality of water.
2. Apply various instrumental methods for quantitative and qualitative chemical analysis
3. Demonstrate the skill for synthesis of engineering materials.
4. Learn the chromatographic separation technique and impact of corrosion
5. Explore mini projects which are relevant to societal and environmental issues, to develop research attitudes.

Guidelines:

1. Under Group A category, students have to perform all experiments from the list given below.
2. Under Group B category, students have to perform a mini project or case studies.

Detailed Syllabus

Expt. No.	Group A: Suggested List of Experiments
1	Safety in the Engineering Chemistry Laboratory.
2	Determination of total hardness of water sample by EDTA method.
3	Determination of type of alkalinity of given water sample and extent of alkalinity.
4	To determine the chloride ion (Cl^-) present in a given water sample by argentometric method.
5	To determine the dissociation constant of a weak acid (acetic acid) using a pH meter.
6	Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid.
7	Proximate analysis of Coal.
8	To estimate the amount of Fe (II) present in the given solution potentiometrically.
9	To determine the maximum wavelength of absorption of $KMnO_4$, verify Beer's law and find concentration of the unknown sample.
10	To determine the electrochemical equivalent (ECE) of Cu.
11	To prepare the Phenol formaldehyde resin.

Group B: Mini project Activity and Case studies

Topics for Mini project:
(Student has to choose one of the topics from list given below but not limiting to)

1	Adsorption studies of methylene blue on bio adsorbents prepared from agricultural waste.
2	Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles.
3	Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV.

4	Green synthesis of chemical compounds.
5	One-pot synthesis of biologically active compounds.
6	Microwave assisted chemical reactions.
7	Soil analysis of agricultural soil samples.
8	Adulterants in food materials.
9	Determination of acid value of oils.
10	Detection of presence of carbohydrates, fats and proteins in given foodstuffs.
11	Preparation of biodiesel.
12	Water audit of water samples.
13	Separation of mixture by chromatographic techniques.
	Topics for Case Studies: **(Student must choose three topics from list given below but not limiting to)**
1	Water audit of samples from different water bodies in and around PCMC area.
2	Impact of corrosion in our daily life.
3	Application of principles of green chemistry in manufacture of pharmaceuticals.
4	Production of renewable fuels from non-petroleum resources.
5	Hydrogen powered cars – the wave of the future. Current state of affairs of hydrogen runs cars in India.
6	Need and applications of biodegradable polymers – a step towards cleaner world.

References:

1. Vogels Text book of Qualitative Chemical Analysis by J. Mendham, R, C, 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. (Information Technology)						Semester: I	
Course:	Digital Electronics and Logic Design						Code:	BIT21ES01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of:

1. Boolean Algebra **is essential.**

Course Objectives:

1. To learn different levels of abstraction of computer systems from a hardware perspective.
2. To understand basic digital design techniques.
3. To design combinational and sequential logic circuits.

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

1. Illustrate basics of number systems conversions and binary arithmetic.
2. Apply Boolean expressions and K-Maps to solve logic design.
3. Design Combinational logic circuit using SSI & MSI chips.
4. Develop Sequential circuits using flip flops.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	Number System and Codes Number Systems: Binary, Octal, Hexadecimal and their conversions. signed binary number representation, 1's and 2's complement representation and arithmetic. Codes: BCD, Excess-3, Gray code, Binary Code and their conversion	7
II	Boolean Algebra and Logic Minimization Boolean algebra, basic theorems and properties of Boolean algebra, Boolean functions, Logic Gates, Logic Functions: SOP form, POS form. Logic minimization: Representation of truth-table, SOP form, POS form, K-Maps up to 4 variables, don't care condition.	8
III	Combinational Logic Design Design using SSI chips: Code Converters, Adders, Subtractors, 4-bit BCD adder. Design to MSI chips: Multiplexer, De-multiplexer, Decoder, Encoder.	6
IV	Sequential Logic Design Introduction to sequential circuits: Difference between combinational and sequential circuits; Memory element-Latch. Flip- Flops: Logic diagram, truth table & excitation table of SR, JK, D, T flip flops; Conversion from one FF to another. Application of Sequential Circuits: Counters- Asynchronous Counter, Synchronous Counter, BCD Counter, Modulus N counter. Registers: SISO, SIPO, PISO, PIPO, Shift Registers.	9
	Total	**30**

Text Books:

1. R. P .Jain, "Modern Digital Electronics", 5th Edition, ISBN 978-93-553-2177-0,Tata McGraw Hill
2. Moris Mano, "Digital Logic and Computer Design", Pearson , ISBN 978-93-325-4252-5

Reference Books:

1. John Yarbrough, Digital Logic applications and Design, Cengage Learning, ISBN – 13: 978-81-315-0058-3
2. D. Leach, Malvino, Saha, ―Digital Principles and Applications‖, Tata McGraw Hill, ISBN –13:978-0-07-014170-4.
3. Anil Maini, ―Digital Electronics: Principles and Integrated Circuits‖, Wiley India Ltd, ISBN:978-81-265-1466-3.
4. Norman B & Bradley, ―Digital Logic Design Principles, Wiley India Ltd, ISBN:978-81-265-1258- 4, 2000.

e-sources:

1.NPTEL Course lectures links:

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

Program:	B. Tech. (Information Technology)						Semester: I	
Course:	Discrete Mathematics						Code:	BIT21ES02
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:

Basic Mathematics concepts **is essential**

Course Objectives:

1. To understand and apply the foundational mathematical concepts.
2. To solve problems with sets, propositions, permutations and combinations.
3. To learn relation and functions and its application.
4. To study how to model problems using graph and tree.

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

1. Solve the problem using sets theory and propositions.
2. Compare relations and functions for solving computational problems.
3. Apply permutation and combination principles for problem solving.
4. Apply the concept of graph theory to devise mathematical models.
5. Demonstrate the concepts of tree to solve problems.
6. Select appropriate algebraic structure to solve problems.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Sets And Propositions** Sets: Sets, Cartesian Product, Principle of Inclusion and Exclusion, Mathematical Induction. Propositions: Propositions, Logical Connectives, Propositions, Logical Equivalence, Predicates and Quantifiers.	7
II	**Relations & Functions** Relations: Properties of Binary Relations, Closure of Relations, Equivalence Relations, Partitions, Warshall's Algorithm, Partial Ordering Relations, Lattices. Functions: Functions, Composition of Functions, Invertible Functions, Applications of Relations and Functions.	8
III	**Counting Principles** Basic Counting Techniques- Sum, Product, Subtractions and Division, Permutations, Combinations, Binomial Co-efficient, Discrete probability, Conditional Probability, Bayes Theorem, Pigeonhole and Generalized Pigeonhole Principle with many examples.	7
IV	**Graph Theory** Graphs: Basic Terminologies, Multi-Graphs, Weighted Graphs, Sub Graphs, Isomorphic graphs, Complete Graphs, Regular Graphs, Graph and its Representation, Bipartite Graphs, Paths, Circuits, Hamiltonian and Eulerian graphs, Planar Graphs, Dijkstra's Algorithm, Graph Coloring, Travelling	8

	Salesman Problem.	
V	**Trees** Trees: Tree Terminologies, Rooted Trees, Properties, Applications of Tree, Introduction to tree- Binary Tree, Binary Search Tree, Spanning Trees, Minimum Spanning Tree, Tree Traversals- In-Order, Pre-Order and Post-Order.	8
VI	**Algebraic Structures** Algebraic Structures: Need and applications of Algebraic Structures Semigroup, Monoid, Group, Abelian Group, Permutation Groups, Ring, Integral Domain, Field.	7
	Total	**45**

Text Books:

1. Kenneth H. Rosen. *Discrete Mathematics and Its Applications*. 7th Edition, McGraw Hill, 2012.
2. C.L. Liu and D.P. Mohapatra, "*Elements of Discrete Mathematics*", 4th Edition, McGraw-Hill.

Reference Books:

1. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, *"Discrete mathematical structures"*, 6th edition, Prentice Hall of India.
2. Edgar G. Goodaire, Michael M. Parmenter, *"Discrete Mathematics with Graph Theory"*, 3rd Edition, Pearson Education.Lipschutz Seymour, *"Discrete mathematics"*,4th Edition, Tata McGraw-Hill.

E-sources:

1. Introduction to Discrete Mathematics for Computer Science Specialization by coursera, https://www.coursera.org/specializations/discrete-mathematics.
2. Introduction to Discrete Mathematics by NPTEL, https://archive.nptel.ac.in/courses/111/107/111107058/

Program:	B.Tech.(Information Technology)				Semester: I		
Course:	Digital Electronics Laboratory				Code:	BIT21ES03	
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:
Boolean Algebra is essential.

Course Objectives:
1. To learn different levels of abstraction of computer systems from a hardware perspective.
2. To understand basic digital design techniques.
3. To design combinational and sequential logic circuits.

Course Outcomes: After learning the course, the students will be able to:
1. Demonstrate the Boolean expressions using basic and universal logic gates.
2. Construct Combinational logic circuits.
3. Design Sequential logic circuits using Flip-Flops.

Guidelines:
1. Continuous assessment of laboratory work will be based on parameters such as experimental write-up, laboratory assignments performance, punctuality and overall behavior of students.
2. Mini project assessment will be based on Understanding of Project Topic, Implementation, Demonstration and Team Work.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1	Realization of logic gates and implementation of Boolean Function(s) using Logic gates.
2	Design and implement 4-bit BCD to Excess-3 / Excess-3 to BCD code converter
3	Design and implement 4-bit Binary to Gray code / Gray to Binary code converter
4	Implement Full Adder / Subtractor using a. Basic Gates b. Universal Gates.
5	Design and implement following using MUX or DeMUX a. Full Adder3 b. Variable logic function(s) (cascade method).
6	Design and implement Encoder or Decoder using IC 74138
7	Design and implement asynchronous counter using MS-JK flip flop- a. 3 bits Up counter b. 3 bit Down counter
8	Design and implement 3 bit asynchronous controlled up/down counter using MS-JK flip flop.
9	Design and implement 3 bit synchronous up counter using MS-JK flip flop.
10	Design and implement 3 bit Synchronous down counter using MS-JK flip- flop.
11	Realization of logic gates and implementation of Boolean Function(s) using Logic gates.
12	Design and implement 4-bit BCD to Excess-3 / Excess-3 to BCD code converter

*** Mini Project**
- The objective of mini project is to apply the concepts such as logic gates, flip-flops, or sequential logic to design and develop a digital circuit or system to solve real world problems

- The mini project must be done in a group of 3-4 students and choose a project topic aligned with course content.
- Sample mini project:
  1. Digital Clock
  2. Frequency Counter
  3. Traffic Light Controller
  4. Soil Moisture Detector
  5. Digital Thermometer
  6. Password-protected Door Lock
  7. LED Cube
  8. LCD Message Scroll

Text Books:

1. R. P. Jain, "Modern Digital Electronics", 5th Edition, ISBN 978-93-553-2177-0,Tata McGraw Hill
2. Moris Mano, "Digital Logic and Computer Design", Pearson , ISBN 978-93-325-4252-5

Reference Books:

1. John Yarbrough, Digital Logic applications and Design, Cengage Learning, ISBN – 13: 978-81-315-0058-3
2. William Stallings, "Computer organization and architecture, designing for performance" , Prentice Hall, Eighth edition.

E-resources:

1. Virtual Lab simulator Link:http://vlabs.iitkgp.ac.in/coa/
2. https://de-iitr.vlabs.ac.in/exp/4bit-sipo-shift-register/index.html

Program:	B.Tech.(Information Technology)					Semester: I	
Course:	Python Programming Laboratory					Code:	BIT21VS01
	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
Credits	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of:

1. Problem solving skills is essential

Course Objectives:

1. To learn basics, features and future of Python programming
2. To develop programming skills using Python.
3. To implement various programs with data types, input output statements, decision making, looping and functions in Python.

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

1. Demonstrate problem solving and basic programming skills in Python.
2. Apply decision control structures and loop control structures to develop program.
3. Make Use of code reusability using functions, modules and libraries.
4. Write programs using various data structures, string functions and file handling operations.

Detailed Syllabus

Assignment No.	Suggested List of Assignments (Any 10)
Expt. No.	**List of Experiments using MATLAB**
1	Write a program to calculate the salary of an employee given his basic pay (take input from user). Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employees pay professional tax as 2% of total salary. Calculate total salary and salary payable after deductions.
2	Write a program to simulate simple calculator using various operators in python also perform some special operations like “x ^ y, x!” etc.
3	Write a program to accept marks of five courses of students and compute his/her result and decide grade. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is Distinction. If aggregate is 60>= then the grade is First class. If aggregate is 50>= then the grade is Second class and if aggregate is 40>= then the grade is Pass class.
4	Write a program to check whether the input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371
5	Teacher is doing the analysis of the internal examination of a student. She has conducted programming &problem solving course test with maximum marks 25 where students have to score at least 12 marks to clear the test. Now she wants to find top scorer, lowest scorer, and total number of pass and fail students. Apply the logic and perform the given task using list.
6	Write a program to accept number from 1 to 12 and print equivalent month of a year using dictionary.
7	Write a program to accept list of N integers and partition list into two sub lists even and odd numbers.
8	Write a program to accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number, e) prime factors using user-defined function.

9	Trainer is conducting a session for all 20 employees. She has employee ids of all employees represented in 6 digit numbers. She wants to make two groups of employees based on even number employee ID or odd number employee ID. Identify the steps to solve the problem and implement it.
10	Write a program that accepts a string from user and perform following string operations- i. Calculate length of string ii. String reversal iii. Equality check of two strings iii. Check palindrome ii. Check substring
11	Write a program to accept the input string from user and find URL available in it.
12	Consider you have created a website in which you are accepting details of users where you have to take password from the user. Write a program to accept password from user with following condition: 1. Minimum characters 6 and maximum are 12. 2. At least one digit and one character. 3. At least one special symbol (@, $,#) .
13	Write a program to copy contents of one file to other. While copying a) all full stops are to be replaced with commas b) lower case are to be replaced with upper case c) upper case are to be replaced with lower case
14	Implement any small scale application using Python (Use of MySql is suggested)

Text Books:

1. Reema Thareja, "Python Programming Using Problem Solving Approach", Second edition Oxford University Press.
2. R. G. Dromey, "How to solve it by Computer", First edition, Pearson Education.
3. R. Nageswara Rao, "Core Python Programming", Second edition, Dream tech Press.

Reference Books:

1. Maureen Sprankle, Problem Solving and Programming Concepts, 9th edition, Pearson.
2. Paul Barry, Head-First Python, 3rd edition August 2023. Publisher(s): O'Reilly Media, Inc. ISBN: 9781492051299.
3. Ashok Namdev Kamthane, Programming and Problem Solving with Python, McGraw Hill Education.

E-resources:

1. https://www.coursera.org/learn/python-programming-fundamentals
2. https://docs.python.org/3/tutorial/index.html

Program:	B. Tech.(Information Technology)						Semester: I	
Course:	Indian Knowledge System (IKS)						Code:	BSH21IK01
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 *Shat* Darshanas as foundational sources of Indian philosophy • Transmission of Knowledge: Oral tradition, Shruti-Smriti, Guru-Shishya Parampara and Early Texts • Institutional Framework: Ancient Indian universities (Takshashila, Nalanda, Vikramshila, Vallabhi) • Revival: Modern relevance, and efforts towards restoration	7
II	**Unit 2: Scientific and Technological Contributions of IKS** • Contributions to Mathematics (Baudhayana, Aryabhata, Brahmagupta & Bhaskaracharya -II **)** • Astronomy and Cosmology (Surya Siddhanta, Jyotish Shastra, Astronomical Observatories) • Metallurgy, Material Science, and Engineering (Iron Pillar, Wootz Steel, Zinc Distillation) • Civil Engineering and Architecture (Vastu Shastra, Water Management Systems, Temple and City Planning) • Ayurveda and Traditional Healthcare Systems	8

III	**Unit 3: Literary, Performing and Artistic Traditions and festivals of India** Contributions of Indian Literature to Ethics and Leadership (Ramayana, Mahabharata) Folk Traditions and Oral Narratives: Preserving local culture and wisdom Performing Arts and Knowledge Expression (Natya Shastra, Temple Art, Music and Dance Forms) Indian festivals as vibrant expressions of cultural values, community bonding, and sustainable environmental practices	7
IV	**Unit 4: Indigenous Technologies, Sustainability, and Ecology in IKS** nmental Ethics and Sustainability Practices in Ancient India iques for Conserving Water (Stepwells, Temple Tanks, and Dams) Agricultural Knowledge Systems (Crop Rotation, Indigenous Seeds, Zero Budget Natural Farming) nous Knowledge in Disaster Management and Climate Adaptation ts from IKS for Contemporary Sustainable Development	8
	Total	**30**

Textbooks:

Mahadevan, B., Bhat, Vinayak Rajat, Nagendra Pavanan R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications",PHI Learning Private Ltd., Delhi.

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.(Information Technology)					Semester: I	
Course:	Life Skills I					Code:	BSH21CC01
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	OR	TW	PR	Total
2	-	4	-	-	100	-	100

Prior knowledge: Nil

Course Objectives: This course aims at enabling students:

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

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

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

Detailed Syllabus

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

	ending relationships **Professional Relationships:** • Professional Etiquette and Conduct: Learning accountability and punctuality in workplace interactions, practice appropriate tone, email/meeting/messaging manners & etiquette, and collaboration ethics • Networking and Relationship Mapping: Identify mentors, peers, and professional contacts, build supportive academic and career networks	
III	**The Reflective Engineer** • Critical & Creative Thinking: Apply logical reasoning and original ideas to find effective and practical solutions. • Convergent & Divergent Thinking: Identify when to focus on a single solution or generate multiple ideas based on the nature of the task. • Perspective Thinking: Develop the ability to understand and consider viewpoints different from your own. • Ethical Decision-Making and Problem-Solving: Make fair, values-driven decisions while employing effective problem-solving strategies in both individual and team settings.	15
IV	**You CAN DO IT…** • Understanding and Managing Emotions: Self-regulation, assertiveness, aggression, emotional dependency versus interdependency and over thinking • Stress Management: Types of stress and healthy coping mechanisms. • Peer Pressure & Addiction: Types of peer pressure and strategies to resist negative influences.	15
	Total	**60**

References:

Books:

1. The 7 Habits of Highly Effective Teens" by Sean Covey Publisher: Simon & Schuster, 2017
2. How to Win Friends and Influence People" by Dale Carnegie Publisher: Simon & Schuster. 2020
3. Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman Publisher: Bantam Books, 2021.
4. Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books, 2019.
5. The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg Publisher: Random House, 2016

E Sources:

1. Psychology Today (www.psychologytoday.com): Psychology Today publishes articles and insights from psychologists and mental health experts that can be useful for improving life skills and emotional intelligence.
2. Lifehack (www.lifehack.org): Lifehack shares practical tips, techniques, and advice on personal development, productivity, and life skills improvement.
3. Coursera (www.coursera.org): Coursera offers online courses on various life skills topics, often provided by universities and experts, to help individuals develop essential skills

Course Syllabus
Semester II

Program:	B. Tech. (Information Technology)						Semester: II	
Course:	Multivariate Calculus						Code:	BSH22BS07
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of

1. Elementary Mathematics
2. Elementary Calculus is **essential.**

Course Objectives: This course aims at enabling students,

1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation area, volume
2. To make students acquainted with advanced techniques to evaluate integrals

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

1. Apply the concepts of partial differentiation to evaluate Jacobians, determine maxima and minima, and estimate errors and approximations
2. Evaluate derivatives and integrals of multivariable functions.
3. Represent the Fourier series for continuous and discrete periodic time domain functions in signal form
4. Compute definite improper integrals using Gamma, Beta function, and DUIS
5. Apply multiple integration techniques to determine Area, Volume

Detailed Syllabus

Unit	Description:	Duration [Hrs]
I	**Partial Differentiation:** Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. **Application of Partial derivatives:** Jacobian for explicit function, Errors and Approximations, Maxima and Minima of two variable functions.	**8**
II	**Fourier Series:** Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and engineering applications.	**7**
III	**Integral Calculus:** Beta and Gamma functions, differentiation under the integral sign (DUIS).	**7**
IV	**Multiple Integral:** Double integration, conversion into polar form, application of double integration to the area, Triple integration, Dirichlet's theorem, application of triple integration to Volume.	**8**
	Total	**30**

Text Books:

1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill)
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)

Reference Books:

1. Higher Engineering Mathematics, 22e, by H. K. Das (S. Chand Publication, Delhi).
2. Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd)
3. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning)
4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education)
5. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi)

e-sources:

1. NPTEL Multivariable Calculus course https://nptel.ac.in/courses/111107108
2. NPTEL Video for Fourier series http://nptel.iitm.ac.in

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

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

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

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

Detailed Syllabus

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

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

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

References:

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

Program:	B. Tech. (Information Technology)						Semester: II	
Course:	Engineering Physics						Code:	BSH22BS03
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of:

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

Course Objectives: This course aims at enabling students,

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

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

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

Detailed Syllabus

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

	Dirac notation (|0⟩, |1⟩), quantum gates (Pauli-X, Hadamard, CNOT,SWAP), quantum circuits, comparison with classical logic gates. Applications of quantum computing. **Superconductivity:** Introduction, critical temperature, properties of superconductors: zero electrical resistance, persistent current, Meissner effect, critical magnetic field, isotope effect, BCS theory, type I and II superconductors, low Tc and high Tc superconductors, AC and DC Josephson effect, DC-SQUID-construction, working and applications, applications of superconductivity- superconducting magnets, maglev trains.	
IV	**Introduction to Nanoscience** Introduction, surface to volume ratio, quantum confinement, properties of nanomaterials- optical, electrical, mechanical, magnetic; methods of preparation of nanomaterials- bottom-up and top-down approaches, physical methods- high energy ball milling, physical vapor deposition; chemical method - colloidal route for synthesis of gold nanoparticle, applications of nanomaterials in medical, electronics, energy, automobile, space, defence.	7
	Total	**30**

Text Books:

1. A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2024, S. Chand & Company Pvt. Ltd.
2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd.
3. Nanotechnology -Principles & Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.
4. Quantum Computation and Quantum Information by Nielsen and Chuang, Cambridge University Press.

Reference Books:

1. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press.
2. Introduction to Solid States Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.
3. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.
4. Heat and Thermodynamics, Anandamoy Manna, Pearson Publishers 2011.

e-sources:

1. NPTEL Semiconductor Devices and Circuits
   Instructor: Prof. Neeraj Khare, IIT Delhi Link: https://nptel.ac.in/courses/117102062
   Instructor: Prof. Shashank Tripathi, IIT Kanpur Link: https://nptel.ac.in/courses/115104112.
2. NPTEL Course: Quantum Physics
   Instructor: Prof. D. K. Ghosh, IIT Bombay Link: https://nptel.ac.in/courses/115101107
   Instructor: Prof. V. Balakrishnan, IIT Madras Link: https://nptel.ac.in/courses/122106034
3. NPTEL Course: Introduction to quantum computing
   Instructor: Prof. Prabha Mandayam: Associate Professor at IIT Madras, Link: https://nptel.ac.in/courses/106106232
4. NPTEL Course: Superconductivity
   Instructor: Prof. P. S. Anil Kumar, IISc Bangalore Link: https://nptel.ac.in/courses/115108078
   Instructor: Prof. Arghya Taraphder, IIT Kharagpur Link: https://archive.nptel.ac.in/courses/115/105/115105131/
5. NPTEL Course: Introduction to Nanoscience and Technology
   Instructor: Prof. V. Ramgopal Rao, IIT Bombay Link: https://nptel.ac.in/courses/118102003
   Instructor: Prof. M. K. Radhakrishnan Link: https://nptel.ac.in/courses/117108047

Program:	B.Tech.(Information Technology)					Semester: II	
Course:	Engineering Physics Laboratory					Code:	BSH22BS04
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Course Objectives:

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

Course Outcomes:

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

Detailed Syllabus

Expt. No.	Title of Experiments
	Group A
1	Newton's Rings (To demonstrate the phenomenon of interference of light in wedge shaped film)
2	Newton's Rings (To determine the radius of curvature of Plano-convex lens)
3	Diffraction Grating (To determine the wavelength of different colours)
4	Diffraction Grating (To determine the wavelength of monochromatic source of light)
5	Malus Law (To verify the Malus Law of polarization of light)
6	Double Refraction: Birefringence (To determine refractive indices and type of crystal)
7	LASER (To determine the size of grating element using LASER)
8	Ultrasonic Interferometer (To determine the compressibility of given liquid)
9	Solar Cell (To determine Fill Factor using IV characteristics)
10	Energy Band Gap (To determine band gap of given semiconductor)
11	Four Probe Method (To determine the resistivity of a given sample)
12	Four Probe Method (To determine the energy band gap of a given sample)
	Group B
1	Hall effect (To demonstrate the Hall effect in semiconductors)
2	Hall effect (To determine the Hall coefficient, mobility and charge carrier in a given semiconductor)
3	Quincke's method (To determine the magnetic susceptibility of MnSO4.H2O solution)
4	Quincke's method (To determine the magnetic susceptibility of FeCl3 solution)
5	Sound Absorption Coefficient (To determine the sound absorption coefficient of the given materials)
6	Optic Fibre Cable (To determine the numerical aperture and acceptance angle)
7	Solar Cell (To determine Fill Factor using IV characteristics for series and parallel combination)
8	Industry-Driven or Faculty-Initiated Experiment
9	Mini project

Reference Books:

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

Program:	B. Tech.(Information Technology)						Semester: II	
Course:	Principles of Programming Languages						Code:	IT22ES01
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. Problem Solving Skills. **is essential.**

Course Objectives:

1. To learn basic principles of programming languages and programming paradigms.
2. To learn derived data types , user defined data types and program structure.
3. To learn basic concepts of logical and functional programming language.

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

1. Summarize principles of programming languages.
2. Make use of Array, pointer and string.
3. Apply various user defined data types.
4. Construct functions for developing programs.
5. Make use of functional and logical programming paradigm.
6. Illustrate Object Oriented Programming language concepts.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Fundamentals of Programming** Importance of Studying Programming Languages, History of Programming Languages, Impact of Programming Paradigms, Role of Programming Languages, Programming Environments. Programming paradigms- procedural, object oriented, functional, and logical, tokens: Keywords, Identifiers, Constants, Strings, Special Symbols, Operators, Data types, Type Conversions, Decision control and loop control structure, Case control structure.	7
II	**Array, Pointer And String** Array & its types, Address calculations, Pointer: Pointer concept, Array of Pointers, Strings: Built in and User defined functions to length, compare, concatenation, reverse etc.	9
III	**Structure, Union And Subprogam** Structure and Union: declaration, initialization and accessing members, array of structure, typedef. Subprograms: Fundamentals of Sub Programs, Design Issues for Subprograms, Local referencing Environments: Local and Global Variables.	6
IV	**Functions And Implementations** User defined Functions, Definition of function, Call by value and Call by reference, Category of functions: No arguments and no return values, Arguments with return values, no arguments but returns a value, recursion, Nested Functions, Dynamic Scoping.	8
V	**Logical And Functional Programming** Functional Programming Paradigm: Basic LISP definitions, predicates, conditionals and scoping, Recursion and iteration, Properties List array and access functions, Logic Programming Paradigm: An Overview of Prolog, Syntax and Meaning of Prolog Programs, Lists, Operators.	8

VI	**Object Oriented Programming Language Overview** Features of OOPs, Classes and objects: class fundamentals, declaring objects, assigning object reference variables, adding methods to a class, returning a value, constructors, *this* keyword.	7
	Total	**45**

Text Books:

1. Brian Kernighan&Dennis Ritchie, "The C Programming Language" Edition, Prentice Hall publication, ISBN: 9780131101630.
2. E Balagurusamy, "Programming in ANSI C, 8th Edition, Tata-McGraw Hill publication.

Reference Books:

1. Carlo Ghezzi, Mehdi Jazayeri, ―Programming Language Concepts, 3rd Ed, Wiley Publication ISBN: 978-81-265-1861-6.
2. Herbert Schildt, "The Complete Reference Java", 9th Ed, TMH,ISBN: 978-0-07-180856-9
3. E Balagurusamy, "Object-Oriented Programming with C++" 4th Edition, Tata McGraw - Hill Publishing Company Limited
4. Carl Townsend ,"Programming in turbo PROLOG", Tata-McGraw Hill

E-resources:

1. https://onlinecourses.nptel.ac.in/noc24_cs02/preview

Program:	B.Tech.(Information Technology)					Semester: II	
Course:	Programming Laboratory					Code:	BIT22ES02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50		50	100

Prior knowledge of:

1. Problem Solving Skills **is essential**

Course Objectives:

1. To write a neat code by selecting appropriate programming constructs.
2. To impart the concepts like functions, pointers, user defined data types, class and object.

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

1. Implement conditional statements, loop, Array and pointer to solve various problem statements.
2. Demonstrate various data types and functions.
3. Apply different concepts of functional and logical programming.
4. Make use of Object Oriented Programming concepts to implement programs.

Assignment No.	Suggested List of Assignments (Any 12)
	Detailed Syllabus
Expt. No.	**Title of Experiments**
1	Write a program to accept marks of five courses and if student is pass then find the grade obtained by student. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>and <75 then the grade is first division. If aggregate is >=50 and <60 then the grade is second division. If aggregate is >=40 and <50 then the grade is third division.
2	Write a program to using basic control structure, branching and looping.
3	Write a program to check whether given number is Prime or not. Take a number as input from user.
4	Write a program to accept n number of element from user (where, n is specified by user) and stores data in an array and display the largest element of that array using loops.
5	A class teacher wants to keep record of 10 students in the class along with the names and marks obtained in 5 subjects. Write a C program with structure that displays : a) Overall percentage result of the class. b) Total number of passing students in the class. c) Total number of students failing in one subject. d) Total number of distinctions in the class.
6	a) Write a program generate Fibonacci series with and without using recursive function. b) Write a program to find factorial of number with recursion.
7	Write a program to swap values of two elements. Use function and pass argument using call by Value and call by reference.
8	Write a program to demonstrate various LISP operators.
9	Write a program that uses functions to perform the following operations: a) Reading a complex Number b) Writing a complex number c) Addition of two complex numbers d) Multiplication of two complex numbers.
10	Write a program to define a structure for customer bank account that holds information like

	account number, name of account holder, balance, internet banking facility availed (Yes or No), pin code (422001 to 422013), account type (saving, recurring, deposit): a) Read account details for N customers. b) Identify the golden, silver and general customers. Golden customers: Balance > 10, 00,000. Silver Customers: Balance > 5, 00, 000 and < 10, 00, 000. General customers: Balance <5, 00, 000. c) Display the list of customers availing the internet banking facility. d) Display the customers belonging to a particular geographical location depending on postal code.
11	Write a function in LISP to find nth element from a list of m elements.
12	Write a program to represent sets using pointers to one dimensional arrays and implement functions to perform a) Union b) Intersection
13	a) Write a program to Create a File, Read from it, And Close the File.(Using sequential file handling Concepts). b) Write a program to read the file and store the lines in an array. c) Write a program to find the number of lines in a text file
14	Write a program using a class and write constructor to initialize two numbers. Include member functions to perform the following tasks: a) To display two numbers. b) To add two numbers. c) Subtract one number from other.
15	Write a program to implement type/copy command using command line arguments.

Text Books:

1. Brian Kernighan &Dennis Ritchie, "The C Programming Language" Edition, Prentice Hall publication, ISBN: 9780131101630.
2. E. Balagurusamy, "Programming ANSI C", 8th Edition, McGraw Hill.
3. Herbert Schildt, "C: The Complete Reference", 4th Edition, McGraw Hill.
4. T. W. Pratt , "Programming Languages", 4th Edition ,Prentice-Hall Of India, ISBN 9780130287199.

Reference Books:

1. Robert w. Sebesta "Concepts of programming languages" 10th edition, university of colorado at colorado springs, Pearson Publication
2. Sethi R., "Programming Languages concepts & constructs", 2nd Edition, Pearson Education, ISBN 81 - 7808 - 104 – 0.

E-resources:

https://onlinecourses.nptel.ac.in/noc24_cs02/preview

Program:	B. Tech. (Information Technology)						Semester: II	
Course:	Data Communication						Code:	BIT22PC01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	2	-	-	1	10	10	30	50

Prior knowledge of: Nil

Course Objectives:

1. To learn the basics of communication engineering.
2. To introduce characteristics of the signals, network performance metrics and modulation techniques.
3. To learn various transmission media and switching techniques.

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

1. Illustrate the basics of data communication.
2. Apply Nyquist bit rate and Shannon capacity to measure performance of the data communication.
3. Apply modulation techniques to convert signal to digital data and digital data to signal.
4. Compare and identify required transmission media and switching devices to design a network.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Fundamentals of Data communication** Definition, Brief history of communication engineering; Various communication applications, components in data communication- message, sender, receiver, Communication channels, Network Models: OSI, TCP/IP, set of rules (protocol), data representation, data flow, Transmission modes: simplex, half duplex and full duplex communication.	8
II	**Data and Signals** Channels and Spectrum - Definition and Types, Nyquist Bit rate, Shannon Theorem, Data –Fundamentals, Types –Analog, digital, Signals- Introduction, Classification -analog and digital, periodic, non-Periodic, Composite Signals, Sine wave. Bandwidth of a signal, Properties - Amplitude, Period, Frequency and phase, bit rate, Bit length, Wavelength, Processing – Fundamentals , Types - Time and frequency domains, Transmission Impairment - Attenuation, Distortion, Noise, Data Rate Limit, Performance metrics of data communication.	9
III	**Data Transmission** Fundamentals, Working principles, Modulation techniques and it's types, Data Conversion and it's types - Digital to Digital, Analog to Digital, Digital to Analog Modes of data transmission- parallel and serial communication: synchronous communication, asynchronous communication, multiplexing and de-multiplexing.	8
IV	**Transmission Media** Fundamentals, Types and it's characteristics - Guided Media, Un-Guided media, Switching –Fundamentals, Types and Characteristics - Circuit-switching, Packet switching, Switching devices–Fundamentals, Importance, types.	5

Total	**30**

Text Books:

1. Behrouz A Forouzan, “Data Communications and Networking”, 5th Ed, McGraw – Hill Education India Edition 2013, ISBN-13: 9781259064753.
2. Atul Kahate, Achyut Godbole, “Data Communications and Networks”, Tata McGraw Hill Education Pvt. Ltd.
3.William Stallings, “Data and Computer Communications”, Eighth Edition, Pearson Education India, 2007
4. Digital Integrated Electronics, “Herbert Taub and Donald Schilling”, McGraw Hill Education (1 July 2017),ISBN-13: 978- 0070857889 ISBN-10: 9780070857889.

Reference Books:

1. Andrew S. Tanenbaum, "Computer Networks", Fifth Edition, Pearson Education India, 2013.

E-sources:

1. https://nptel.ac.in/courses/1061050

Program:	B. Tech. (Information Technology)					Semester: II	
Course:	Web Development Laboratory					Code:	BIT22VS01
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of:

1. HTML & CSS **is essential.**

Course Objectives:

1. To design effective user interface.
2. To create interactive websites as per the requirements.

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

1. Make Use of web programming concepts like HTML, CSS and JAVA SCRIPTS.
2. Make use of HTML 5 Elements for designing of web page.
3. Build effective User Interface
4. Design Web site using HTML, CSS and JavaScript.

Assignment No.	Suggested List of Assignments (Any 8)
	Detailed Syllabus
Expt. No.	**Title of Experiments**
1	Create a HTML page, which has properly aligned paragraphs with image along with it.
2	Create style sheets and use them in the web page.
3	Design a webpage for implementing – a. Ordered list within unordered list. b. Unordered list within ordered list. c. Ordered list within ordered list (implement different list numbering style). d. Unordered list within unordered list (Implement different bullet styles). Write an HTML script that displays definitions of minimum 10 terms related to a context. Use definition lists for the same.
4	Adding Hyperlinks and Images: a. Create a webpage containing two images and add a hyperlink to another webpage. - Apply width and height property to one image. - Align one image to center and the other one to left. - Assign the second image as hyperlink to another webpage. b. Create a webpage containing an image and short paragraph. Apply following- - Create the map of image with sections of image linking to different webpage's in the same HTML where it is to be applied. Apply this map on the image.
5	Create a simple webpage using HTML5 Semantic and Structural Elements.
6	Create a webpage using HTML5 Media Elements. (minimum five elements)
7	Write an HTML page that contains a selection box with a list of 5 Companies, when the user selects a Company, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).
8	Create IT Department ITSA Registration Form in HTML using textbox, text area, radio button and drop down menu, check box, submit, file and reset button etc. Field should contain name, address, birth- date, qualification, email, phone number, gender, comments, attach photo etc.

	Use HTML Form elements wherever required. Align all elements using table.
9	Design the following static web pages required for an online book store web site. a) HOME PAGE: The static home page must contain three frames. b) LOGIN PAGE c) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. REGISTRATION PAGE.
10	Write a java script program to test the first character of a string is uppercase or not.
11	Write a java script for loop that will iterate from 0 to 15 for each iteration, it will check if the current number is odd or even, and display a message to the screen.

Mini Project

Guidelines for Mini Project: Develop a website using knowledge of HTML, CSS and validate using JavaScript.

It is appreciated if the web site is based on the concepts learned. Use of open-source software and recent version is to be encouraged.

At the end students has to upload on github repository.

Text Books:

1 Thomas A. Powell , "HTML & CSS: The Complete Reference", Fifth Edition, McGraw Hill

Reference Books:

1. DT Editorial Services, HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and Query, Second Edition, dreamtech publication ISBN 9789351199076
2. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", 4th Edition by BPB Publications. ISBN: 9788183330084.
3. Elisabeth Robson, Eric Freeman, "Head First HTML and CSS" by O'Reilly Media, Inc.

E-resources:

1. https://www.codecademy.com/learn/learn-html
2. https://www.codecademy.com/learn/introduction-to-javascript
3. https://www.codecademy.com/learn/learn-css

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

Prior knowledge of: Basic knowledge of English Language is essential.

Course Objectives: This course aims at enabling students:

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

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

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

Detailed Syllabus

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

Lab Session	Activities	Duration
1	Listening 1: Listen to the audio and answer the questions (IELTS) Cambridge Assessment - Free Tool	2

2	Listening 2: Listen to the audio and Summarize (Ted Talks)	2
3	Grammar: Correct the sentences and understand the business usages.	2
4	Vocabulary: Different ways to improve vocabulary - AI-based activities for vocabulary enrichment	2
5	Writing Skills 1: Formal writing such as Job Application, Leave Application, Enquiry and Complaint Letter. Writing a personalized letter followed by applying AI for polishing of grammar and vocabulary.	2
6	Writing Skills 2: Different Styles of writing and Paragraph Writing (Descriptive, Technical)	2
7	Writing Skills 3: Report Writing; Progress, Accident Report, Event Report - Using AI to formulate a structured report and learning how to customize it for maximum relevance.	2
8	Reading Activity 1: Communication Case Studies	2
9	Reading Activity 2: IELTS based Comprehension Skills	2
10	Reading Activity 3: Research Articles and Technical Documents	2
11	Reading Activity 4: Literary Reading and Discussion	2
12	Speaking Activity 1: IPA Pronunciation and Phonetics Exercises	2
13	Speaking Activity 2: Delivering speeches and Mastering the Art of Public Speaking	2
14	Speaking Activity 3: Preparing and Participating Group Discussions / Elevator Speeches	2
15	Speaking Activity 4: Oral/PPT Presentation with Q&A Session	2
	Total	**30**

Text Books:

1. Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015

Reference Books:

1. Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005
2. David F. Beer, Writing and Speaking in the Technology Professions: A Practical Guide, Wiley-IEEE Press; 2nd Edition, 2003
3. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011
4. Clifford Whitcomb, Leslie E. Whitcomb, Effective Interpersonal and Team Communication Skills for Engineers, Wiley–Blackwell; Nil edition, 2013.
5. Krishnaswami, N and Sriraman, T, Creative English for Communication, Macmillan.Saran Freeman, Written Communication in English, Orient Longman

e-sources:

1. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vWlA1-FXdmtGD4TbPCXo-
2. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC
3. https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1

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

Prior knowledge of: English Language is essential.

Course Objectives: This course aims at enabling students,

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

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

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

Detailed Syllabus

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

	appropriate manner • Carry out short easy German dialogues with expressions	
IV	**Writing Skills** • Writing short easy sentences in German • Using German punctuation and orthographic rules correctly in given texts • Taking dictation for words and simple sentences • Correcting errors in given texts • Writing simple texts, short messages, letters emails on given topics	4
	Total	**15**

Lab	Activities	Duration (Hrs)
1	**Vocabulary:** Exercises to recall and enhance vocabulary	2
2	**Listening 1:** Listen to the audio and repeat (phonetics)	2
3	**Listening 2:** Listen to the audio and select the correct option	2
4	**Reading 1:** Read short easy texts and fill up the information in table	2
5	**Reading 2:** Read short easy texts and mark true or false	2
6	**Reading 3:** Read short easy texts and answer the questions	2
7	**Grammar 1:** Solve simple grammar exercises	2
8	**Grammar 2:** Construct correct sentences by applying grammar rules	2
9	**Speaking 1:** Spell and pronounce the words correctly	2
10	**Speaking 2:** Give your short introduction	2
11	**Speaking 3:** Frame simple questions, requests and reply	2
12	**Writing 1:** Fill up simple data in registration forms	2
13	**Writing 2:** Correct errors in given draft	2
14	**Writing 3:** Fill in the sentences and rewrite the texts, short messages, emails, and letters	2
15	**Presentation:** Basic geographical information of India and German speaking countries in German	2
	Total	**30**

Text Books:

1. Menschen A1.1: Sandra Evnas, Angela Pude, Franz Pecht, Hueber Verlag Ismaning Germany, 2016

Reference Books:

1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015
2. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag,Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018
3. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005

e-sources:

1. NPTEL Course lectures (IIT Madras) link: https://onlinecourses.nptel.ac.in/noc25_hs121/preview
2. DW Learn link: https://learngerman.dw.com/en/beginners/s-62078399
3. Goethe-Institut Link: https://www.goethe.de/en/spr/ueb/ele.html
4. Easy German link: https://www.easygerman.org

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

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

Course Objectives:

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

Course Outcomes:

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

Detailed Syllabus

Unit	Description:	Duration [Hrs.]
I	Introduction: **Hiragana Script.** Listening: Short video skit on self-introduction Speaking: Song of greetings. Reading: Hiragana words Writing: Japanese scripts (Hiragana) Test on Hiragana	5
II	Introduction: **Katakana script** Listening: English words Speaking: Song on body parts. Reading: Katakana words Writing: Locating countries on map, Word hunt.	4
III	Introduction to Kanjis Writing: Learn to write kanjis with stroke order.	3
IV	わたし は マイク.ミラー です。 Listening: Conversation based on L-1 Speaking: Self introduction Reading: Lesson reading no.-1 Writing: Writing about yourself. Grammar: Introduction to1.Particles (は、か、も、か) 2.Verbs (です、ではありません)	3
	Total	**15**

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

Text Books:

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

Reference Books:

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

e-sources:

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

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

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

Course Objectives: This course aims at enabling students:
1. To understand storytelling as one of the tools of influential communication.
2. To strengthen their creativity, critical thinking and social skills.
3. To use stories to face leadership, management and professional challenges.

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

Detailed Syllabus

Unit	Description	Duration [Hrs.]
I	**Concept and Scope:** What is a story? A Brief History & Importance of Storytelling, Basics of Storytelling- Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling **Activity:** Analysis of Steve Jobs Commencement Speech at Stanford(2005)	3
II	**Process of Storytelling:** Elements of a Story - Context and Relevance, Style and Detailing, Plot, and Characters, The Flow of the Story-Relevance-Action-Result, Know the Purpose- Inspire Action, Educate People, Showcase Values, Build Collaboration, Know your Audience - Educational, Social Background and Age, Developing Narratives: Characteristics of a Narrative, Data Visualization, Presenting a Word Picture, Triggering Emotions of the Audience, Choosing Media - Audio, Written, Oral and Digital Storytelling **Activity:** Analysis of Short Story: The Three Hermits by Leo Tolstoy', The Last Painting by O'Henry	4
III	**Types of Stories:** Customer Story, Origin Story, Event Story, Product Stories, Storytelling Techniques for Presentations, Using Power Words Effectively, Using Narratives to Manage Conflicts, Using a Narrative Interpret the Past and Shape the Future, Storytelling in Marketing, Story Strategies-Using Anchor Stories **Case Studies-**Brand Storytelling-Steve Jobs/Jack Maa- Product Presentation, Lido Anthony "Lee" Iacocca	4

IV	**Crafting a Story:** Crafting a Story from A Picture/an Idea/Situation/Artifacts, Storyline-Beginning/Motive/Struggle/Achievement, Six-word Story-Memoirs to Being with, Detailing Of Character and the Context, Delivering a Story–Tone / Emotions / Voice Modulation Activity- Developing and Delivering Presentation through Storytelling on the Given Situation/context	4
	Total	**15**

Lab Session	**Activities**	**Duration**
1	Basic of Storytelling: Using Five Senses in storytelling activity and Elements of Storytelling	2
2	Analysis of a Short Story: 'The Three Hermits by Leo Tolstoy', and The Last Painting by O' Henry.	2
3	Character Study: Create a detailed character profile of a fictional character, including their background, motivations, and personality traits. Write a short story or scene that showcases this character in action	2
4	Personal Storytelling: Write and present a short personal story that highlights a challenge you've faced and how you overcame it	2
5	Collaborative Storytelling: Partner with another student to create a collaborative story. Take turns writing alternating sections, focusing on maintaining a consistent tone and narrative flow.	2
6	Historical Business Story: Research and narrate a significant historical event or moment in a well-known business's journey, focusing on how storytelling played a role in shaping public perception	2
7	Social Impact Story: Develop a story that demonstrates how a business initiative or project positively impacted a community or addressed a social issue	2
8	Customer Success Story: Craft a narrative that showcases a customer's journey with your fictional business	2
9	Change Management Story: Design a narrative that communicates a change initiative within a company, addressing challenges, resistance, and the ultimate benefits of the change	2
10	Investor Pitch Story: Craft a persuasive story for a startup pitch. Highlight the problem, solution, market opportunity, and potential for growth in a captivating way	2
11	Leadership Story: Compose a story that illustrates effective leadership qualities and strategies. Highlight a leader's ability to motivate, inspire, and guide a team toward Success	2
12	Cultural Storytelling: Explore how storytelling can bridge cultural gaps in a global business context. Share a story that demonstrates cultural sensitivity and Understanding	2

13	Ethical Dilemma Story: Present a complex ethical dilemma faced by a business or individual. Use storytelling to explore various perspectives and potential solutions	2
14	Analysis of AI-generated stories: Analyzing an AI-generated story and adding your perspective and details to it.	2
15	Crisis Turnaround Story: Narrate a scenario where a business successfully navigated a crisis through strategic communication and storytelling, ultimately regaining trust and reputation.	2
	Total	**30**

Text Books:
Kendall Haven, Story Smart, Libraries Unlimited, 2014

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

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

Program:	B.Tech.(Information Technology)				Semester: II		
Course:	Life Skills II				Code:	BSH22CC02	
Credits	Teaching Scheme (Hrs. /Week)				Evaluation Scheme and Marks		
	Theory	Practical	Tutorial	OR	TW	PR	Total
2	-	4	-	-	100	-	100

Prior knowledge: Nil

Course Objectives:

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

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

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

Detailed Syllabus

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

	goals, time, and choices by setting priorities and acting independently. • **Overcoming Fear of Failure:** Recognize failure as part of the learning process and use techniques to reduce fear and build a positive attitude. • **Learning Agility:** Improve ability to adapt by learning from experience and tracking growth through regular self-review activities.	
IV	**From Procrastination to Progress: Adapting with Purpose** • **Understanding Adaptability in a Changing World:** Learn how staying open to change helps in succeeding in new roles, environments, and situations. • **Flexibility in Teamwork and Collaboration:** Practice working with different people and adapting your role based on team needs and work styles. • **Managing Time and Setting Priorities:** Build practical strategies for organizing tasks, managing schedules, and balancing academic, personal, and social commitments. • **Understanding and Overcoming Procrastination:** Identify common causes of procrastination and learn actionable techniques (e.g., habit stacking, the 5-minute rule) to build momentum	15
	Total	**60**

References Books:

1. "Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books
2. "The Financial Diet: A Total Beginner's Guide to Getting Good with Money" by Chelsea Fagan and Lauren VerHage
3. "Grit: The Power of Passion and Perseverance" by Angela Duckworth Publisher: Scribner, 2018

E Sources:

1. Skills You Need (www.skillsyouneed.com): This website offers comprehensive information and practical guidance on a wide range of life skills, including communication, time management, problem-solving, and more
2. Mind Tools (www.mindtools.com): Mind Tools provides resources on personal effectiveness, leadership, communication skills, and other essential life skills to enhance professional and personal development
3. TED Talks (www.ted.com): TED Talks offer inspiring and informative speeches by experts and thought leaders covering various life skills topics, including resilience, emotional intelligence, and personal growth
4. Very well Mind (www.verywellmind.com): This website covers mental health, emotional well-being, and self improvement topics that contribute to overall life skills development

Vision and Mission of Applied Sciences & 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

M1: To develop a strong base of engineering sciences through innovative and experiential learning.

M2: To provide excellent harmony of conducive environment and moral support for joyful learning.

M3: To strive for overall development of students by providing the right platform to nurture all personality traits.

M4: To create research attitude and endeavour innovation, creativity.

Vision and Mission of Information Technology Department

Vision

To become a front-runner in the western region in preparing Information Technology engineers with academic excellence and research skills empowering their roles in technology and society.

Mission

M1: To equip students with the skills and knowledge through a dynamic learning environment

M2: To collaborate with industries to nurture proficient Information Technology Engineers

M3: To cultivate a spirit of research, innovation, and entrepreneurship to address community and business challenges.

M4: To imbibe work ethics and leadership skills through co-curricular and extracurricular activities.