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. Computer Engineering (Regional)
(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 Computer Engineering (Regional)

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS chairman
1	Computer Programming and Problem Solving	BCER21ES01	17	Chairman BoS, Computer Engineering (Regional Language) PCET's Pimpri Chinchwad College of Engineering Sect. 26, Pradhikaran, Nigdi, Pune-411044.
2	Digital Electronics and Computer Organization	BCER21ES02	19	
3	Digital Electronics Laboratory	BCER21ES03	21	
4	Computer Programming and Problem-Solving Laboratory I	BCER21VS01	23	
5	Object Oriented Programming	BCER22ES01	46	
6	Object Oriented Programming Lab	BCER22ES02	48	
7	Discrete Mathematics	BCER22PC01	50	
8	Computer Programming and Problem-Solving Laboratory II	BCER22VS02	52	

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	BSH22IK01	54	
6	Life Skill I	BSH21CC01	36	
7	Multivariate Calculus	BSH22BS07	39	
8	Multivariate Calculus Laboratory	BSH22BS08	40	
9	Engineering Physics	BSH22BS03	42	
10	Engineering Physics Laboratory	BSH22BS04	44	
11	AEC I(Eng/Ger/Jap /Business story telling)	BSH21AE01/ 02/03/04	26/28/31 /33	
12	Life Skill II	BSH22CC02	56	

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	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. (Computer Engineering) Regional Semester – I

First Year B. Tech Computer Engineering Regional language (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						
		L	P	T	Total	L	P	T	O	Total	FA		SA	TW	PR	OR	Total
											FA 1	FA 2					
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
BCER21ES01	Computer Programming and Problem Solving	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BCER21ES02	Digital Electronics and Computer Organization	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BCER21ES03	Digital Electronics Laboratory	-	1	-	1	-	2	-	-	2	-	-	-	50	-	-	50
BCER21VS01	Computer Programming and Problem-Solving Laboratory I	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-	100
BSH21AE01/ 02/03/04	AEC (Eng/Ger/Jap /Business story telling)	1	1	-	2	1	2	-	-	3	10	10	30	-	-	-	50
BSH21CC01	Life Skill I	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-	100
Total		**11**	**9**	**0**	**20**	**11**	**18**	**0**	**4**	**33**	**70**	**70**	**210**	**325**	**75**	**-**	**750**

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

CURRICULUM STRUCTURE

First Year B. Tech. (Computer Engineering – Regional language) Semester – II

First Year B. Tech Computer Engineering Regional language (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
BCER22ES01	Object Oriented Programming	3	-	-	3	3	-	-	1	4	20	20	60	-	-	-	100
BCER22ES02	Object Oriented Programming Laboratory	-	2	-	2	-	4	-	-	4	-	-	-	50	-	50	100
BCER22PC01	Discrete Mathematics	2	-	-	2	2	-	-	1	3	10	10	30	-	-	-	50
BCER22VS02	Computer Programming and Problem Solving Laboratory II	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-	100
BSH22IK01	Indian Knowledge System	2	-	-	2	2	-	-	-	2	25	25	-	-	-	-	50
BSH22CC02	Life Skill II	-	2	-	2	-	4	-	-	4	-	-	-	100	-	-	100
Total		**11**	**9**	**-**	**20**	**11**	**18**	**-**	**4**	**33**	**75**	**75**	**150**	**325**	**75**	**50**	**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. Computer Engineering (Regional)						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:	Duration [Hrs]
I	**Matrices:** Rank, System of linear equations with applications in electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.	8
II	**Differential Calculus:** Indeterminate Forms, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.	7
III	**Ordinary Differential Equations:** Exact differential equations, Differential equations reducible to Exact form. **Applications:** Orthogonal trajectories, Kirchoff's law of electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).	8
IV	**Linear Differential Equations:** Linear differential equation of n^{th} order with constant coefficients, General method, Shortcut methods, Method of variation of parameters, Application of linear differential equations in engineering viz. mass spring system, electrical circuits etc.	7
	Total	**30**

Text Books:

1. Higher Engineering Mathematics by B.V. Ramana, 34e, Tata McGraw-Hill.
2. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd.
2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.
3. Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.
4. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi

e-sources:

1.NPTEL Course lectures links: https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

Program:	B. Tech. Computer Engineering (Regional)					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 of:

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:

The project group shall consist of not more than 4 students per group.

The project report should include mathematical analysis or applications, and, where applicable, software performance parameters.

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. Computer Engineering (Regional)						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 storage and transportation of H2 gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	7

III	**Corrosion and Corrosion control:** a) Corrosion: introduction, types of corrosion, mechanism of atmospheric 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. Computer Engineering (Regional)						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 states of affairs of hydrogen run cars in India.
6	Need and applications of biodegradable polymers – a step towards cleaner world.

References:

1. Vogels Text book of Qualitative Chemical Analysis by J. Mendham, R, C, 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. Computer Engineering (Regional)						Semester: I	
Course:	Computer Programming and Problem Solving						Code:	BCER21ES01
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 is essential.

Course Objectives: This course aims at enabling students,

1. To acquaint with the fundamental principles, concepts of problem solving.
2. To acquaint with the fundamentals of Algorithms.
3. To build the programming logic using Modular Programming.
4. To acquaint with data structures and their terminology.

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

1. Solve various problems using sequential and conditional problem solving approaches
2. Illustrate the conditional and iterative approaches for Problem Solving.
3. Use the array techniques for Problem solving.
4. Apply the searching and sorting techniques for problem solving.
5. Apply the appropriate data structure to perform different operations.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Introduction to Problem Solving aspect** Top-down design, Algorithm, Flowcharts/Pseudo codes, Sequential Approach, the compilation process, Syntax and Semantic errors, Variables and Data Types, Conditional Approach, Iterative Approach. Exchanging values of two Variables with and without temporary variable, Counting, Reversing the digits of a number, Base Conversion, Character to number conversion	9
II	**Complex Problem Solving** Factorial Computation, Power Computation, Fibonacci Sequence Generation, Finding Square root of a number, Smallest Divisor of an integer, Finding GCD, LCM, Generating Prime numbers, Computing the prime factor of a number. Computing n-th Fibonacci number	9
III	**Array Techniques** Array order reversal, Summation of a set of numbers, Finding maximum number in a set, Removal of Duplicates from an ordered array, Union of two sets	9
IV	**Searching and Sorting Techniques** Searching Techniques: Linear search, Binary search Sorting Techniques: Types of sorting – Sorting by selection, Sorting by Exchange, Sorting by Insertion	9
V	**Introduction to Data Structures** Introduction, Stack operation, Queue operations, Applications of Stack, Applications of Queue	9
	Total	**45**

Self Study

Pointer variables, Pointers with Arrays.
Declaration and Initialization of structure, Array of Structures, Unions.
Designing Structured Programs, Types of Functions, Parameter Passing techniques

Text Books:

1. R. G. Dromey, “How to Solve it by Computer”, 1st Edition, Pearson India,2007, ISBN: 978-8131705629.
2. Maureen Sprankle, “Problem Solving and Programming Concepts” ,9th Edition, Pearson, 2011, ISBN: 978-0132492645.
3. "The C Programming Language" by Brian W. Kernighan and Dennis M. Ritchie 4.
4. “The complete reference C” by Herbert Schildt, Fourth Edition

Reference Books:

1. Ferreira Filho, Wladston. Computer science distilled: learn the art of solving computational problems. Code Energy, 2017.
2. Davidson, Janet E., and Robert J. Sternberg, eds. The psychology of problem solving. Cambridge university press, 2003.

Online Sources:

1. https://www.eolymp.com/en/problems/3
2. Ranade, Abhiram G. "Introductory programming: Let us cut through the clutter!." In Proceedings of the 2016 ACM Conference on Innovation and Technology in Computer Science Education, pp. 278-283. 2016. - https://dl.acm.org/doi/abs/10.1145/2899415.2899430

Program:	B. Tech. Computer Engineering (Regional)						Semester: I	
Course:	Digital Electronics & Computer Organization						Code :	BCER21ES02
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 concepts of Number System are **essential.**

Course Objectives: This course aims at enabling students,

1. To get acquainted with the fundamental concept's Digital Electronics circuit design.
2. To develop skills for the design and implementation of combinational logic circuits.
3. To develop skills for the design and implementation of sequential logic circuits.
4. To get acquainted with the basic concept of computer organization.

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

1. Interpret Boolean expressions for designing digital circuits using K-Maps.
2. Design Combinational digital circuits as per the specifications.
3. Design Sequential digital circuits as per the specifications.
4. Apply the concepts of sequential circuits to categorize registers and counters.
5. Summarize the basic concepts of computer organization, input output and memory subsystem.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Introduction to Logic Gate and minimization techniques** **Logic Gates:** Representation of truth-table, SOP form, POS form, Simplification of logical functions, **Logic Minimization: Minimization** of SOP and POS forms don't care conditions Reduction techniques: K-Maps up to 4 variables.	9
II	**Design of Combinational Logic** Code converter - BCD, Excess-3, Gray code, Binary Code. Half- Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexers (MUX), Demultiplexers (DEMUX), Parity generators.	9
III	**Design of Sequential Logic** Storage elements: Latches and Flip-Flops, Flip-Flop: SR, J-K, D, T; Preset & Clear , Truth Tables and Excitation tables, Conversion from one type to another type of Flop- Flop.	9
IV	**Registers and Counters:** Registers: SISO, SIPO, PISO, PIPO. Counters: Asynchronous Counter, Synchronous Counter, BCD Counter, Johnson and Ring Counter, Modulus of the counter (IC 7490)	9
V	**Introduction to Computer Organization** Introduction: Function and structure of computer components: Bus Structures. Components of a processor - Registers, ALU and Control unit, Instruction cycle. **Introduction to Input/Output Subsystem : A**ccess of I/O devices, I/O ports, I/O interfaces - Serial port, Parallel port, PCI bus, USB bus, I/O peripherals - Input devices, Output devices, Secondary storage devices. **Introduction to Memory Subsystem:** Memory Hierarchy, RAM (Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory	9
	Total	**45**

Self Study

Arithmetic operation using One's and Two's Complement, Number Conversion, Quine-McCluskey minimization technique, decoder, encoder, Computer function and interconnection

Text Books:

1. R.P.Jain, “Modern Digital Electronics”, Tata McGraw-Hill, 4th Edition,2010 ISBN 978-0-07-06691-16,
2. Moris Mano, “Digital Logic and Computer Design”, 2017, Pearson, ISBN 978-93-325-4252-5.
3. W. Stallings, “Computer Organization & Architecture: Designing for performance”, 10th Edition, 2016, Pearson Education/ Prentice Hall of India, ISBN-10: 0-13-410161-8 | ISBN-13: 978-0-13-410161-3.

Reference Books:

1. John Yarbrough, “Digital Logic applications and Design”, Cengage Learning, 2006, ISBN 13:978-81-315-0058-3.
2. Norman B & Bradley, “Digital Logic and Design Principles”, Wiley India Ltd, 2000, ISBN 978-81-265-1258-4.
3. D. Leach, Malvino, Saha, “Digital Principles and Applications”, Tata McGraw Hill, 2011, ISBN 13:978-0- 07-014170-4.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer Organization, 5th Edition, Tata McGraw Hill, 2002.

Program:	B. Tech. Computer Engineering (Regional)				Semester: I		
Course:	Digital Electronics Laboratory				Code:	BCER21ES03	
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
1	-	2	-	50	-	-	50

Prior knowledge of Basic concepts of Number System **is essential.**

Course Objectives: This course aims at enabling students,

1. To get acquainted with the fundamental concepts of Digital Electronics circuit design.
2. To develop skills for the design and implementation of combinational logic circuits.
3. To develop skills for the design and implementation of sequential logic circuits.
4. To get acquainted with the concept of design of counters in sequential logic circuits.

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

1. Interpret Boolean expressions to design digital circuits using K-Maps.
2. Design combinational digital circuits as per the specifications.
3. Design sequential digital circuits as per the specifications.
4. Compare synchronous and asynchronous counters to design digital circuits.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of prologue, certificate, table of contents and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Software & Hardware requirements, Date of Completion, Assessment grade/marks and assessor's sign, Theory- Concept, circuit diagram, pin configuration, conclusion/analysis).

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students.
2. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include timely completion, performance, innovation, efficiency, punctuality and neatness.

Guidelines for Laboratory Conduction

1. Each student must perform at least 4 assignments from group A and 3 assignments from group B and study assignment is compulsory.
2. Assignments are mandatory to perform either on digital trainer kit or online simulator
3. Students are expected to work in group of 3 to 4.

Detailed Syllabus

Expt. No.	Suggested List of Experiments
	Group A - Assignments based on Combinational Logic Design
1	Design & Implement Basic gates and Universal logic gates. (AND, OR, NOT, NAND, NOR).
2	Design & Implement Full adder using Basic Gates.
3	Design & Implement Full subtractor using Basic Gates.
4	Design and Implement Code Converters-Binary to Gray.
5	Design & Realization of Boolean Expression for suitable combinational logic using MUX 74151.
6	Design & Implement Parity Generator using EX-OR.
	Group B- Assignments based on Sequential Logic Design
7	Design and Realization of Flip Flop Conversion.
8	Design of 3-bit Up Counter using suitable Flip Flops.

9	Design of 3-bit Down Counter using suitable Flip Flops
10	Design & Realization of Mod -N counter using IC 7490.
Group C: Study Assignment	
11	Assembling and disassembling of computer systems and Identifying Internal Components such as motherboard, RAM, SMPS, Ports, I/O Peripherals and Processor etc.

Reference Books:

1. John Yarbrough, Digital Logic applications and Design‖, Cengage Learning, ISBN – 13:978-81-315-0058-3, 2006.
2. Norman B & Bradley, Digital Logic Design Principles, Wiley India Ltd, ISBN:978-81-265-1258-4, 2000.
3. D. Leach, Malvino, Saha,Digital Principles and Applications‖, Tata McGraw Hill, ISBN – 13:978-0- 07- 014170-4,2 011.

e-sources: www.Deldsim.com

Program:	B. Tech. Computer Engineering (Regional)					Semester: I	
Course:	Computer Programming & Problem-Solving Laboratory 1					Code:	BCER21VS01
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of: Basic knowledge of programming and logic building **is essential.**

Course Objectives: This course aims at enabling students,

1. To write the programming code by using various data types, variables, and operators.
2. To implement the decision and looping concepts in programs.
3. To get acquainted with the operations of Arrays.
4. To select appropriate searching and/or sorting techniques in the application development.
5. To implement the data structure in programs.

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

1. Use data types, variables and operators for solving problems.
2. Illustrate the decision and looping statements in programming.
3. Implement the operations on Arrays.
4. Explore the various searching and sorting techniques for problem solving.
5. Apply the Stack and Queue data structure to perform the operations.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of prologue, certificate, table of contents and handwritten write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, Assessment grade/marks and assessor's sign, Theory- Concept, algorithm, sample input and expected output, conclusion).

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students.
2. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include- timely completion, performance, innovation, efficiency, punctuality and neatness.

Guidelines for Laboratory Conduction

1. Assignments on all concepts covered in Group A are mandatory.
2. Any two Assignments from Group B should be implemented, recommended on coding platforms such as Hacker Rank, CodeChef.
3. Encourage students for appropriate use of Hungarian notation, proper indentation and comments.
4. Use of open-source software is to be encouraged.
5. Operating System recommended: - 64-bit Open-source Linux or its derivative.
6. Programming tools recommended: -GCC, Turbo C/C++,Eclipse.

Expt. No.	Suggested List of Experiments
	Group A
1	Choose a real world problem that involves various types of data. Develop a program to solve this problem by effectively using appropriate variables and data types.
2	Write a program to generate Fibonacci series and Factorial of a given number.
3	Write a program to find a. Prime number from given 'n' Numbers. b. GCD of given numbers. c. The given number is Palindrome.
4	Write a program to input marks of 5 courses (Physics, Chemistry, Math, and English & Computer) for a student. Display the rank, total marks and percentage of each student in each

	course. The rank is categorized as fail (marks < 40%), pass & third division (marks between 40 to 55%), second (marks between 55 to 65%), first (marks between 65 to 80%), Distinction (marks between 80 to 95%), extra ordinary (marks above 95 to 100%).
5	Write a program to accept details of two matrices. Add and multiply given matrices and print the result.
6	Write a program for Linear search. Test your program on a variety of arrays of different sizes and types.
7	Write a program for Binary search for given 'n' numbers. The program should handle sorted arrays of different sizes and types.
8	Write a program for implementing Selection sort for given 'n' numbers
9	Choose a real world problem for using Stack and Queue concepts. Write a program to implement this problem using stack and queue.
10	Write a program to store student information (e.g. Roll No, Name, Percentage etc.). a. Display the data in descending order of Percentage (Insertion Sort). b. Display data for roll no specified by user (Linear Search).
Group B	
11	An online bookstore is facing challenges in managing its large inventory of books. The inventory contains thousands of book titles across various genres and authors. To improve the user experience and optimize book discovery, the bookstore needs an efficient sorting algorithm to organize books systematically on their website. (Sorting by Title, Sorting by Author, Sorting by Genre, Sorting by Release Date)
12	Implement a stack-based system to manage the checkout process for online shopping cart of an e-commerce platform. The system should be able to handle the following scenarios: • **Adding Items to the Cart:** When a customer selects an item to purchase, it should be added to their shopping cart. • **Removing Items from the Cart:** If a customer decides to remove an item from their cart, the system should remove the item from the top of the stack. • **Checking the Top Item:** The system should provide a way to check the top item in the shopping cart without removing it from the stack. If the cart is empty, the system should indicate that the cart is empty. • **Completing the Checkout Process:** Once a customer completes their shopping and proceeds to checkout, the system should process the items in the cart.
13	An online bookstore is experiencing a surge in customer orders due to a special promotion. To efficiently handle the incoming orders and ensure smooth order processing, they have decided to implement a queue-based system. The system needs to handle the following scenarios: • **Order Queuing:** When a customer places an order, the order details (such as order ID, customer information, and ordered items) should be added to the order queue. • **Order Completion:** Once an order has been successfully processed and shipped, it should be removed from the queue. • **Order Status and Updates:** Customers should be able to check the status of their orders. Implement a queue-based order processing system that efficiently handles the above scenarios to ensure timely and accurate order fulfillment for the online bookstore.

Text Books:

1. E. Balagurusamy, “Programming in ANSI C”, 8 th Edition, McGraw Hill,2019.
2. Brian W Kernighan, Dennis M Ritchie, “C Programming Language”, 2 nd Edition, Pearson, 1988.
3. Y. Langsam, M. Augenstin and A. Tannenbaum, “Data Structures using C”, Pearson Education Asia, First Edition,2002, ISBN 978-81-317-0229-1.
   R.G.Dromey, “How to Solve it by Computer”,1st Edition,Prentice-HallInternational,1982.

Reference Books:

1. Maureen Sprankle, “Problem Solving and Programming Concepts” ,7th Edition, Prentice Hall, 1989.
2. Yashavant Kanetkar, “Let Us C”, 16th edition, BPB publications,2018
3. G.A.V. PAI, “Data Structures and Algorithms, Concepts, Techniques and Applications”,Volume 11st Edition, 2017, Tata McGraw-Hill, ISBN-10: 0070667268/ ISBN-13: 978-0070667266.

Program:	B. Tech. Computer Engineering (Regional)						Semester: I	
Course:	English						Code:	BSH21AE01
Credits	Teaching Scheme (Hrs./Week)				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Other	FA		SA	Total
					FA1	FA2		
2	1	2	-	-	10	10	30	50

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

Course Objectives: This course aims at enabling students:

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

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

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

Detailed Syllabus

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

Lab Session	Activities	Duration
1	Listening 1: Listen to the audio and answer the questions (IELTS) Cambridge Assessment - Free Tool	2
2	Listening 2: Listen to the audio and Summarize (Ted Talks)	2
3	Grammar: Correct the sentences and understand the business usages.	2

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

Text Books:

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

Reference Books:

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. Computer Engineering (Regional)						Semester: I	
Course:	German						Code:	BSH21AE02
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 appropriate manner • Carry out short easy German dialogues with expressions	3
IV	**Writing Skills** • Writing short easy sentences in German • Using German punctuation and orthographic rules correctly in given texts • Taking dictation for words and simple sentences • Correcting errors in given texts • Writing simple texts, short messages, letters emails on given topics	4
	Total	**15**

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

Text Books:

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

Reference Books:

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

e-sources:

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

Program:	B. Tech. Computer Engineering (Regional)						Semester: I	
Course:	Japanese						Code:	BSH21AE03
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. Computer Engineering (Regional)						Semester: I	
Course:	Business Storytelling						Code:	BSH21AE04
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:

1. 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. Computer Engineering (Regional)				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 promote personal growth, resilience, and success in their academic journey and beyond.

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

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

Detailed Syllabus

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

	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. Computer Engineering (Regional)						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, 34e, Tata McGraw-Hill.
2. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.

Reference Books:

1. Higher Engineering Mathematics, 22e, by H. K. Das (S. Chand Publication, Delhi).
2. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd.
3. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha SFAnce International, Ltd.
4. Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.
5. Higher Engineering Mathematics by B. S. Grewal, 43e, 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. Computer Engineering (Regional)					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. Computer Engineering (Regional)						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 Dirac notation ($\|0\rangle$, $\|1\rangle$), quantum gates (Pauli-X, Hadamard, CNOT), 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.	8

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. Computer Engineering (Regional)					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. Computer Engineering (Regional)						Semester: II	
Course:	Object Oriented Programming						Code :	BCER22ES01
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
Fundamental of programming language
is essential.

Course Objectives: This course aims at enabling students,

1. To acquire the fundamental principles, concepts and constructs of Object-Oriented Programming
2. To use the object-oriented paradigm in program design.
3. To build the programming skills using C++
4. To understand about constructors which are special type of functions
5. To process data in files using file I/O functions.

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

1. Explore the strengths of object-oriented programming.
2. Apply the concept of Inheritance in C++
3. Apply the concept of polymorphism in C++
4. Use of exception handling in C++
5. Explore the concept of file handling.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Introduction** Introduction, Role of programming languages, need to study programming languages, Characteristics of good programming languages. Introduction to various programming paradigms: Procedural, object-oriented, logical and functional, Features of OOP, Comparison of Procedural and OOP User defined types, structures, unions, polymorphism, encapsulation. C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members,references, Tokens, Expressions and Control Structures.	9
II	**Inheritance** Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.	9
III	**Polymorphism** Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Operator Overloading - Overloading unary and binary operators – Overloading Using Friend functions, manipulation of Strings using Operators. Dynamic polymorphism: Base class pointer, object slicing, method overriding with virtual functions, pure virtual functions, abstract classes.	9
IV	**Generic Programming & Exception Handling** Introduction to generic programming, Function Template, Class Templates, Template with multiple parameters. **Exception Handling** - Fundamentals multiple catching nested try statements uncaught exceptions throw and rethrow Stack unwinding.	9

V	**File handling** Introduction, Classes for File Stream operations, opening and closing files, detecting end of file, Open (): file modes, File pointer and their manipulations, Sequential Input and output file operations, Updating the file: Random access, Error handling during file operations.	9
	Total	**45**

Self Learning

Containership in C++, C++ STL: Vector, List, Stack, Queue, Dque, Sets, Maps, Iterators, Difference between Interface and Abstract Class, Collections, Threading.

Text Books:

1. Balagurusamy, E. "Object oriented programming with C++." (2021),McGraw Hill,Edition 8th, ISBN-13 978-9389949186
2. Lafore, Robert. Object-oriented programming in C++. Pearson Education, 1997.
3. Stroustrup, Bjarne. "What is object-oriented programming?" IEEE software 5, no. 3 (1988): 10-20.

Reference Books:

1. Wiener, Richard S., and Lewis J. Pinson. An introduction to object-oriented programming and C++. Addison-Wesley Longman Publishing Co., Inc., 1988.
2. Rai, Laxmisha, ed. Programming in C++: Object Oriented Features. Vol. 5. Walter de Gruyter GmbH & Co KG, 2019.
3. Bjarne Stroustrup, The C++ Programming language, Third edition, 2008, Pearson Education. ISBN 9780201889543.
4. Deitel, C++ How to Program, 4 th Edition, Pearson Education,2002, ISBN:81-297-0276-2.
5. Herbert Schildt, C++ The complete reference, Eighth Edition, McGraw Hill Professional, 2011, ISBN:978-00-72226805.

Online Sources:

1. http://www.cplusplus.com (C++ documents, tutorials, and references).
2. GNU GCC (GNU Compiler Collection) @ http://gcc.gnu.org, with source codes.
3. Bjarne Stroustrup's C++11 FAQ @ http://www.stroustrup.com/C++11FAQ.html.
4. https://www.javatpoint.com/cpp-oops-concepts

NPTEL Course

1. https://onlinecourses.nptel.ac.in/noc21_cs02/preview

Program:	B. Tech. Computer Engineering (Regional)					Semester: II	
Course:	Object Oriented Programming Laboratory					Code:	BCER22ES02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	50		100

Prior knowledge of: Fundamental of programming language **is essential.**

Course Objectives: This course aims at enabling students,

1. Develop critical thinking and problem-solving ability by using the characteristics of an object-oriented approach.
2. Build the programming skills using C++
3. Apply the appropriate Object-Oriented features for various applications.
4. Handle Exceptions to control errors.
5. Managed the files and templates in C++
6. Teach the student to implement an object oriented paradigm.

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

1. Identify the technical aspects of the problem statement with a comprehensive and systematic approach.
2. Apply various object-oriented features for problem solving.
3. Apply the concept of Inheritance
4. Implement the concept of polymorphism for problem solving
5. Demonstrate the use of exception handling in C++
6. Implement the various operations in file handling.

Guidelines for Students:

1. Students are expected to work on Assignments/Experiments throughout the semester.
2. Throughout the laboratory process, students must define and analyze the problem, generate learning issues and apply what they have learned to solve the problem.
3. Each student recommended to perform all assignments
4. At the end of each assignment content of OOP is to be applied in the Assignment/ Experiments.
5. Assignments should be implemented in C++ language.
6. Operating System recommended: - 64-bit Open source Linux or its derivative.
7. Programming tools recommended: - G++/GCC, Eclipse.

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students.
2. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include timely completion, performance, innovation, efficiency, punctuality and neatness.

Guidelines for Laboratory Conduction

1. Instructors must regularly monitor and mentor students for successful completion of the Assignments/Experiments throughout the semester as per instructions given in list of assignments.
2. Instructor is expected to form assignments from the set of suggested assignments.
3. Instructor is expected to complete all assignments
4. Instructor is expected to encourage students for appropriate use of Hungarian notation, proper indentation and comments.
5. Instructors are expected to encourage use of open-source software.

Expt. No.	Title of Experiments
1	**Basic C++ programs** – Input/Output, class, object, control Statement, looping, array, strings.
2	a. Write a C++ program to find the sum of individual digits of a positive integer. b. Write a C++ program to generate the first n terms of the sequence

3	a. Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user. b. Write a C++ program to find both the largest and smallest number in a list of integers.
4	a. Write a C++ program to sort a list of numbers in ascending order. b. Write a C++ Program to illustrate New and Delete Keywords for dynamic memory allocation
5	a. Write a C++ program Illustrating Class Declarations, Definition, and Accessing Class Members. b. Write a C++ Program to illustrate default constructor, parameterized constructor and copy constructors
6	Write a C++ Program to Implement a Class STUDENT having Following Members: Data members Sname - Name of the student Marks- array Marks of the student Total -Total marks obtained Tmax- Total maximum marks Member functions assign()- Assign Initial Values compute() -to Compute Total, Average display()- to Display the Data.
7	a. Write a C++ Program to Demonstrate the i) Operator Overloading. ii) Function Overloading. b. Write a C++ Program to Demonstrate Friend Function and Friend Class
8	a. Write a C++ Program to Access Members of a STUDENT Class Using Pointer to Object Members. b. Write a C++ Program to Generate Fibonacci Series use Constructor to Initialize the Data Members
9	Write a C++ program to implement the matrix ADT using a class. The operations supported by this ADT are: a) Reading a matrix. b) Addition of matrices. c) Printing a matrix. d) Subtraction of matrices. e) Multiplication of matrices
10	Write C++ programs that illustrate how the following forms of inheritance are supported: a) Single inheritance b) Multiple inheritance c) Multi level inheritance d) Hierarchical inheritance
11	a. Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class. b. Write a C++ Program to Invoking Derived Class Member Through Base Class Pointer
12	a. Write a C++ Program Containing a Possible Exception. Use a Try Block to Throw it and a Catch Block to Handle it Properly. b. Write a C++ Program to Demonstrate the Catching of All Exceptions.

Reference Books:

1. Balagurusamy, E. "Object oriented programming with C++." (2021),McGraw Hill,Edition 8th, ISBN-13 978-9389949186
2. Lafore, Robert. Object-oriented programming in C++. Pearson Education, 1997.
3. Richard F. Gilberg& Behrouz A. Forouzan, "Data Structures, Pseudo code Approach with C", Cengage Learning India Edition, 2nd Edition, 2007, ISBN 10: 8131503143 / ISBN 13: 9788131503140.
4. Herbert Schildt, "C++: The Complete Reference", McGraw Hill Education, 4th Edition, July 2017, ISBN-10: 007053246X (ISBN-13 : 978-0070532465).
5. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C", Pearson Education Asia, First Edition, 2002, ISBN 978-81-317-0229-1.
6. Bjarne Stroustrup, "The C++ Programming language", Pearson Education, 3rd edition, 2008, ISBN 9780201889543.

Program:	B. Tech. Computer Engineering (Regional)						Semester: II	
Course:	Discrete Mathematics						Code:	BCER22PC01
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 Linear Algebra and Univariate Calculus **is essential.**

Course Objectives: This course aims at enabling students,

1. To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context.
2. Learn logic and proof techniques to expand mathematical maturity.
3. Interpret set theory, graph theory and algebraic structure.
4. Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.

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

1. Solve real world problems logically using appropriate set and logic.
2. Identify various types of relations, functions and their properties.
3. Use the concept of graphs, trees and related discrete mathematics for problem solving.
4. Comprehend the basic results of group and ring theory.

Detailed Syllabus

Unit	Description	Duration [Hrs]
I	**Set Theory and Logic** Significance of Discrete Mathematics in Computer Engineering, Application areas in Computer Engineering. **Set Theory:** Principle of Inclusion and Exclusion. **Logics and Proofs:** Propositions, Conditional Propositions, Truth Tables, Logical Connectivity, Rules of Inferences, Predicates and Quantifiers, Proposition calculus, Translating English Statements into Propositions. Mathematical Induction	**7**
II	**Relation and Function** **Relation:** Relation Definition, Properties of Binary Relations, Closure of Relations, Warshall's Algorithm, Equivalence Relations and Equivalence Classes, Partitions, Partial Ordering Relations, Hasse Diagrams and Lattices, Chains and Anti-chains. **Function:** Function Definition, Composition of Functions, Injective, Surjective and Bijective Function, Inverse of a Function.	**7**
III	**Graph and Trees** **Graph:** Basic Terminology and Special Types of Graphs, Paths and Circuits, Hamiltonian and Euler Paths and Circuits, Isomorphic Graphs, Planer Graph, Dijkstra's Shortest Path Algorithm. **Trees**: Trees, Rooted Trees, Prefix Codes, Spanning Trees, Minimum Spanning Trees, Kruskal's and Prim's Algorithm for Minimum Spanning Tree.	**9**
IV	**Group Theory** Basic Properties of Group, Semigroup & Monoid, Abelian group, Subgroup, Normal subgroup**,** Groups and Coding. Rings, Integral Domain and Field.	**7**
	Total	**30**

Self Study

Introduction to Set, Set Representation, Set Builder form, roster form, Types of Sets, Set Operations, Multisets, Linear recurrence relation with constant coefficients, Traveling Salesperson Problem, Graph Coloring, Congruence and Modulo Relation.

Text Books:

1. C. L. Liu, ―Elements of Discrete Mathematics, TMH, 4th Edition, 2017, ISBN 978-1259006395.
2. Kenneth H. Rosen, ―Discrete Mathematics and its Applications, Tata McGraw-Hill, 8th Edition, 2018, ISBN 978-1259676512.

Reference Books:

1. Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, "Discrete Mathematical Structures," 6th edition, Prentice Hall of India.
2. Dr. K. D. Joshi, ―Foundations of Discrete Mathematics‖, New Age International Limited, Publishers, 2nd Edition, January 2014, ISBN-13:978-8122435986.

Program:	B. Tech. Computer Engineering (Regional)					Semester: II	
Course:	Computer Programming & Problem-Solving Laboratory II					Code:	BCER22VS02
Credits	Teaching Scheme (Hrs. /Week)			Evaluation Scheme and Marks			
	Theory	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100

Prior knowledge of: Basic of programming **is essential.**

Course Objectives: This course aims at enabling students,

1. Provide basic Program structure, variables, operators, and Expressions in Python language.
2. To make students familiar with the use of control flow tools in Python
3. To Provide knowledge about different data structures in Python
4. To explore the use of modules/functions in Python
5. To explore classes and Object-oriented concepts in Python programming.
6. To get acquainted with the use of I/O, error, and exception handling in Python programming.

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

1. Illustrate the use of variables, operators, and expressions in a Python program.
2. Use control flow statements to implement logic in programs.
3. Apply different data structures from the Python language to solve problems.
4. Implement modules in the program to simplify problem solutions.
5. Apply object-oriented concepts to solve real-world problems.
6. Elaborate the error and exception handling in programs.

Guidelines for Students:

1. The laboratory assignments are to be submitted by students in the form of a journal.
2. Journal consists of a prologue, certificate, table of contents, and write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, Date of Completion, Assessment grade/marks and assessor's sign, Theory Concept, algorithm, time complexity, sample input and expected output, conclusion).
3. Program codes with sample output of all performed assignments are to be submitted as a softcopy.

Guidelines for Laboratory/Term Work Assessment:

1. Continuous assessment of laboratory work is done based on overall performance and Laboratory performance of students.
2. Each Laboratory assignment assessment should assign grade/marks based on parameters with appropriate weightage.
3. Suggested parameters for overall assessment as well as each Laboratory assignment assessment include timely completion, performance, innovation, efficiency, punctuality and neatness.

Guidelines for Laboratory Conduction

1. Set of suggested assignment lists is provided.
2. All assignments from group A are compulsory
3. Solve any five assignments from Group B.
4. Solve any three assignments from Group C.
5. Theory and concept need to be covered before conducting an assignment.
6. Operating System recommended: - 64-bit Open-source Linux or its derivative
7. Programming tools recommended: - PYTHON 3

Expt. No.	Suggested List of Experiments
	Group A
1	Write a Python program to convert Celsius temperature to its equivalent temperature in Fahrenheit. Accept Celsius temperature from the user and display Fahrenheit temperature.
2	Implement a Python program to generate the first ten numbers in the Fibonacci series then find the average of those ten numbers.
3	Write a Python program to accept a string from the user. Generate a new string from the accepted string by shifting two characters to the right. Display the generated string. (e.g. if the input is ‘college 2022’ then the generated new string will be ‘22college 20’).
4	Write a program to accept n numbers from the user and store them in the list. Then create a dictionary consisting of Key: ‘EVEN’ and ‘ODD’ and values are corresponding even and odd

	number lists from accepted numbers.
Group B	
5	Write a Python program to accept n numbers from the user. Then find the minimum, maximum, and mean values. Write different functions for calculating minimum, maximum, and mean values.
6	Write a Python program to find the gcd of given two numbers using recursive functions.
7	Write a Python program to calculate the area of the shapes (Circle and rectangle) using class and inheritance concepts.
8	Write a Python program to count the total characters, total words, total lines, and frequency of given words in the file.
9	Write a Python program to create a phone directory which consists of detail {Name, phone number, place}. The phone number in the directory should be 10 digits long. Do error and exception handling in the program.
10	Consider the list of stop words as {'i', 'me', 'my', 'myself', 'we', 'our', 'ours', 'ourselves', 'you', , 'your', 'yours', 'yourself', 'yourselves', 'he', 'him', 'his', 'himself', 'she', 'her', 'herself', 'it', 'itself', 'they', 'them', 'their', 'theirs', 'themselves', 'what', 'which', 'who', 'whom', 'this', 'that'}. Write a python program to remove stopwords from the text file.
Group C	
11	Write a calculator for complex numbers.
12	Write a Python program for a timer application, where a time constraint is entered into the timer in terms of minutes and seconds, and once the timer starts countdown gets started in reverse order of time (in minutes and seconds). Once the timer reaches zero, it gives the message that timed up. The timer can be reset at any time.
13	Write a Python program for the EMI calculator. In this application, the user enters the principal amount and tenure of a loan. There is a variable rate of interest on the basis of the CIBIL score. If the CiBIL score is greater than 800 then the rate of interest per annum will be 7.5% and if the score is less than 800 then it would be 8.3%. Find the emi amount for the loan amount. Also, display the table which shows the bifurcation of the emi amount to Principal and interest for each month.
14	Write a program to make bar charts in Python. User prompt to enter x values and y values. Based on the values a bart chart is drawn and displayed. Save the bar chart in an image file on the disk. (Use "Matplotlib" library to plot graphs)
15	Write a small banking application. Where the following operations can be performed. 1. Create an account, 2. Update account, 3. Withdraw amount 4. Deposit Amount 5. Display Balance 6. Display statement. Account information consists of {account holder name, balance, address, age}. Create additional fields wherever required. Create appropriate classes and handle errors and exceptions in the program.

Text Books:

1. Guido van Rossum, and the Python development team, Python Tutorial, Python software foundation, Release 3.11.4, 2023
2. Fabrizio Romano, Heinrich Kruger, Learn Python Programming, Third Edition, Packt Publication, 2021.

Reference Books:

1. Dr. Charles R. Severance, Python for Everybody, Open Book, licensed under a Creative Commons Attribution, 2023.
2. Martin C. Brown, Python: The Complete Reference, McGraw Hill Education, 1st Edition, 2018 n-Non-Commercial Share Alike 3.0, Jun 2023.
3. Jeeva Jose, P. Sojan Lal, Introduction to Computing & Problem Solving with Python, Khanna Computer Book Store; First edition, 2016
4. R. Nageswara Rao, Core Python Programming, Dreamtech Press; Second edition, 2017.

e-sources:

1. https://courses.analyticsvidhya.com/courses/introduction-to-data-science
2. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
3. https://nptel.ac.in/courses/106106182
4. https://pythondsa.com/.

Program:	B. Tech. Computer Engineering (Regional)						Semester: II	
Course:	Indian Knowledge System (IKS)						Code:	BSH22IK01
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** • Environmental Ethics and Sustainability Practices in Ancient India • Techniques for Conserving Water (Stepwells, Temple Tanks, and Dams) • Agricultural Knowledge Systems (Crop Rotation, Indigenous Seeds, Zero Budget Natural Farming) • Indigenous Knowledge in Disaster Management and Climate Adaptation • Insights from IKS for Contemporary Sustainable Development	8
	Total	**30**

Textbooks:

1. Mahadevan, B., Bhat, Vinayak Rajat, Nagendra Pavanan R.N. (2022), "Introduction to Indian Knowledge System: Concepts and Applications",PHI Learning Private Ltd., Delhi.
2. Dharampal (2021), "Indian Science and Technology in the Eighteenth Century",ISBN10:8175310936.

Reference Books:

1. Kapil Kapoor, Avadhesh Kumar Singh.(2005), "Indian Knowledge Systems" (Vol. 1 and Vol.2), ISBN-10:9788124603369.

E-sources:

1. https://onlinecourses.swayam2.ac.in/ntr24_ed78/preview
2. https://onlinecourses.swayam2.ac.in/imb24_mg20/preview
3. https://iksindia.org/

Program:	B. Tech. Computer Engineering (Regional)				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	-	04	-	-	100	-	100

Prior knowledge: Nil

Course Objectives:

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

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

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

Detailed Syllabus

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

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

References Books:

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

E Sources:

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

Vision and Mission of Applied Sciences & 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 endeavor innovation, creativity.

Vision and Mission of Computer Engineering – (Regional) Department

Vision

To be a premier Computer Engineering program by achieving excellence in Academics and Research for creating globally competent and ethical professionals.

Mission

M1: To develop technologically competent and self-sustained professionals through contemporary curriculum.

M2: To nurture innovative thinking and collaborative research, making a positive impact on society.

M3: To provide a state-of-the art computing environment and learning opportunities through the Center of Excellence.

M4: To foster leadership skills and ethics with holistic development.