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

DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES
Department of Electronics & Telecommunication Engineering

Curriculum Structure and Syllabus
of
FY B Tech Electronics & Telecommunication Engineering
(Course 2023)

Effective from Academic Year 2023-24

Institute Vision

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

Institute Mission

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

Quality Policy

We at PCCOE are committed to impart Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders. We shall strive for academic excellence, professional competence and social commitment in fine blend with innovation and research. We shall achieve this by establishing and strengthening state-of- the-art Engineering and Management Institute through continual improvement in effective implementation of Quality ManagementSystem.   .
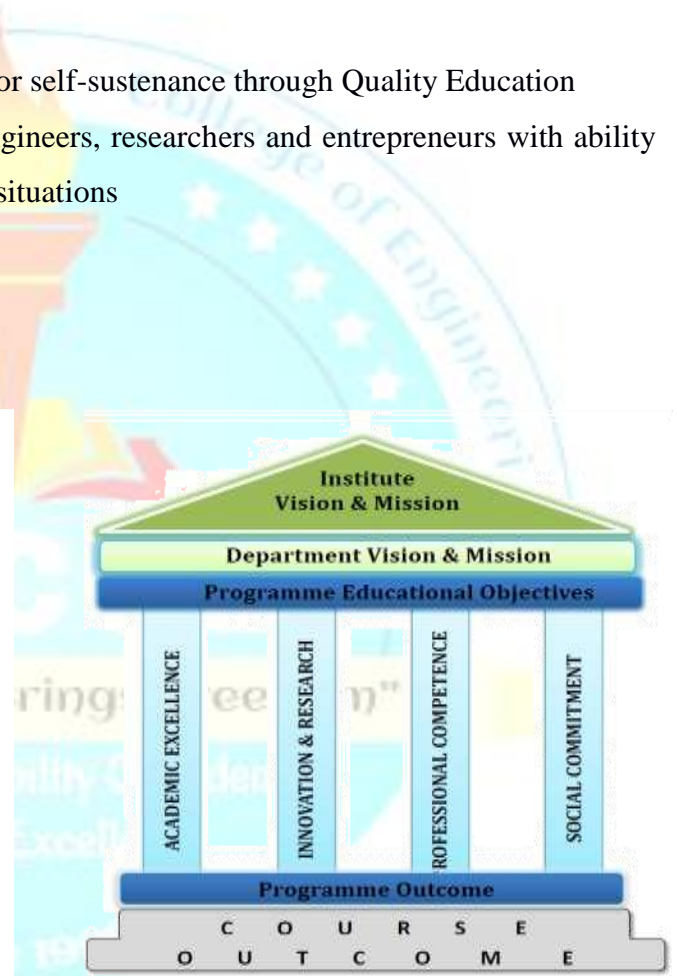
LIST OF ABBREVIATIONS IN CURRICULUM STRUCTURE

Sr. No.	ABBREVIATION	TYPE OF COURSES
1	BSC	Basic Science Course
2	ESC	Engineering Science Course
3	VSEC	Vocational and Skill Enhancement Course
4	AEC	Ability Enhancement Course
5	PCC	Programme Core Course
6	CC	Co-curricular Courses
7	HSMC	Humanities/ Social Sciences/Management Courses
8	B.Tech	Bachelor of Technology
9	L	Lecture
10	P	Practical
11	T	Tutorial
12	H	Hours
13	CR	Credits
14	CIE	Continuous Internal Evaluation /Examination
15	IE	Internal Evaluation
16	MTE	Mid Term Evaluation
17	ETE	End Term Evaluation
18	TW	Term work
19	OR	Oral
20	PR	Practical
21	LS	Life Skills
22	UHV	Universal Human Values
23	Eng.	English
24	Jap.	Japanese
25	Ger.	German
26	IKS	Indian Knowledge system

First Year B.Tech Electronics and Telecomunication Engineering:

Course Code	Course Type	Course Name	Teaching Scheme							Evaluation Scheme						
			L	P	T	H	TH	CR PR/Tu	Total	IE	MTE	ETE	TW	PR	OR	Total
BSH21A01	BSC	Linear Algebra & Univariate Calculus	2	-	1	3	2	1	3	20	30	50	-	-	-	100
BSH21A02	BSC	Engineering Physics	3			3	3		3	20	30	50	-	-	-	100
BSH21A03	BSC	Engineering Physics Laboratory		2		2		1	1				50	-		50
BET21B01	ESC	Basic Electrical and Electronics Engineering	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BET21B02	ESC	Basic Electrical and Electronics Engineering Lab.	-	2	-	2	-	1	1	-	-	-	50	-	-	50
BET21B03	ESC	Programming for Problem Solving	2		-	2	2	-	2	10	15	25	-	-	-	50
BET21B04	ESC	Programming for Problem Solving Laboratory	-	2	-	2	-	1	1	-	-	-	50	-	-	50
BET21G01	VSEC	Electrical and Electronics Maintenance	-	4	-	4	-	2	2	-	-	-	100	-	-	100
BSH21H01 /02/03/04	AEC	AEC (Eng/Ger/Jap/Business story telling)	1	2	-	2	1	1	2	30	-	20	-	-	-	50
BSH21K01	CC	Life Skill 1	-	4	-	4	-	2	2	-	-	-	100	-	-	100
		Total	**11**	**16**	**1**	**27**	**11**	**9**	**20**							**750**

First Year B.Tech Electronics and Telecomunication Engineering:

Course Code	Course Type	Course Name	Teaching Scheme							Evaluation Scheme						
			L	P	T	H	TH	CR PR/Tut	Total	IE	MTE	ETE	TW	PR	OR	Total
BSH22A06	BSC	Multivariate Calculus	2		1	3	2	1	3	20	30	50	-	-	-	100
BSH22A04	BSC	Engineering Chemistry	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BSH22A05	BSC	Engineering Chemistry Laboratory	-	2	-	2	-	1	1	-	-	-	50			50
BET22B01	ESC	Digital Systems	3	-	-	3	3	-	3	20	30	50	-	-	-	100
BET22B02	ESC	Digital Systems Lab.	-	4	-	4	-	2	2	-	-	-	50	-	50	100
BET22C01	PCC	Network Theory	2	-	-	2	2	-	2	20		30				50
BET22G01	VSEC	Problem Solving with Python Programming	-	4	-	4	-	2	2	-	-	-	100	-	-	100
BSH22H05	IKS	Indian Knowledge system	2	-	-	2	2	-	2	30	-	20	-	-	-	50
BSH22K01	CC	Life skill 2	-	4	-	4	-	2	2	-	-	-	100	-	-	100
		Total	**12**	**14**	**1**	**27**	**12**	**8**	**20**							**750**

Curriculum Structure

First Year B.Tech

E & Tc Engineering

Semester I

Program: B. Tech. (E & Tc Engineering)					Semester: I		
Course: Linear Algebra & Univariate Calculus					Code: BSH21A01		
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
2	-	1	3	20	30	50	100

Prior Knowledge: 1) Elementary Mathematics 2) Elementary Calculus is essential

Course Objectives: This course aims at enabling students,
1) To familiarize with concepts and techniques in Calculus and Matrices.
2) To get acquainted with Mathematical Modeling of physical systems using differential equations.
3) To acquire techniques of advanced level mathematics and its applications that would enhance analytical thinking power.

Course Outcomes: After learning the course, the students will be able to:
1) Apply the concept of rank to solve Electrical Circuits problems and Find Eigenvalues and Eigenvectors.
2) Represent Fourier series for the periodic time domain continuous and discrete function into signal form.
3) Use Successive differentiation & Taylor's and Maclaurin's theorems for expansion of a function in infinite series and evaluate the limits of indeterminate forms with L'Hospital rule.
4) Develop and solve models related to Orthogonal Trajectories, Electrical Circuits and One dimensional heat flow using differential equations.

Unit	Description	Duration (Hrs.)
1	**Matrices**: Rank, System of linear equations with applications in Electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.	8
2	**Fourier Series:** Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and application to engineering.	7
3	**Differential Calculus:** L' Hospital rule, Taylor's series, Maclaurin's series, Successive differentiation and Leibnitz theorem.	7
4	**Differential Equations:** Exact differential equations, differential equations reducible to Exact form, Applications of Differential Equations: Orthogonal trajectories, Kirchoff's law of Electrical circuits (L-R and R-C circuits) , One-dimensional conduction of heat (steady state).	8
	Total	30

* Tutorial will be conducted in batches as 1Hr/week/batch

Sr. No.	List of Tutorials
1	Rank, System of linear equations,
2	Applications in Electrical circuits
3	Linear dependence and independence, Linear transformations
4	Eigenvalues, Eigen vectors
5	Full range Fourier series
6	Full range Fourier series
7	Harmonic analysis
8	Application to engineering
9	L' Hospital rule, Taylor's series

10	Maclaurin's series, Successive differentiation
11	Successive differentiation, Leibnitz theorem
12	Exact differential equations,
13	Differential equations reducible to Exact
14	Orthogonal trajectories, Kirchoff's law of Electrical circuits
15	One-dimensional conduction of heat

Text Books:
1) Higher Engineering Mathematics by B.V. Ramana , 34e, Tata McGraw-Hill.
2) Linear Algebra & Univariate Calculus by Team Mathematics, PCCoE, Pune, 1e, Techknowledge Publication.

Reference Books:
1) Advanced Engineering Mathematics by ErwinKreyszig, 9e, Wiley Eastern Ltd.
2) Higher Engineering Mathematics by H. K. Dass , 22e, S. Chand Publication, Delhi.
3) Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.
4) Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.
5) Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.
6) Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi.

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

Program: B. Tech. (E & Tc Engineering)						Semester: I	
Course: Engineering Physics						Code: BSH21A02	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
3	-	-	3	20	30	50	100

Prior Knowledge:
1) Wave theory of light
2) Elasticity
3) Atom, molecule & nuclei
4) Current, electricity & magnetism
5) Electromagnetic Induction

Course Objectives: This course aims at enabling students,
1) To build strong conceptual understanding of Optics, Semiconductor Physics & Quantum Physics
2) To explore advances in Physics with introduction of Lasers, Nanotechnology & Superconductivity
3) To provide consciousness about the importance of Physics principles in various engineering applications

Course Outcomes: After learning the course, the students will be able to:
1) Interpret intensity variation due to optical phenomena like interference and relate these concepts to various engineering applications
2) Apply basics of semiconductor physics to explain the behavior of charge carriers inside a semiconductor
3) Illustrate the working principle of laser and their prominent applications
4) To distinguish wave behavior of a matter particle for the manipulation of the processes at quantum scale.
5) Interpret properties of superconductors & their applications in advanced technologies
6) Summarize properties, preparation methods of nanomaterials & explore their applications in various engineering fields

Unit	Description	Duration (Hrs.)
1	**Wave Optics** Interference: Interference, phase difference & path difference between waves, constructive & destructive interference, phase difference due to reflection at boundaries of optical interfaces, thin film, interference due to thin film of uniform thickness, conditions of maxima and minima, anti-reflection coating as an application of interference **Diffraction:** Diffraction, Fraunhofer diffraction at a single slit (Qualitative)-condition of maxima and minima, resultant intensity distribution pattern, diffraction grating (Qualitative), introduction to X-Ray diffraction	7
2	**Semiconductor Physics** Band Theory of solids, Electrical conductivity of conductors & semiconductors, Hall effect (with derivation), Fermi Dirac probability distribution function, Fermi energy, position of Fermi level in intrinsic semiconductors (Qualitative) & in extrinsic semiconductors, dependence of Fermi level on temperature & doping concentration, energy band diagram of P-N Junction diode, solar cell I-V characteristics.	6

3	**Laser & Fiber Optics** Laser: Introduction, interaction of light with matter- absorption, spontaneous emission, stimulated emission, population inversion, metastable state, active system, resonant cavity, characteristics of laser, semiconductor hetero-junction laser, carbon dioxide laser, applications of laser-industrial, defense & medical; introduction to holography **Fiber Optics:** Propagation of light in optical fibers, acceptance angle, numerical aperture, modes of propagation, types of fibers- step index, graded index, single mode & multi-mode; Losses -attenuation, dispersion	8
4	**Quantum Mechanics** Limitations of classical physics, need of quantum mechanics, wave particle duality of radiation & matter, De Broglie hypothesis, De Broglie wavelength in terms of kinetic & potential energy, concept of wave packet, phase and group velocity, properties of matter waves, Heisenberg's uncertainty principle, wave function & probability interpretation, well behaved wave function, Schrodinger's time independent wave equation, applications of independent wave equation to the problem of (i) particle in rigid box, (ii) particle in a non-rigid box(qualitative),Tunneling effect, examples of tunneling effect, tunnel diode & scanning tunneling microscope (STM)	8
5	**Magnetism and Superconductivity** Magnetism: Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop, magneto-resistance, giant magneto-resistance (GMR), application of magnetic materials in magneto caloric effect, adiabatic demagnetization. Superconductivity: Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, BCS theory, type I and II superconductors, low Tc and high Tc superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains	8
6	**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 , aerogels- properties and applications, applications of nanomaterials in medical, energy, automobile, space, defense; introduction to quantum computing.	8
	Total	**45**

Text Books:
1) A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, 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.

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 (India) Pvt. Ltd.
3) Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
4) An introduction to Laser's theory and applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
5) Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press.
6) Introduction to solid states Physics - Charles   Kittel, Eighth Edition, Wiley India Pvt Ltd.
7) Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Engineering Physics Laboratory				Code: BSH21A03			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Oral	Practical	Total
-	2	-	1	50	-	-	50

Prior Knowledge:
1) Wave theory of light
2) Elasticity
3) Atom, molecule & nuclei
4) Current, electricity & magnetism
5) Electromagnetic Induction

Course Objectives: This course aims at enabling students,
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: After learning the course, the students will be able to:
1) Develop an ability to handle measuring instruments and understand uncertainty and errors involved in various measurements
2) Apply the knowledge of Physics to learn various experimental methodologies - by performing experiments related to optics, sound, semiconductors, magnetism & Laser

Unit	Description (Any 10 experiments from following list)
1	To determine the radius of curvature of Plano-convex lens using Newton's rings.
2	To determine unknown wavelength by using plane diffraction grating.
3	To verify Malus Law of polarization of light.
4	To determine refractive indices and identification of types of crystal using double refraction.
5	To determine the number of lines on grating surface using Laser.
6	To study IV characteristics of solar cell and determine fill factor.
7	To determine band gap of given semiconductor.
8	To determine Hall coefficient and charge carrier density.
9	To determine Magnetic susceptibility of given material by Quinke's Tube Experiment.
10	To determine compressibility of given liquid using Ultrasonic Interferometer.
11	To Determine specific rotation of a solution with Laurent's Half Shade Polari meter
12	To Determine electrical resistivity of given semiconductor using four probe method

Text Books:
1) A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand & Company Pvt. Ltd.
2) Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd.

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 (India) Pvt. Ltd.
3) Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
4) An introduction to Laser's theory and applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
5) Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.

Program: B. Tech. (E & Tc Engineering)						Semester: I	
Course: Basic Electrical and Electronics Engineering						Code: BET21B01	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
3	-	-	3	20	30	50	100

Prior Knowledge:

Basics of Physics & Mathematics is essential

Course Objectives: This course aims at enabling students,

1.To build a strong conceptual understanding of single phase and polyphase AC circuits with phasor diagram representation.

2.To impart basic knowledge for conceptual understanding of static and rotating AC machines.

3.To impart basic knowledge for conceptual understanding of DC machines.

4.To make students understand the basics of PN Junction diode, rectifiers and special types of diodes.

5.To introduce students to the basics of BJT, its applications, and biasing circuits.

6.To make students understand the working of JFET, its characteristics, configurations & applications.

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

1.Apply the knowledge of single phase and three phase circuits to determine unknown electrical quantities.

2.Explain the constructional features and operation of single phase transformer and single phase induction motors.

3.Describe the constructional features and working principles of DC Machines.

4.Describe the working and functionality of PN junction diodes, rectifiers & special purpose diodes.

5.Elaborate the working of the transistor and its biasing circuits.

6.Explain the working of JFET with applications.

Unit	Description	Duration (Hrs.)
1	**AC Circuits** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, and power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance, Concept of impedance & admittance, Three-phase balanced circuits, voltage and current relations in star and delta connections	7
2	**AC Machine** Transformer: Principle of operation and construction of single-phase transformers (core and shell types), ideal and practical transformer, EMF equation, losses, efficiency and voltage regulation, Auto-transformer and three-phase transformer connections. Single phase induction motors: Types, construction, working principle of split phase and shaded pole type induction motors, applications. Specifications of induction motors (KW rating, rated voltage, current rating, frequency, speed, class of insulation)	8
3	**DC Machines** Working principle of DC machine as a generator and a motor; Types and constructional features; EMF equation of generator, DC motor working principle; Back EMF and its significance, torque equation; Types of D.C. motors, characteristics, Necessity of a starter for DC motor, Speed control methods of DC shunt and DC series motor and industrial applications.	8
4	**Diode Circuits** PN junction Diode, working of PN junction diode, VI characteristics, diode current equation, types of Rectifiers, performance parameters of the bridge rectifier, comparison between rectifiers, capacitor filter, introduction to 3 pin voltage regulators. Introduction to DC power supply and different topologies. Zener diode, Zener voltage regulator, Light Emitting Diode, and Photodiode along with their V-I characteristics, Schottky diode, Varactor diode	8

5	**Transistor Circuits** Bipolar Junction Transistor: construction, types, operation, CB, CE, CC configurations, characteristics, region of operation, BJT as a switch and as a CE amplifier. Transistor bias circuits: The DC operating point, DC Load line, need of biasing, Biasing circuits, Analysis of voltage divider bias, Industrial applications	7
6	**Field effect transistor** Introduction to JFET, Types, Construction, Operation, Static Characteristics, JFET parameters, FET Configurations (CS), Common Source amplifier, and its frequency response, JFET as a switch, Industrial applications.	7
	Total	**45**

Text Books:

1.V. N. Mittal and Arvind Mittal,"Basic Electrical Engineering" , 2nd Edition. (McGraw-Hill),2010

2.D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010

3.Thomas L. Floyd, "Electronics Devices", Sixth edition, Pearson Education, 2022

4.Donald Neaman "Electronic Circuit Analysis and Design", Third Edition, Tata McGraw Hill, 2001

Reference Books:

1.D. C. Kulshreshtha, "Basic Electrical Engineering" , 1st Edition (Tata McGraw hill),2009

2. B. L. Theraja and A. K. Theraja S. Chand & Co. Pvt. Ltd. New Delhi, "A textbook of Electrical Technology Vol I" 2021

3.B. L. Theraja and A. K. Theraja S. Chand & Co. Pvt. Ltd. New Delhi, "A textbook of Electrical Technology Vol II",2020

4.Jacob Milman, Christos Halkias, Chetan Parikh "Millman's Integrated Electronics", Second edition, McGraw Hill,2017

5.R. L. Boylestad, L. Nashelsky, "Electronic Devices and Circuits Theory", 11th Edition, Prentice Hall of India, 2017

E sources:

1.Basic Electrical Technology: https://nptel.ac.in/courses/108108076

2.Introduction to Basic Electronics : https://nptel.ac.in/courses/122106025

3.Fundamentals of Electrical Engineering : https://onlinecourses.nptel.ac.in/noc22_ee113

4. Introduction-to-electricity-magnetism: https://www.coursera.org/specializations/introduction-to-electricity-magnetism

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Basic Electrical and Electronics Engg. Laboratory				Code: BET21B02			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
2	-	2	1	50	-	-	50

Prior Knowledge:
Basic Measuring instruments(Ammeter, Voltmeter, DMM) is essential

Course Objectives: This course aims at enabling students,
1.To impart Comprehensive understanding of the fundamentals of electrical circuits / machines.
2.To provide working knowledge for the analysis of basic AC circuits.
3.To provide hands on experience for conceptual understanding of DC machines, AC machines, measuring instruments.
4.To provide knowledge of various electronics components and equipment.
5.To provide the knowledge about working principle and characteristics of various analog circuits

Course Outcomes: After learning the course, the students will be able to:
1.Demonstrate AC circuits by performing different experiments.
2.Demonstrate AC & DC machines by performing different experiments.
3.Demonstrate the working of different electronic components.
4.Build and test various analog circuits

Sr. No.	List of Experiments
General Guidelines: Ten experiments are to be performed.	
Group A	
1	To study different parts of DC Machine.
2	To study various types of single-phase AC motors.
3	To determine the resonance frequency in a series RLC circuit.
4	To verify the relation between phase & line quantities in three phase balanced star & delta connected
5	To determine efficiency and regulation of single-phase transformers by direct loading test.
6	To determine the efficiency of a DC shunt motor by performing load test.
7	To plot characteristics of DC Shunt Motor by Performing different speed control methods.
8	To plot characteristics of DC Series Motor by performing different speed control methods.
Group B	
9	Testing of various Electronic Components and equipments.
10	Measurement of performance parameters of DC Regulated power supply.
11	Study VI characteristics of Zener diode and photodiode.
12	Build and test voltage divider biasing circuit for BJT
13	Build and test transistor as a switch and as an amplifier.
14	Build and test single stage CS amplifiers using JFET.
15	Plot drain & transfer characteristics of JFET

Reference Books:
1.R. L. Boylstad, L. Nashlesky, "Electronic Devices and Circuits Theory", 11th Edition, Prentice Hall of India, 2017
2.Thomas L. Floyd, "Electronics Devices", Sixth edition, Pearson Education, 2022

E sources:
NPTEL Course Link
  https://nptel.ac.in/courses/122106025 (Introduction to Basic Electronics)
Links to Virtual Lab
  https://ems-iitr.vlabs.ac.in/exp/dcshunt-motor-armature-control/theory.html
  http://vlabs.iitkgp.ernet.in/be/exp5/index.html
  http://vlabs.iitkgp.ac.in/psac/exp3/index.html
  http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAE/exp6/index.html

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Programming for Problem Solving				Code: BET21B03			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
2	-	2	2	10	15	25	50

Prior Knowledge: Fundamentals of computers is essential

Course Objectives: This course aims at enabling students,
1. To introduce the basics of the C Programming language.
2. To make students aware about the different sorting and searching algorithms and their analysis.
3. To demonstrate different types of functions.
4. To aware students about problems on structures and pointers.

Course Outcomes: After learning the course, the students will be able to:
1. Implement conditional branching and iteration.
2. Apply programming concepts to solve matrix operations, searching and sorting problems.
3. Develop a problem into functions and synthesize a complete program using divide and conquer approach.
4. Use pointers and structures to formulate algorithms and programs.

Unit	Description	Duration (Hrs.)
1	**INTRODUCTION TO PROGRAMMING** Algorithms: Steps to solve logical and numerical problems, Representation of Algorithm, Flowchart/Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching, Iteration and loops.	7
2	**ARRAYS, SEARCHING & SORTING ALGORITHMS** Arrays: Arrays (1-D, 2-D), Character arrays and Strings Searching Algorithms: Linear and Binary Search algorithms Sorting Algorithms: Bubble, Insertion and Selection. Notion of order of complexity through example programs (no formal definition required)	8
3	**FUNCTIONS** Functions including using built in libraries, Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference Recursion: Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort using functions.	8
4	**STRUCTURES & POINTERS** Structures: Defining structures and Array of Structures Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)	7
	Total	**30**

Text Books:

1. E Balgurusamy, "Programming in ANSI C", Tata McGraw-Hill, Eighth Edition,2019.

2. Yashavant Kanetkar, "Data Structures Through C: Learn the fundamentals of Data Structures through C", BPB Publication, Third Edition, 2019.

3. Herbert Schildt, "C: The Complete Reference", Tata McGraw-Hill, Fourth Edition, 2017.

4. R.S. Salaria, AICTE's Prescribed Textbook: "Programming for Problem Solving", Khanna Book Publishing Co.,2022
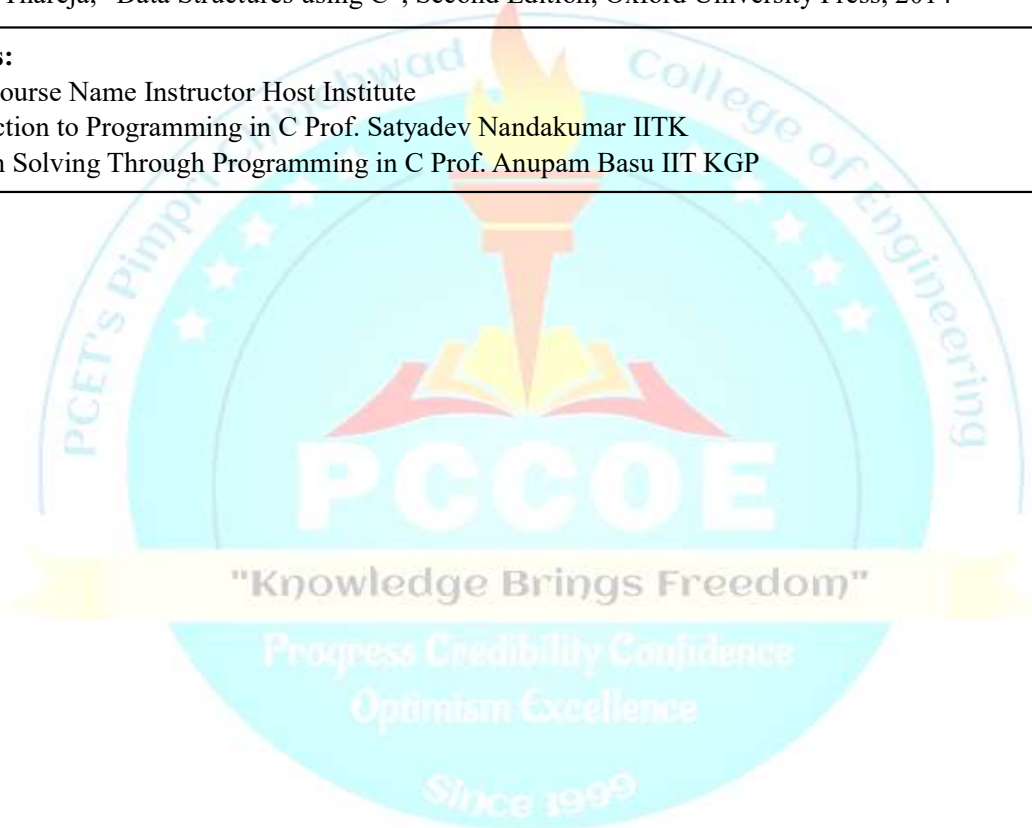
Reference Books:

1. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Galgotia Books Source, 2nd Edition, 2008.

2. Reema Thareja, "Data Structures using C", Second Edition, Oxford University Press, 2014

E sources:

NPTEL Course Name Instructor Host Institute

1 Introduction to Programming in C Prof. Satyadev Nandakumar IITK

2 Problem Solving Through Programming in C Prof. Anupam Basu IIT KGP

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Programming for Problem Solving Laboratory				Code: BET21B04			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
2		2	1	50		-	50

Prior Knowledge: Fundamentals of computers is essential

Course Objectives: This course aims at enabling students,
1. To introduce the basics of the C Programming language.
2. To make students aware about the different sorting and searching algorithms and their analysis.
3. To demonstrate different types of functions.
4. To aware students about problems on structures and pointers

Course Outcomes: After learning the course, the students will be able to:
1. Formulate simple problems into C language program, test and execute by correcting the errors
2. Apply the basic C Programming concepts using arrays and strings.
3. Write iterative as well as recursive functions.
4. Use the concepts of structures and pointers of different types of problems.

Sr. No.	List of Experiments
General Guidelines: All Experiments are to be performed.	
Detailed Syllabus: Experiments from the following list need to be completed using Code Blocks /Turbo C / Online GDB	
Write a C program for:	
1	Simple computational problems using arithmetic expressions
2	Problems involving conditional statements
3	Iterative problems: e.g., sum of series
4	1D Array manipulation: Matrix operations
5	String operations
6	Simple functions
7	Programming for solving Numerical methods problems
8	Recursive functions
9	Structures
10	Pointers
11	Call by value Program
12	Call by Reference
Implement a Mini Project to use all the concepts of course	

Reference Books:
1. E Balgurusamy, "Programming in ANSI C", Tata McGraw-Hill, Eighth Edition,2019.
2. Yashavant Kanetkar, "Data Structures Through C: Learn the fundamentals of Data Structures through C", BPB Publication, Third Edition, 2019.
3. Herbert Schildt, "C: The Complete Reference", Tata McGraw-Hill, Fourth Edition, 2017.
4. R.S. Salaria, AICTE's Prescribed Textbook: "Programming for Problem Solving", Khanna Book Publishing Co., 2022

E Sources:

1) Simple computational problems using arithmetic expressions:

http://ps- iiith.vlabs.ac.in/exp7/ Introduction.html?domain=Computer% 20Science&

lab=Problem%20Solving%20Lab

2) Iterative problems e.g., sum of series

http://ps-iiith.vlabs.ac.in/exp4/Introduction.html?do

main=Computer%20Science&lab=Problem%20Solving%20Lab

3) 1D Array manipulation

http://cse02-iiith.vlabs.ac.in/exp4/index.html

4) Matrix problems, String operations

http://ps-iiith.vlabs.ac.in/exp5/ Introduction.html?

domain=Computer%20Science&lab=Problem%20Solving%20Lab

5) Simple functions

http://cse02-iiith.vlabs.ac.in/exp2/index.html

6) Programming for solving Numerical methods problems

http://ps-iiith.vlabs.ac.in/exp1/Introduction.html?

domain=Computer%20Science&lab=Problem%20Solving%20Lab

7) Recursive functions

http://ps-iiith.vlabs.ac.in/exp6/Introduction.html?

domain=Computer%20Science&lab=Problem%20Solving%20Lab

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Electrical and Electronics Maintenance				Code: BET21G01			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
-	4	-	2	100	-	-	100

Prior Knowledge: Safety precautions while working on electrical and electronic systems are essential.

Course Objectives:

This practical-based course complements the theoretical knowledge of electrical and electronics maintenance with hands-on activities. Students will engage in various practical exercises to develop their skills in troubleshooting, repairing, and maintaining electrical and electronic systems.

1) To provide theoretical knowledge to real-world electrical and electronic maintenance scenarios with safety.

2) To demonstrate proficiency in using maintenance tools and equipment.

3) To provide knowledge for troubleshooting common electrical and electronic faults.

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

1) Demonstrate a fundamental understanding of electrical and electronic principles, including Ohm's law, circuit analysis, and semiconductor behavior.

2) Demonstrate proficiency in PCB diagnostics and repairs.

3) Develop effective troubleshooting techniques and a systematic approach to diagnose and rectify electrical and electronic faults.

Sr. No.	List of Experiments
	GROUP A (Any six experiments)
	To study and get familiarized with the lab facilities, equipment, standard operating procedures & lab safety. Introduction to Practical Maintenance ● Familiarization with the electrical and electronics lab. ● Safety guidelines and procedures for lab work. ● Proper usage of hand tools and test equipment.
2	**Electrical Installations and Wiring Practice** ● Practical wiring exercises with different cable types.
3	**Electrical Installations and Wiring Practice.** ● Circuit breaker testing and replacement. ● Earthing and grounding practices **Study the operation of a circuit breaker, test its tripping characteristics, and perform routine maintenance tasks.**
4	**Basic Electrical Circuit Experiments** ● Ohm's law verification and resistor circuits. ● Series and parallel circuits. ● Measurement of voltage, current, and resistance, power.
5	**Electricity Bill verification.** ● Power and Energy calculations. ● Understanding various components of HT and LT bills.
6	**Basic Electronics Circuit Experiments** ● Measurement using electronic equipment DMM, CRO, and Function generator.
7	**Basic Electronics Circuit components** ● Study of different active and passive electronic components: Resistor, capacitor, inductor, diode, BJT, MOSFET, switches, relays, etc
8	**Passive Component Testing** ● Capacitor testing and measurement. ● Inductor testing and measurement. ● Use of an LCR meter.

9	**Active Component Testing** ● Diode testing and identification. ● Transistor testing and characterization. ● Operational amplifier testing.
10	**Power Supply and Inverter Maintenance** ● Troubleshooting linear and switch-mode power supplies. ● Inverter testing and repair. ● Motor drive maintenance.
11	● **Electrical Machine Maintenance** ● Generator and alternator inspection
12	**Electrical Machine Maintenance** ● AC motor testing and troubleshooting.
13	**Testing of batteries** ● The state of charge, capacity, and overall health of different types of batteries.
GROUP B (Any three experiments)	
14	**Electronics Troubleshooting** ● Troubleshooting digital logic circuits. ● Troubleshooting analog electronic circuits. ● Use of an oscilloscope and logic analyzer.
15	**Electrical Machine Maintenance** ● DC motor testing and troubleshooting
16	**Single Line Diagram** of Power System ● 132 or 220 or 400 kV substation (based on actual field visit) Symbols, Plate or Pipe earthing. (Drawing sheets)
17	**Measurement of insulation** ● Resistance of motors and cables.
18	**Study of troubleshooting of electrical equipment** ● Based on an actual visit to repair workshop (Any One) i) Three phase induction motor ii) Transformer iii) Power Cable
19	**Troubleshooting of household equipment** – ● Construction, working and troubleshooting of any two household Electrical equipments (Fan, Mixer, Electric Iron, Washing Machines, Electric Oven, Microwave - Limited to electrical faults)
GROUP C (Any three experiments)	
20	**Introduction to PCB design software** ● To understand schematics and layout of PCBs.
21	**Testing PCB** ● The functionality of single-layer PCB.
22	**Diagnosis and Troubleshooting of Damaged PCB** ● Diagnose and Repair Damaged PCB Traces ● Identify and replace faulty components on a PCB.
23	**Maintenance Protocols Presentation** ● Investigate an electronic or electrical failure of a circuit
24	**Technical Report Writing:** ● Write a formal report detailing the diagnosis and solution. ● Prepare and deliver a presentation on standard maintenance protocols.

Text Books:

1) Horowitz & Hill, The Art of Electronics; Cambridge University Press, 3rd edition, 2015.

2) Michael E. Brumbach, Industrial Electricity, 8th Edition, Cengage Learning

3) Institution of Engineering and Technology, Guide to Electrical Maintenance, 2nd Edition, IET.

4) Farid N. Nazm, Circuit Simulation, Wiley, 1st edition, 2010.

5) Mark I. Montrose, Printed Circuit Board Design Techniques for EMC Compliance: A Handbook for Designers, Wiley-IEEE Press, 2nd Edition, 2000.
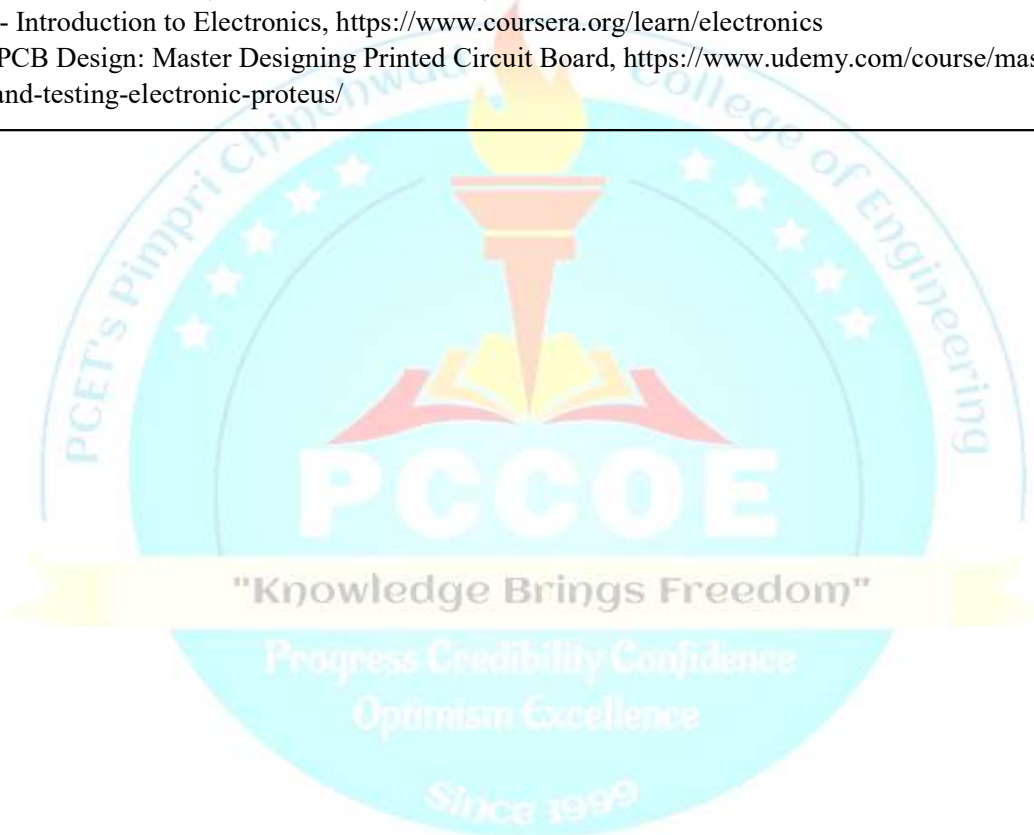
E-sources:

NPTEL - Basic Electrical Circuits, Prof. Nagendra Krishnapura, IIT Madras

NPTEL - Power Electronics, Prof. G. Bhuvaneswari, IIT Delhi

Coursera - Introduction to Electronics, https://www.coursera.org/learn/electronics

Udemy - PCB Design: Master Designing Printed Circuit Board, https://www.udemy.com/course/master-designing-drawing-and-testing-electronic-proteus/

Program: B. Tech. (E & Tc Engineering)						Semester: I	
Course: HSMC-English						Code: BSH21H01	
Teaching Scheme				**Evaluation Scheme**			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior knowledge: 1. Basic Knowledge of English grammar. 2. Basic Vocabulary, Listening and Speaking Skills

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.

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.

Unit	Description	Duration
1	**Listening Skills:** Importance of Listening Skills, Listening and Hearing, Types of Listening: Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills **Grammar & Vocabulary:** Common Errors in Daily Discourse, Compound and Complex Sentences, Modal Auxiliaries. Processes of Word Formation, One Word Substitutions, Words often Confused, Usage of Business Phrases & Idioms.	3
2	**Writing Skills** : Elements of Effective Writing, Writing Styles (Formal & Informal), Paragraph Writing (Descriptive, Technical) **Professional Writing**: Job Application, Leave Application, Enquiry and Complaint Letter. Features of Technical Writing, Report Writing; Progress, Accident Report, Event Report.	4
3	**Reading Skills**: Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension: Factual / Expository / Informative texts, Case Studies, Reading Research Articles **Literary Reading**:1 The Story of An Hour by Kate Chopin, 2 The Classical Student by Anton Chekhov3 A Chameleon by Anton Chekhov.	4
4	**Speaking Skills**: Basic Sounds-IPA, Word Stress, Intonation, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking, etc) Art of Asking and Responding to Questions **Public Speaking**: Importance of Public Speaking, Art of Extempore& Presentations, Role Play, Delivering Welcome Speech, Vote of Thanks, Group Discussion.	4
	Total	15
Practical/Lab Sessions		
Lab Session	Activities	Duration (Hrs)
1	Listening 1: Listen to the audio and answer the questions (IELTS)	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 and activities	2

5	Writing Skills 1: Formal writing such as Job Application, Leave Application, Enquiry and Complaint Letter.	2
6	Writing Skills 2: Different Styles of writing and Paragraph Writing (Descriptive, Technical)	2
7	Writing Skills 3: Technical Writing, Report Writing; Progress, Accident Report, Event Report.	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. (E & Tc Engineering)				Semester: I			
Course: HSMC-German				Code: BSH21H02			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior Knowledge: English Language

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 get equipped with basic language skills, namely listening, speaking, reading, and writing for the purpose of socializing, providing and obtaining information.
3. To develop inter cultural competence and understanding of perceptions, gestures, family, and community dynamics.

Course Outcomes: After learning the course, the students will be able to,
1. Demonstrate understanding of simple texts in German
2. Apply grammar rules to frame correct sentences in German
3. Communicate in a simple manner in German
4. Construct simple texts in German

Unit	Description	Duration (Hrs.)
1	**Building Vocabulary, Developing Listening and Reading Skills** ● Self-introduction, things of day-to-day use, Hobbies & Free time, Food & Beverages, Clock time & Daily Routine, Living & Working in Germany, Weather and Healthcare ● Listen and understand short conversations, announcements, voice mail in German ● Read and comprehend from instruction boards, advertisements, simple texts, short messages, letters and emails in German B64:B67	3
2	**German Grammar and Sentence Structure** ● Personal Pronouns: Singular and Plural ● Verbs and Verb-Conjugation: regular, irregular, mixed, separable, modal auxiliaries ● Types of Articles: definite, indefinite, negative, possessive ● Cases: nominative, accusative, dative ● Types of the sentences: declarative, interrogative, imperative ● Basic German conjunctions: and, or, but, because	4
3	**Speaking Skills** ● Spelling and pronunciation ● Asking for and giving simple information ● Requesting and responding to requests ● Learning simple German dialogues and speaking with expression ● Role play: Presenting a simple dialogue on given situation	4
4	**Writing Skills** ● Building words and simple sentences ● Filling up personal information in very simple forms (e.g. name, address, etc) ● Using punctuation marks correctly in given texts ● Correcting errors in given draft ● Writing simple texts, short messages, letters and emails on given topics	4

		Total	15

Practical/Lab Sessions			
Lab Session	**Activities**		**Duration (Hrs)**
1	**Vocabulary 1**: Exercises torecall and enhance vocabulary		2
2	**Listening 1**:Listen to the audio andrepeat(phonetics)		2
3	**Listening 2**: Listen to the audio and select the correct option(A1 practice)		2
4	**Vocabulary 2**: Exercises torecall and enhance vocabulary		2
5	**Reading 1**: Read short texts and fill up the information in table		2
6	**Reading 2**: Read short texts and mark true or false (A1 practice)		2
7	**Reading 3**: Read short texts and answer the questions		2
8	**Grammar 1**: Solve simple grammar exercises		2
9	**Grammar 2**:Construct correct sentences by applying grammar rules		2
10	**Speaking 1**: Spell and pronounce the words correctly(A1 practice)		2
11	**Speaking 2**:Give your short introduction(A1 practice)		2
12	**Speaking 3**:Frame simple questions, requests and reply(A1 practice)		2
13	**Writing 1**: Fill up simple data in forms(A1 practice)		2
14	**Writing 2**: Correct errors in given draft		2
15	**Writing 3**: Write simple texts, short messages, emails and letters(A1 practice)		2
		Total	**30**

Text Books:

Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015

Reference Books:

1) Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag,Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018

2) 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/noc23_hs98/preview

2) Udemy Course lectures link: https://www.udemy.com/topic/german-language/free/

Program: B. Tech. (E & Tc Engineering)						Semester: I	
Course: HSMC-Japanese						Code: BSH21H03	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
1	2	-	2	30	-	20	50

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

Course Objectives: This course aims at enabling students
1. To beaware of Japanese scripts (Hiragana,Katakana) and basic Kanjis.
2. To familiarize themselves with the Japanese language and use basic greetings inday-to-day life.
3. To develop language skills namely listening, speaking, reading and writing skills for socializing, providing and obtaining information.
4. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions.

Course Outcomes: After learning the course,the students will be able to
1. Understand Japanese scripts through oral and written communication
2. Explore Japanese culture and etiquettes
3. Express themselves by using simple sentences and responses to questions
4. Develop language skills namely speaking, reading and writing skills for providing and obtaining Information.

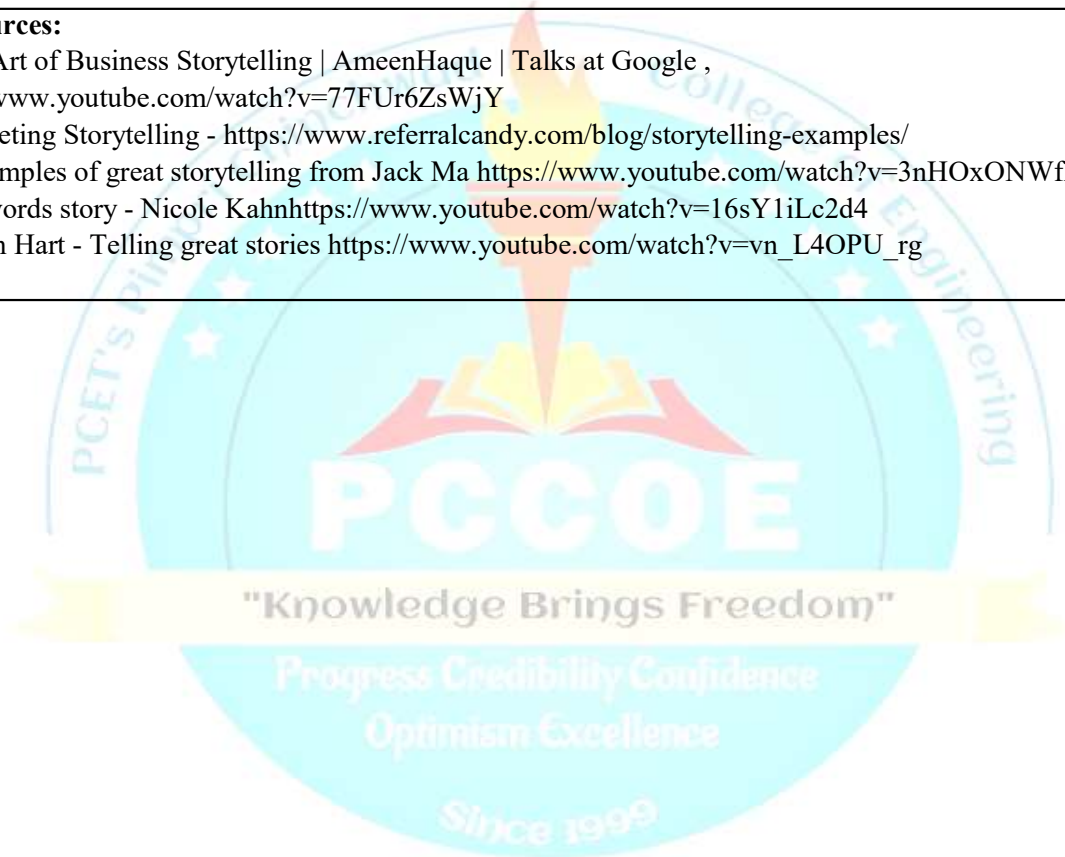| Unit	Description	Duration (Hrs.)
1	**Introduction: Hiragana Script.** ● Listening: Short video skit on self-introduction. ● Speaking: Song of greetings. ● Reading: Hiragana words ● Writing: Japanese scripts (Hiragana) ● Test on Hiragana	3
2	**Katakana script** ● Listening: English words ● Speaking: Song on body parts. ● Reading: Katakana words ● Writing: Locating countries on map, Wordhunt. ● Grammar:Test onKatakana.	4
3	**わたしはマイク.ミラーです。** ● Speaking:Self-introduction ● Listening: Conversation based on L-1 ● Writing:Writing about yourself. ● Reading:Lessonreadingno.-1 ● Grammar: Introductionto1.particles (は、か、も、か) 2.Verb (です、ではありません)	4

4	これからお世話になります。 ● Speaking:Greetings. ● Listening: Conversation based on L-2 ● Writing: Numbers (0- 100) in Japanese. ● Reading: Lesson reading no.2 ● Grammar:(past,negativeform), ● Introductionto 12, questioning words(なん、だれ、どなた). ● 2.この、その、あの、どの3.Particleの ● Test on grammar	4
	Total	15

Practical/Lab Sessions

Lab Session	Activities	Duration (Hrs)
1	**Speaking skill 1**: Japanese greetings	2
2	**Writing Skill 1**: Hiragana script	2
3	**Listening Skill 1**: Writing 'Hiragana' words	2
4	**Reading Skill 1**: Reading and recognizing 'Hiragana' words	2
5	**Writing Skill 2:** World map activity	2
6	**Reading Skill 2**: Reading 'Katakana' words	2
7	**Speaking Skill 2**: Self introduction	2
8	**Writing Skill 3**: Basic sentence formation using grammar.	2
9	**Reading Skill 3**: Chapter-1 reading	2
10	**Listening Skill 3**: Conversation in the office.	2
11	**Speaking Skill 3**: Dialogues between people of different nationality.	2
12	**Writing Skill 4**: Writing Japanese numbers using 'Hiragana' and 'Kanjis'.	2
13	**Reading Skill 4:** Chapter-2 reading	2
14	**Listening Skill 4**: Listening to Days of the week and dates of the month	2
15	**Speaking Skill 4**: Daily routine using verbs.	2
	Total	30

Textbook:

1. Minna no Nihongo Part I and II Publication: Goyal Publishers & Distributors Pvt. Ltd. , Author: Tsuruo Yoshiko (Compiled) , Edition: 2018

2. NihongoShoho Publication: JALTAP , Author: JALTAP(With permission of Japan Foundation, Tokyo), Edition: April 2008

Reference Books:

1.Genki1 Author: Eri Banno,Yoko Sakane,Yutaka Ohno,Chikako Shinagawa,and Kyoko Tokashiki. Publication: The Japan Times. Edition: 2011

2. MOMO Author: Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007

3. MOMO Japanese work book Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007

4. MOMO Japanese workbook Japan Foundation,New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd.,Edition: October 2007

Program: B. Tech. (E & Tc Engineering)					Semester: I		
Course: HSMC-Business Storytelling					Code: BSH21H04		
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior Knowledge: Basic competence of English language.

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.

Unit	Description	Duration (Hrs.)
1	**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
2	**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 a Short Story: **'The Three Hermits by Leo Tolstoy', The Last Painting by O' Henry**	4
3	**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 to 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

4	**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**

Practical/Lab Sessions

Lab Session	Activities	Duration (Hrs)
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	Marketing Campaign Story: Design a storytelling-based marketing campaign for a specific product or service launch, incorporating different media and channels	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. Kendall Haven, Story Proof, Libraries Unlimited, 2007.
2. Rob Biesenbach, Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results, Eastlawn Media, 2018.
3. Yiannis Gabriel, Storytelling in Organizations: Facts, Fictions, and Fantasies, Oxford University Press, 2011.

E-resources:

1. The Art of Business Storytelling | AmeenHaque | Talks at Google ,
https://www.youtube.com/watch?v=77FUr6ZsWjY
2. Marketing Storytelling - https://www.referralcandy.com/blog/storytelling-examples/
3. 5 examples of great storytelling from Jack Ma https://www.youtube.com/watch?v=3nHOxONWfEs
4. Six words story - Nicole Kahnhttps://www.youtube.com/watch?v=16sY1iLc2d4
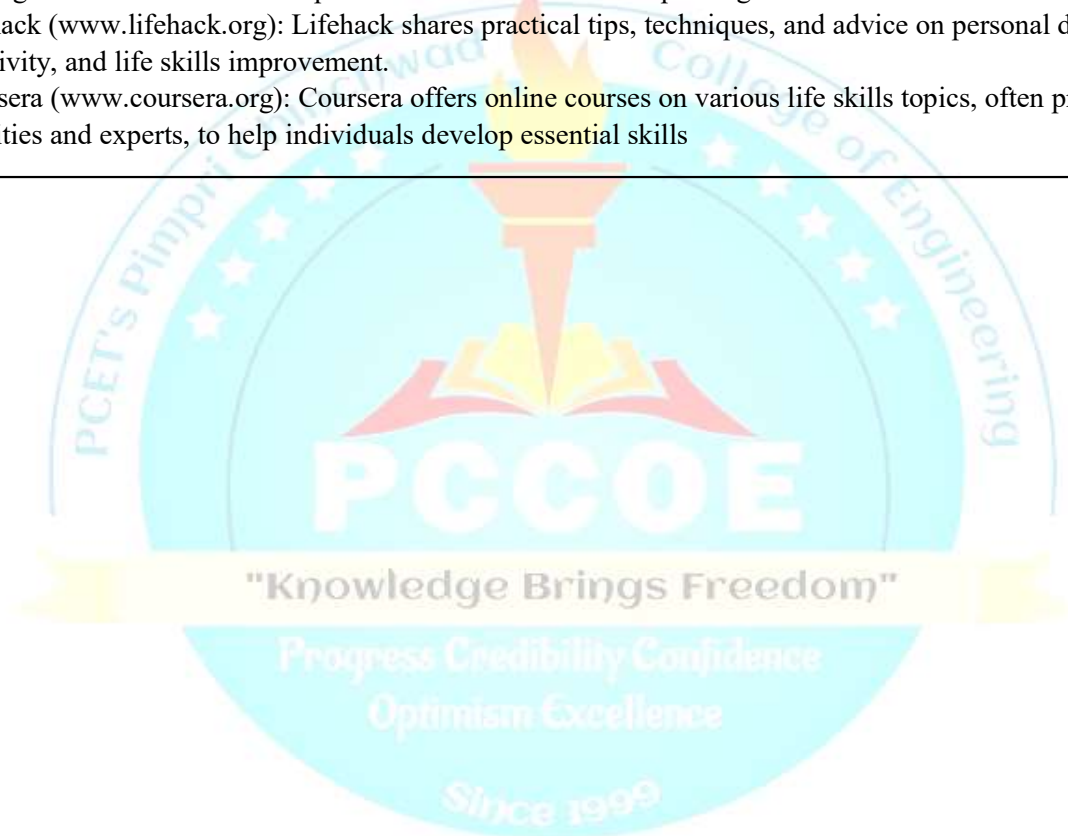5. Kevin Hart - Telling great stories https://www.youtube.com/watch?v=vn_L4OPU_rg

Program: B. Tech. (E & Tc Engineering)				Semester: I			
Course: Life Skills 1				Code: BSH21K01			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
-	4	-	2	100	-	-	100

Prior Knowledge:- Nil

Course Objectives:
1. To equip them with essential skills and knowledge 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: Students will be able to
1. Understand the true essence of happiness by being harmony with oneself.
2. Explore skills to get along with others to create and maintain healthy relationships.
3. Apply different ways of rational thinking.
4. Develop emotional intelligence.

Unit	Description	Duration (Hrs.)
1	**Happy You, Happy Life!** (i) Healthy Mind - Music Therapy, Yoga, Meditation, Happiness and Success. (ii) Self-Awareness - Know your personality, Develop yourSelf- Esteem, Johari Window, SWOT, Setting goals for yourself (SMART). (iii) Healthy Lifestyle - Nutrition, Significance of Physical Activity in Daily routine.	15
2	**Building Relationships** (i) People Skills - Networking, Developing Healthy Relationships, Collaboration, Reliability, Respectfulness, Open- Mindedness (ii) Effective Communication in Relationships-My Relationship Web, Relationship Recipe, Active Listening and Conflict Resolution (iii) Embracing Diversity: Respect for Different Perspectives and Cultures.	15
3	**The Reflective Engineer** (i) Critical Thinking - Fact or Fiction, Convergent & Divergent Thinking (ii) Creative Thinking - Imagination, Formulate and Articulate Ideas (iii) Perspective Thinking – Understanding others view Points, Respecting Others Opinions (iv) Decision Making – Rational, Analytical & Ethical Solutions.	15
4	**You CAN DO IT…** (i) Managing Stress - Good Stress , Bad Stress, Anxiety (ii) Managing time - Planning, Prioritization, Delegation, Productivity and Positivity (iii) Managing Emotions – Self- Regulation, Self-Motivation, Empathy, Assertiveness, Anger Management (iv) Handling Peer Pressure- Types of Peer Pressure: Spoken Peer Pressure, Unspoken Peer Pressure, Direct Peer Pressure, Indirect Peer Pressure, Positive Peer Pressure, Negative Peer Pressure.	15
	Total	**60**

Reference Books

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

Weblinks

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

Curriculum Structure

First Year B.Tech

E & Tc Engineering

Semester II

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course: Multivariate Calculus				Code: BSH22A06			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial*	Credit	IE	MTE	ETE	Total
2	-	1	2	20	30	50	100

Prior Knowledge: 1) Elementary Mathematics   2) Elementary Calculus

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 will be able to:
1) Evaluate Partial Differentiation and apply the concept of partial differentiation to find Maxima & Minima and Error & Approximation.
2) Solve for First order and first degree partial differential equations.
3) Understand definite improper integrals like Gamma, Beta function, DUIS.
4) Apply multiple integration techniques to analyze Area, Volume.

Unit	Description	Duration (Hrs.)
1	**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
2	**Partial Differential Equation(PDE):** Definition of PDE, order and degree of PDE, Formation of PDE, Classification of PDE, Initial and Boundary value problems, Solution of First order Partial differential equations.	7
3	**Integral Calculus:** Beta and Gamma functions, differentiation under integral sign (DUIS).	7
4	**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

* Tutorial will be conducted in batches as 1Hr/week/batch

Sr. No.	List of Tutorials
1	Partial derivatives basic rules, Mixed partial derivatives & properties ;
2	Euler's theorem on Homogeneous Functions and deductions;
3	Examples on variables to be treated as constant, Composite functions;
4	Definition of Jacobian, Jacobian of explicit functions;
5	Errors & Approximations, problem solving;
6	Maxima and minima of functions of two variables;
7	Partial differential equation formation, classification,
8	Solution of first order first degree
9	Beta, Gamma Function & its properties;
10	Differentiation under integral sign & Problems;
11	Concept of Double Integrationan and problem Solving;
12	Application of double integration to find Area;
13	Concept of Triple integration and problem Solving;
14	Dirichelet's theorem and Problems;
15	Application of triple integration to find Volume;

Text Books:

1) Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill).

2) Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)

Reference Books:

1) Higher Engineering Mathematics, 22e, by H. K. Das (S. Chand Publication, Delhi).

2) Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd).

3) Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning).

4) Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).

5) Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course: Engineering Chemistry				Code: BSH22A04			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
3	-	-	3	20	30	50	100

Prior Knowledge:
1) Structure of water.
2) Volumetric analysis.
3) Electromagnetic radiations.
4) Classification and properties of polymers.
5) Fossil and derived fuels.
6) Corrosion and its effects.
7) Electrochemical series.

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 lead students to investigate the advancement in engineering materials, batteries and structural elucidation by spectroscopy.
3) To build consciousness about the recent development in alternate energy sources and corrosion control.
4) To develop experimental skills and thereby forge their conceptual lucidity.

Course Outcomes: After learning the course, the students will be able to:
1) Analyse the water quality, interpret techniques of water purification and compare green over traditional synthesis of polycarbonate.
2) Apply basic principles of various electro-analytical techniques for qualitative and quantitative analysis and understand battery technology.
3) Apply the principles, instrumentation of UV & IR spectroscopy for structural elucidation.
4) Perceive the fuel quality and understand the scope of derived alternate fuels
5) Relate the preventive methods of corrosion to real-life problems.
6) Interpret the chemical structure, properties and synthesis of various polymers and nanomaterials and their uses.

Unit	Description	Duration (Hrs.)
1	**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.	9

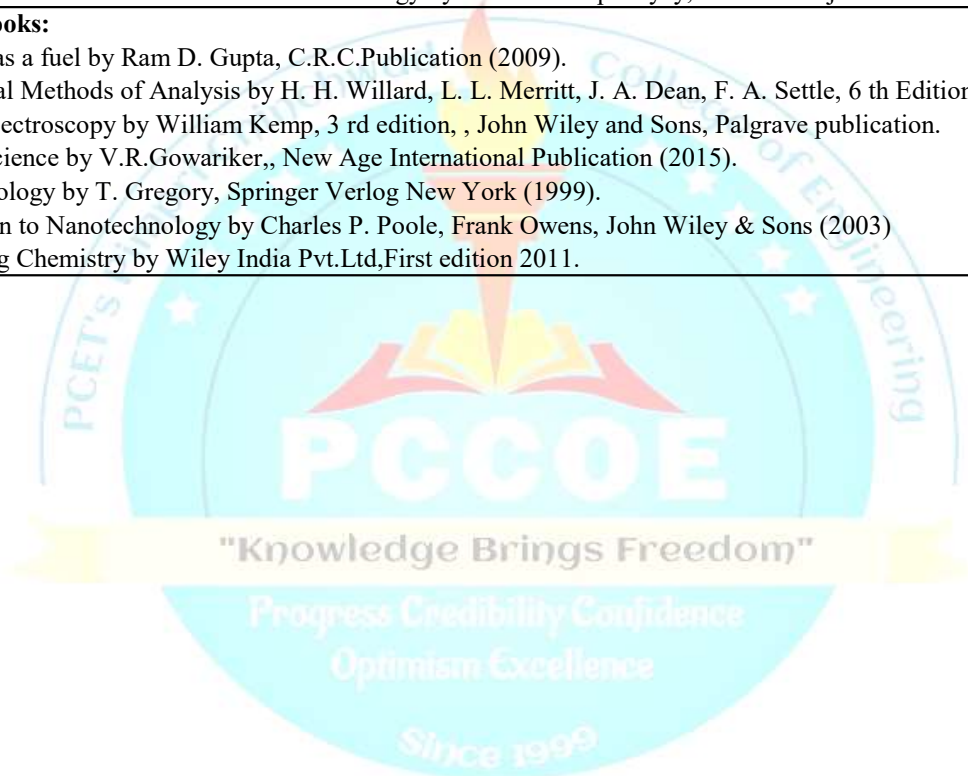|		
2	**Instrumental Analysis and battery technology.** a) Electrochemistry: fundamentals of an electrochemical cell, EMF of cell, reference and indicator electrodes and Nernst Equation. b) Basic principles, instrumentation and applications of :- i)Conductometry: Introduction, Kohlrausch's law, measurement of conductance and conductometric titrations of strong acid versus strong base, strong acid versus weak base and weak acid versus strong base. ii) pH-metry: theory of buffers and preparation, standardization of pH-meter, titration of weak acid versus strong base, simple and differential plots. iii) Potentiometry: Introduction, principle and application: potentiometric titration of Fe^{2+} versus Ce^{4+} along with simple and differential plots. Battery technology and Fuel Cell: introduction and types of batteries, construction, working and applications of Lithium ionbattery, charging and discharging reactions at respective electrodes. H_2- O_2 fuel cell.	7
3	**Spectroscopic techniques: Ultra Violet and Infrared spectroscopy** a) UV Spectroscopy: nature of electromagnetic radiation and its characteristics. Interaction of matter with UV radiations leading to different electronic transitions. Beer's & Lambert's law, their derivations and applications. Instrumentation of UV -Visible spectrophotometer. Terms used in UV spectroscopy-chromophore, auxochrome, bathochromic shift (red shift), hypochromic shift (blue shift), hyper chromic and hypochromic effect. b) IR spectroscopy: principle, types of vibrations (stretching and bending), Different regions of IR spectrum such as fundamental group region, finger print region and aromatic region. Applications of IR spectroscopy.	8
4	**Fuels and combustion** a) Fuels: definition, calorific value and its units. Calorific value (CV), gross calorific value (GCV), net calorific value (NCV). Determination of calorific value - Bomb calorimeter, Boy's colorimeter and numerical. i) Solid fuels: coal, proximate and ultimate analysis of coal, numerical based on analysis of coal. ii) Liquid fuels: composition of petroleum, refining of petroleum. Synthesis, properties, advantages and disadvantages of Power alcohol and Biodiesel. iii) Gaseous fuels: Hydrogen gas as a future fuel, production by steam reforming of methane and by electrolysis of water. Challenges in storage and transportation of H_2 gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	8
5	**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. Method to apply metallic coatings - hot dipping, cladding, electroplating and cementation.	6
6	**Chemistry of Polymers and Novel Carbon Compounds** a) Polymers: definition, classification of polymers on the basis of thermal behaviour, 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).	7
	Total	**45**

Text Books:

1) Engineering Chemistry by S.S. Dara, S.Chand Publications (2010).

2) Engineering Chemistry by B.S. Chauhan, UnivScPress.(2015).

3) A Text Book Of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (2015).

4) Spectroscopy of Organic Compounds by P. S. Kalsi, New Age International (2007).

5) Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014).

6) Instrumental methods of Chemical Analysis by GurdeepChatwal, Himalaya publishing house (1996).

7) Engineering Chemistry by Jain and Jain, DhanpatRai Publishing Co.(2016).

8) Engineering Chemistry by Wiley India (2012).

9) Engineering Chemistry by O.G. Palanna, McGraw-Hill Education.

10) Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).
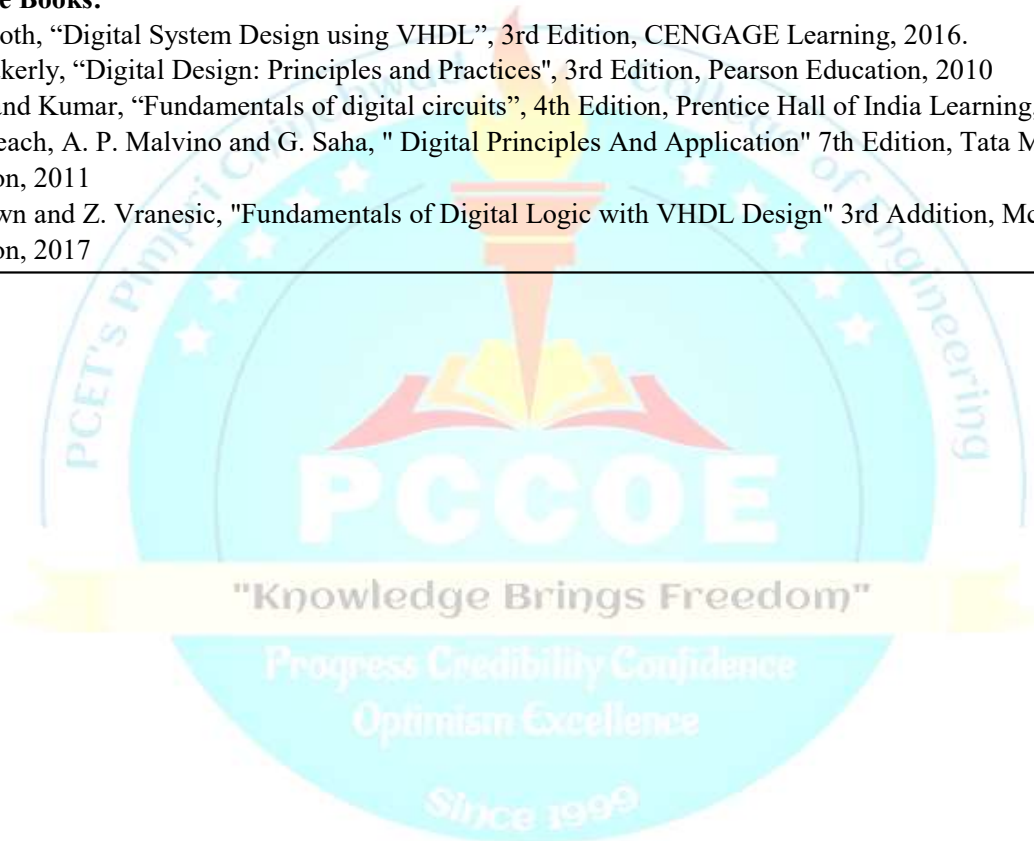
Reference Books:

1) Hydrogen as a fuel by Ram D. Gupta, C.R.C.Publication (2009).

2) Instrumental Methods of Analysis by H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, 6 th Edition, CBS Publisher.

3) Organic Spectroscopy by William Kemp, 3 rd edition, , John Wiley and Sons, Palgrave publication.

4) Polymer Science by V.R.Gowariker,, New Age International Publication (2015).

5) Nanotechnology by T. Gregory, Springer Verlog New York (1999).

6) Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003)

7) Engineering Chemistry by Wiley India Pvt.Ltd,First edition 2011.

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course:Engineering Chemistry Laboratory				Code: BSH22A05			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
-	2	-	1	50	-	-	50

Prior Knowledge: Nil

Course Objectives: This course aims at enabling students,
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 learning the course, the students will be able to:
1) Analyze the quality of water for its hardness and alkalinity.
2) Apply various instrumental methods like pH-metry, conductometry, spectroscopy and electrochemical techniques for quantitative and qualitative chemical analysis.
3) Demonstrate the skill for determination of quality of coal by proximate analysis and synthesis of engineering materials.
4) Learn the chromatographic technique for separation of mixture of compounds.
5) Explore mini projects which are relevant to societal and environmental issues to develop research attitude.

Note: First five experiments are mandatory. A student has to perform either next five experiments or mini project in lieu of experiments.

Sr. No.	I) List of Experiments
1	Determination of total hardness (by EDTA method) and alkalinity of given water sample.
2	To determine the dissociation constant of a weak acid (acetic acid) using pH meter.
3	Titration of mixture of strong acid with strong base using Conductivity meter and determine strength of acid.
4	To determine the maximum wavelength of absorption of $KMnO_4$, verify Beer's law and find concentration of the unknown sample.
5	Structural elucidation of unknown compounds by applying principles of UV and IR spectroscopy.
6	Proximate analysis of Coal.
7	To determine the electrochemical equivalent (ECE) of Cu. formaldehyde resin.
8	To prepare the Phenol
9	Preparation of biodiesel.
10	Chromatographic separation of ortho- and para nitro-phenol
Sr. No.	II) Topics for Mini project (Student has to choose one of the topics from list given below but not limiting to)
1	Synthesis of nano-materials.
2	Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV-Spectrophotometer.
3	Water audit of water samples
4	One-pot synthesis of biologically active compounds.
5	Microwave assisted chemical reactions.
6	Study of corrosion of metals in a medium of different atmospheric conditions
7	Soil analysis of agricultural soil samples.

Laboratory manual:
1. Vogel's 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. (E & Tc Engineering)						Semester: II	
Course: Digital Systems						Code: BET22B01	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
3	-	-	3	20	30	50	100

Prior Knowledge: a. Basics of Electronics, b. Basics of Number systems.

Course Objectives: This course aims at enabling students,
1) To explore the basic concepts of digital electronics and programmable devices.
2) To introduce the students to implementation of combinational and sequential logical operations for digital applications.
3) To lay the foundation for the design and implementation of digital circuits for various applications in VLSI .

Course Outcomes: After learning the course, the students will be able to:
1) Understand basic combinational logic circuits.
2) Build modular combinational circuits with MUX/DEMUX, Decoder, Comparator etc.
3) Construct sequential logic circuits.
4) Understand the concept of state machines.
5) Apply knowledge of the digital logic family for the selection of ICs used in applications.
6) Design and simulate arithmetic and sequential circuits using HDL toolflow.

Unit	Description	Duration (Hrs.)
1	**Logic Families: Logic Families:** TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, ECL, CMOS families and their interfacing	6
2	**Combinational Logic Design-I :** Introduction to Logic gates , Definition of combinational logic, Review of Boolean Algebra and De Morgan's Theorem, canonical forms, Standard representations for logic functions, k-map representation of logic functions (SOP and POS forms), minimization of logical functions for min-terms and max-terms (up to 4 variables), don't care conditions, Design Examples: Arithmetic Circuits.	8
3	**Combinational Logic Design-II :** BCD - to – 7 segment decoder, Code converters. 4-bit Binary Adder, 4-bit BCD adder , Digital Comparator, Parity generators/checkers, Multiplexers and their use in combinational logic designs, multiplexer trees, De-multiplexers and their use in combinational logic designs ,Decoders, Demultiplexer trees	8
4	**Sequential Logic Design:** 1-Bit Memory Cell, Clocked SR, JK, MS J-K flip flop, D and T flip-flops. Use of preset and clear terminals, Excitation Table for flip flops,. Application of Flip flops: Shift registers, Counters (ring counters, twisted ring counters), ripple counters, up/down counters, synchronous counters.	8
5	**Programmable Logic Devices:** Programmable logic devices: Concept of Programmable logic devices, Study of PROM, PAL, PLA, Designing combinational circuits using PLDs. Introduction to FPGA and CPLD.	7

6	**Digital Design using VHDL:** VLSI Design flow: Design entry: Schematic, FSM & HDL, different modeling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modeling, VHDL constructs and codes for combinational and sequential circuits.	8
	Total	**45**

Text Books:

1) R.P. Jain, "Modern digital electronics", 3rd edition, 12th reprint Tata McGraw Hill Publication, 2007.

2) M. Morris Mano, "Digital Logic and Computer Design", 4th edition, Prentice Hall of India, 2013.

3) D. L. Perry, "VHDL Programming by Example" 4th Edition, McGraw Hill Publication, 2002.

Reference Books:

1) C.H. Roth, "Digital System Design using VHDL", 3rd Edition, CENGAGE Learning, 2016.

2) J.F.Wakerly, "Digital Design: Principles and Practices", 3rd Edition, Pearson Education, 2010

3) A. Anand Kumar, "Fundamentals of digital circuits", 4th Edition, Prentice Hall of India Learning, 2016.

4) D.P. Leach, A. P. Malvino and G. Saha, " Digital Principles And Application" 7th Edition, Tata McGraw Hill Publication, 2011

5) S. Brown and Z. Vranesic, "Fundamentals of Digital Logic with VHDL Design" 3rd Addition, McGraw Hill Publication, 2017

Program: B. Tech. (E & Tc Engineering)					Semester: II		
Course: Digital Systems Laboratory					Code: BET22B02		
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
4	-	2	2	50	-	50	100

Prior Knowledge: a. Basics of Electronics, b. Basics of Number systems.

Course Objectives: This course aims at enabling students,
1. To introduce Basic Digital ICs and their working principles.
2. To deliver concepts related to designing basic combinational logic circuits for arithmetic operations.
3. To demonstrate designing of basic sequential circuits.
4. To introduce FSM design and implementations for real time applications.

Course Outcomes: After learning the course, the students will be able to:
1. Demonstrate the use of digital ICs in designing combinational circuits.
2. Demonstrate the use of digital ICs in designing sequential circuits such as counters, registers, etc.
3. Design and Simulate Sequential Circuits using EDA Tools
4. Design and Simulate basic combinational and sequential using HDL design flow

Sr. No.	List of Experiments
	Part A: Combinational Logic Circuit Implementation
1	a. Verification of truth table of basic logic and universal gates. b. Design and implement 1 bit adder using basic gates.
2	Study of IC-74LS153 as a Multiplexer: a. Design and Implement 8:1 MUX using IC-74LS153 & Verify its Truth-Table. b. Design and Implement the given 4 variable functions using IC74LS153. Verify its Truth-Table.
3	Study of IC-74LS138 as a Demultiplexer / Decoder: a. Design and Implement full adder / subtractor function using IC-74LS138. b.Design & Implement 3-bit code converter using IC-74LS138. (Gray to Binary/Binary to Gray).
4	Study of IC-74LS83 as a BCD adder: a. Design and implement 1 bit adder using basic gates.
5	Study of IC-74LS85 as a magnitude comparator: a. Design and Implement 5-bit comparator.
	Part B: Sequential Logic Circuit Implementation
6	a. Study of Counters (IC-74LS90) a. Design and Implement 5-bit comparator.
7	a . Study of Counters (IC74HC191/ IC74HC193) a. Design & Implement MOD-N Up/down Counter using IC74HC191/ IC74HC193.
8	a. Design and Simulate 4-bit right shift and left shift register using D-flip flop using EDA Tool.
9	Study of Shift Register (74HC194/74LS95): a. Design and Simulate a Pulse train generator using IC-74HC194/IC74LS95 (Use right shift/ left shift) using EDA Tool. b. Design and Simulate 4-bit Ring Counter/ Twisted ring Counter using shift registers IC 74HC194/IC74LS95 using EDA Tool.
	Part C: VHDL based Design and Simulation
10	Design and Simulate adder, subtractor and 3 bit binary to gray converter using VHDL.
11	Design and Simulate 3 bit up/ down counter using VHDL.
12	Simulation based mini project

Reference Books:

1. S. Brown and Z. Vranesic, "Fundamentals of Digital Logic with VHDL Design" 3rd Addition, McGraw Hill Publication, 2017

2. Anand Kumar, "Fundamentals of digital circuits", 4e, Prentice Hall of India Learning, 2016,

3. Charles Roth, "Digital System Design using VHDL", 3rd Edition, CENGAGE Learning, 2016,

4. J.F. Wakerly, "Digital Design: Principles and Practices", 3e, Pearson Education, 2010,

5. D. L. Perry, "VHDL Programming by Example" 4th Edition, McGraw Hill Publication, 2002.

E sources:

1. http://vlabs.iitkgp.ac.in/dec/index.html#

2. https://da-iitb.vlabs.ac.in/

3. https://dld-iitb.vlabs.ac.in/

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course: Network Theory				Code: BET22C01			
Teaching Scheme				**Evaluation Scheme**			
Lecture	Practical	Tutorial	Credit	IE	MTE	ETE	Total
2	-	2	2	20	-	30	50

Prior Knowledge: Passive components & Mathematics is essential.

Course Objectives:
1. To Introduce the fundamental concepts of DC electrical circuits
2. To deliver different network simplification techniques to analyze DC electrical circuits
3. To deliver the concepts related to fundamentals of network graph theory for resistive networks.
4. To Familiarize students with various network theorems to analyze dc electrical circuits

Course Outcomes: After the completion of this course, the students will be able to:
1. Understand the fundamental concepts of DC electrical circuits.
2. Analyze DC electrical circuits using different network simplification techniques.
3. Solve the given resistive network using graph theory for current, voltage and power.
4. Apply various theorems to DC electrical circuits with dependent and independent sources

Unit	Description	Duration (Hrs.)
1	**Introduction to network theory** Electric circuit versus network, network terminology - node, junction, branch, mesh, loop . mesh versus loop , power calculations , short circuit and open circuit , types and classification of networks, classification of sources,source transformation and source shifting, series parallel combination of sources, current divider and voltage divider rule	7
2	**Circuit simplification techniques** Ohm's law, KVL, KCL for dependent DC sources, mesh , node analysis. (*Numericals should be covered on independent and dependant DC sources only)	8
3	**Graph Theory for Linear Networks** Network Graph,Tree, Co-Tree,and loops. Incidence matrix, tie-set,cut-set matrix.	8
4	**Circuit simplification using network theorem** Superposition, thevenin's, Norton's theorem and maximum power transfer. (*Numericals should be covered on independent and dependant DC sources only)	7
	Total	**30**

Text Books:
1. Ravish Singh, "Network Analysis and synthesis TMH", 2nd Edition,2019.
2. William H Hyat, Jack E Kimmerly and Steven M. Durbin, " Engineering circuit Analysis", Tata McGraw Hill, 9th edition,2002.

Reference Books:
1. M.E. Van Valkenburg, "Network Analysis" ,2002.
2. David E. Johnson, John L. Hilburn, and Johnny R. Johnson, "Electric Circuit Analysis" ,1997.
3. Allan H. Robbins and Wilhelm C. Miller,"Circuit Analysis: Theory and Practice",1995.
4. Charles K. Alexander and Matthew N.O. Sadiku,"Fundamentals of Electric Circuits",1999.
5. William H. Hayt, Jr. and Jack E. Kemmerly, "Engineering Circuit Analysis",1999.

E sources:

NPTEL

1) Basic Electrical Technology: https://nptel.ac.in/courses/108108076

2) Introduction to Basic Electronics : https://nptel.ac.in/courses/122106025

3) Fundamentals of Electrical Engineering : https://onlinecourses.nptel.ac.in/noc22_ee113

COURSERA

1) Introduction-to-electricity-magnetism : https://www.coursera.org/specializations/introduction-to-electricity-magnetism

2) Introduction to Electronics : https://in.coursera.org/learn/electronics#about

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course: Problem Solving with Python Programming				Code: BET22G01			
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
-	4	-	2	100	-	-	100

Prior Knowledge: Basic computer programming is essential

Course Objectives:
1. To introduce basic python programs using problem-solving aspects, programming and debugging.
2. To acquaint to python functions to achieve code reuse.
3. To aware students about problems based on stings and its operation using python.

Course Outcomes: After the completion of this course, the students will be able to:
1. Acquire problem solving and basic programming skills in Python.
2. Apply decision control structures in python programming.
3. Build program using functions, modules and libraries to facilitate code reuse.
4. Make use of various operations on strings in python programs.

Experiment list based on the Content:
Basics of Python Programming, Decision Control Statements, Functions and Modules, Strings and Operations.

General Guidelines: 12 experiments covering Course Outcomes along with Mini Project.

Detailed Syllabus: Experiments from the following list need to be completed using any Python Compiler /IDE

Sr. No.	List of Experiments
1a	Give the values of the variables x, y and z. Write a program to rotate their values such that x has the value of y, y has the value of z and z has the value of x.
1b	To calculate the salary of an employee given his basic pay (take input from user). Calculate salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employees pay professional tax as 2% of total salary. Calculate salary payable after deductions
2a	To accept the total number of minutes as input and then output as hrs + minutes. Ex:- 90 minutes=1hr 30 mins
2b	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as p=mv where m is the mass of the object and v is its velocity.
3	To accept marks of five courses of students and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is Distinction. If aggregate is 60>= and <75 then the grade is First division. If aggregate is 50>= and <60, then the grade is Second division. If aggregate is 40>= and <50, then the grade is Third division.
4	To read the coordinates (x, y) (in Cartesian system) and find the quadrant to which it belongs (Quadrant -I, Quadrant -II, Quadrant -III, Quadrant -IV).
5	A hotel has a pricing policy as follows: 2 people: 2500Rs. 3 people: 3500Rs. 4 people: 4500Rs. Additional people: 1000Rs. per person If the customer is staying on company business, there is a 20% discount. If the customer is over 60 year age, there is a 15% discount. A customer does not receive both discounts. Given the above data, print the cost of the room.
6	To check whether the input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.
7	Teacher is doing the analysis of the internal examination of a student. She has conducted programming & problem solving course test with maximum marks 25 where students have to score at least 12 marks to clear the test. Now she wants to find top scorer, lowest scorer, total number of pass and fail students. Apply the logic and perform the given task.

8	Write a program to simulate a simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing xy and x!.
9	Accept number from 1 to 12 and print equivalent month of a year
10	Write a program to accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number, e) prime factors.
11	The students want to play a game in which blocks are used denoting some integer from 0 to 9. These are arranged together in a random manner without seeing to form different numbers keeping in mind that the first block is never a 0. Once they form a 5 digit number they read in the reverse order to check if the number and its reverse is the same. If both are same then the player wins.(Palindrome)
12	Trainer is conducting a session for all 20 employees. She has employee ids of all employees represented in 6 digit numbers. She wants to make two groups of employees based on even number employee ID or odd number employee ID. Identify the steps to solve the problem and implement it
13	Programmer is teaching a course to students. There are N students attending the course, numbered 1 through N. Before each lesson, he has to take attendance, i.e. call out the names of students one by one and mark which students are present. Each student has a first name and a last name. In order to save time, He wants to call out only the first names of students. However, whenever there are multiple students with the same first name, he has to call out the full names (both first and last names) of all these students. Help him to decide, for each student, whether he will call out this student's full name or only the first name. Input: List of all student names (First & Last name)
14	Consider you have created a website in which you are accepting details of users where you have to take password from the user. Accept password from user with following condition: 1. Minimum characters 6 and maximum are 12. 2. At least one digit and one character. 3. At least one special symbol (@, $,#) .
15	Mini Project to use all the concepts of course

Text Books:
1. R. G. Dromey,"How to Solve it by Computer", First edition, Pearson Education,2015
2. Reema Thareja,"Python Programming Using Problem Solving Approach", Second edition Oxford University Press.2019
3. R. Nageswara Rao, "Core Python Programming", Second edition, Dreamtech Press,2016

Reference Books:
1. Maureen Spankle, "Problem Solving and Programming Concepts",11th edition, Pearson,2012
2. Paul Barry,"Head First Python- A Brain Friendly Guide", 2nd Edition,2016
3. "Python: The Complete Reference", Martin C, fourth edition Brown, McGraw Hill Education,2018
4. Ashok Namdev Kamthane,"Programming and Problem Solving with Python",, McGraw Hill Education,2020

Program: B. Tech. (E & Tc Engineering)				Semester: II			
Course: Life Skills 2				Code: BSH22K01			
Teaching Scheme				**Evaluation Scheme**			
Lecture	Practical	Tutorial	Credit	TW	Practical	Oral	Total
-	4	-	2	100	-	-	100

Prior Knowledge: –Nil

Course Objectives: This course aims at enabling students,
1) To equip them with essential skills and knowledge 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) Understand the ways to nurture their passion.
2) Develop skills growth mindset to be successful in personal and professional life.
3) Demonstrate adaptability and flexibility for any environment.
4) Apply essential skills for successful and happy life management.

Unit	Description	Duration (Hrs.)
1	**Nurture Your Passion** (i) Developing Hobbies- Importance, Ways and Benefits (ii) Exploring Skills - Singing/Painting/Dancing etc (iii)Sports: Basketball, Table tennis, Football and Volleyball (iv) Performing Arts: Painting/ Sketching/ Drawing (v) Stage performance (vi) Let's Play to Learn - games and play forms possible, like, Puzzles & Brainteasers, quiz.	15
2	**Lead Yourself - Growth Mindset** (i) Understanding the concept for personal development. (ii) Embracing change: Coping with the dynamic nature of life (iii) Resilience and perseverance: Overcoming obstacles and setbacks (iv) Developing self-leadership skills and taking initiative/ responsibilities.	15
3	**Adaptability and Flexibility** (i) Adaptability in a rapidly changing world (ii) Problem-solving and decision-making in dynamic situations. Approaching Problem Differently (iii) Embracing uncertainty: Coping with ambiguity and making the most of new opportunities (iv) Flexibility in teamwork: Navigating diverse team dynamics effectively.	15
4	**Life Management** (i) Financial Literacy-Saving is earning, Value of money (ii) Coping up with Virtual Life and Reality (iii) Understanding the responsibilities and impact of Global Citizenship (iv) Environmental awareness and sustainable practices (v) Social responsibility: Contributing positively to the community.	15
	Total	**60**

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

Weblinks

1) SkillsYouNeed (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) MindTools (www.mindtools.com): MindTools 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) Verywell Mind (www.verywellmind.com): This website covers mental health, emotional well-being, and self-improvement topics that contribute to overall life skills development