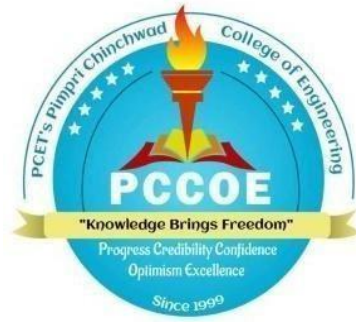


Pimpri Chinchwad Education Trust's

# **PIMPRI CHINCHWAD COLLEGE OF ENGINEERING**

**SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044**

**(An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune)**



## **Curriculum Structure and Syllabus**

**of**

## **First Year B. Tech. E & TC Engineering (Regulations 2023)**



**Effective from Academic Year 2024-25**

## **Institute Vision**

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

## **Institute Mission**

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

## **EOMS Policy**

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

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

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

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

**CURRICULUM FRAMEWORK**  
**(2023 Regulations)**

**LIST OF ABBREVIATIONS**

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

**COURSE WISE CREDIT DISTRIBUTION**

Sr.No.	Type of Course	No. of Courses	Total Credits	
			NO.	%
1	Basic Science Course	8	14	35
2	Engineering Science Course	6	12	30
3	Program Core Course	1	2	5
4	Vocational and Skill Enhancement Course	2	4	10
5	Ability Enhancement Course	1	2	5
6	Indian Knowledge System	1	2	5
7	Co-Curricular Courses	2	4	10
	<b>Total</b>	<b>21</b>	<b>40</b>	<b>100</b>

# **Curriculum Structure**

## **First Year B. Tech.**

### **E & TC Engineering**

# CURRICULUM STRUCTURE

## First Year B.Tech. (E & TC Engineering) Semester – I

First Year B. Tech E & TC Engineering (2023 Regulations) (With effect from Academic Year 2024-25)															
Semester I															
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)				Evaluation Scheme and Marks					
		L	P	T	Total	L	P	T	FA		SA	TW	PR	OR	Total
									FA1	FA2					
BSH21BS01	Linear Algebra & Univariate Calculus	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH21BS02	Linear Algebra & Univariate Calculus Laboratory	-	1	-	1	-	2	-	-	-	-	25	25	-	50
BSH21BS03	Engineering Physics	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH21BS04	Engineering Physics Laboratory	-	2	-	2	-	4	-				50	50	-	100
BET21ES01	Basic Electrical and Electronics Engineering	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BET21ES02	Basic Electrical and Electronics Engineering Lab	-	1	-	1	-	2	-	-	-	-	50	-	-	50
BET21ES03	Programming for Problem Solving	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BET21ES04	Programming for Problem Solving Lab.	-	1	-	1	-	2	-	-	-	-	50	-	-	50
BET21VS01	Electrical and Electronics Maintenance	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BSH21IK01	Indian Knowledge System	2	-	-	2	2	-	-	25	25	-	-	-	-	50
BSH21CC01	Life Skill I	-	2	-	2	-	4	-	-	-	-	100	-	-	100
Total		11	9	-	20	11	18	-	75	75	150	375	75	-	750

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

**\*Exit Policy: Available as a separate document**

# CURRICULUM STRUCTURE

## First Year B.Tech. (E & TC Engineering) Semester – II

First Year B. Tech E &TC Engineering (2023 Regulations) (With effect from Academic Year 2024-25)															
Semester II															
Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
		L	P	T	Total	L	P	T	FA		SA	TW	PR	OR	Total
									FA1	FA2					
BSH22BS07	Multivariate Calculus	2	-	-	2	2	-	-	10	10	30				50
BSH22BS08	Multivariate Calculus Laboratory	-	1	-	1	-	2	-	-	-	-	25	25	-	50
BSH22BS05	Engineering Chemistry	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BSH22BS06	Engineering Chemistry Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BET22ES01	Digital Systems	3	-	-	3	3	-	-	20	20	60	-	-	-	100
BET22ES02	Digital Systems Lab	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BET22PC01	Network Theory	2	-	-	2	2	-	-	10	10	30	-	-	-	50
BET22VS01	Problem Solving with Python Programming	-	2	-	2	-	4	-	-	-	-	100	-	-	100
BSH22AE 01/02/03/04	AEC (Eng/Ger/Jap /Business story telling)	1	1	-	2	1	2	-	10	10	30	-	-	-	50
BSH22CC02	Life Skill II	-	2	-	2	-	4	-	-	-	-	100	-	-	100
<b>Total</b>		10	10	-	20	10	20	-	60	60	180	375	75	-	750

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

**\*Exit Policy: Available as a separate document**

# **Course Syllabus**

## **Semester I**

<b>Program:</b>		<b>B. Tech. (E &amp; TC)</b>				<b>Semester: I</b>	
<b>Course:</b>		<b>Linear Algebra &amp; Univariate Calculus</b>				<b>Code:</b>	<b>BSH21BS01</b>
<b>Credits</b>	<b>Teaching Scheme (Hrs./Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>FA</b>		<b>SA</b>	<b>Total</b>
				<b>FA1</b>	<b>FA2</b>		
<b>2</b>	<b>2</b>	<b>-</b>	<b>-</b>	<b>10</b>	<b>10</b>	<b>30</b>	<b>50</b>
<b>Prior knowledge of:</b> 1. Elementary Mathematics. 2. Elementary Calculus. is essential							
<b>Course Objectives:</b> This course aims at enabling students, 1. To strengthen the concept of univariate calculus and mathematical modeling of physical systems using ordinary differential equations 2. To get acquainted with advanced techniques for solving problems related to calculus and ordinary differential equation							
<b>Course Outcomes:</b> After learning the course, the students should be able to: 1. Apply the concept of rank for the solution of the system of equations, linear dependence/independence of vectors and finding Eigen values and Eigen vectors. 2. Evaluate the limits of indeterminate forms and representation of a function in an infinite series using successive differentiation, Taylor’s and Maclaurin’s theorems. 3. Formulate the mathematical models related to orthogonal trajectories, electrical circuits and one-dimensional heat flow and solve using ordinary differential equations. 4. Solve higher order linear differential equations and Apply it to evaluate the current for electrical circuits.							
<b>Detailed Syllabus</b>							
<b>Unit</b>	<b>Description</b>						<b>Duration [Hrs]</b>
<b>I</b>	<b>Matrices:</b> Rank, System of linear equations with applications in electrical circuits, Linear dependence and independence, Linear transformations, Eigenvalues, Eigen vectors.						<b>8</b>
<b>II</b>	<b>Differential Calculus:</b> Indeterminate Forms, Taylor's series, Maclaurin’s series, Successive differentiation and Leibnitz theorem.						<b>7</b>
<b>III</b>	<b>Ordinary Differential Equations:</b> Exact differential equations, Differential equations reducible to Exact form. <b>Applications:</b> Orthogonal trajectories, Kirchoff’s law of electrical circuits (L-R and R-C circuits), One-dimensional conduction of heat (steady state).						<b>8</b>
<b>IV</b>	<b>Linear Differential Equations:</b> Linear differential equation of nth order with constant coefficients, General method, Shortcut methods, Method of variation of parameters, Application of linear differential equations in engineering viz. mass spring system, electrical circuits etc.						<b>7</b>
	<b>Total</b>						<b>30</b>
<b>Text Books: Include international Author</b> 1. Higher Engineering Mathematics by B.V. Ramana, 34e, Tata McGraw-Hill. 2. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning. 3. Linear Algebra & Univariate Calculus by Team Mathematics, PCCoE, Pune, 1e, Techknowledge Publication							
<b>Reference Books:</b> 1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd. 2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd. 3. Advanced Engineering Mathematics by M. D. Greenberg, 2e, Pearson Education. 4. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi							



**e-sources:**

**1.NPTEL Course lectures**

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

<b>Program:</b>	<b>B. Tech. (E &amp; TC)</b>					<b>Semester: I</b>	
<b>Course:</b>	<b>Linear Algebra &amp; Univariate Calculus Laboratory</b>					<b>Code:</b>	BSH21BS02
<b>Credits</b>	<b>Teaching Scheme (Hrs. /Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
1	-	2	-	25	-	25	50

**Prior knowledge:**

1. Elementary Mathematics.
2. Elementary Calculus

**Course Objectives:**

This course aims at enabling students,

1. Understanding MATLAB for mathematical computations, visualization, and data analysis.
2. Ability to apply MATLAB to solve engineering problems related to matrices, ordinary differential equations & differential calculus.

**Course Outcomes:**

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

1. Solve problems related to matrices, differential calculus, and ordinary differential equations.
2. Develop simple MATLAB program for limits, Taylor and Maclaurin Series, Successive differentiation, and solution of ordinary and Linear differential equations.

**Detailed Syllabus**

<b>Expt. No.</b>	<b>Suggested List of Experiments</b>
<b>1</b>	Introduction to MATLAB & Matrix operation using MATLAB
<b>2</b>	Properties of Matrices-Rank, Determinant & Solving Linear Systems of Equations
<b>3</b>	Rank & Solution of Linear Systems of Equations using MATLAB
<b>4</b>	Eigen Values and Eigen Vectors
<b>5</b>	Eigen Values & Eigen Vectors using MATLAB
<b>6</b>	Solving ordinary differential equations.
<b>7</b>	Programming Assignment I.
<b>8</b>	Indeterminate Forms
<b>9</b>	Evaluation of limits using MATLAB
<b>10</b>	Taylor's series, Maclaurin's series, and successive derivatives of the function.
<b>11</b>	Expansion of function using MATLAB
<b>12</b>	Solution of linear differential equations.
<b>13</b>	Circuit analysis using linear differential equations.
<b>14</b>	Plotting the solution of linear differential equations using MATLAB
<b>15</b>	Programming Assignment II.

**References:**

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

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

**Prior knowledge of:**

1. Atom, molecule & nuclei,
2. Current, electricity & magnetism,
3. Electromagnetic Induction

**is essential.**

**Course Objectives:**

This course aims at enabling students,

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

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

1. Apply basics of semiconductor physics to explain the behavior of charge carriers inside a semiconductor
2. Distinguish wave behavior of a matter particle for the manipulation of the processes at quantum scale
3. Interpret properties of superconductors & their applications in advanced technologies
4. Summarize properties, preparation methods of nanomaterials & explore their applications in various engineering fields

**Detailed Syllabus:**

<b>Unit</b>	<b>Description</b>	<b>Duration [Hrs]</b>
<b>I</b>	<b>Semiconductor Physics</b> Band Theory of solids, Electrical conductivity of conductors & semiconductors (qualitative), Hall effect (with derivation), Fermi Dirac probability distribution function, Fermi level, p-n junction, solar cell I-V characteristics, Basics of sensors, Characteristics of sensors-range, sensitivity, resolution, accuracy, repeatability types of sensors-Active and Passive sensors, Applications of sensors.	<b>8</b>
<b>II</b>	<b>Quantum Mechanics</b> 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, scanning tunneling microscope (STM)	<b>7</b>
<b>III</b>	<b>Magnetism and Superconductivity</b> 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. <b>Superconductivity:</b> Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, BCS theory, type I and II superconductors, low T <sub>c</sub> and high T <sub>c</sub> superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains	<b>7</b>

IV	<b>Introduction to Nanoscience</b> 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
	<b>Total</b>	30
<b>Text Books:</b> <ol style="list-style-type: none"> <li>1. A textbook of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand &amp; Company Pvt. Ltd.</li> <li>2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications (P) Ltd.</li> <li>3. Sensors Handbook- Sabrie Soloman, Second edition, Mc Graw Hill Publications,</li> <li>4. Nanotechnology -Principles &amp; Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.</li> </ol>		
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge University Press.</li> <li>2. Handbook of Modern Sensors- Jacob Fraden, Physics, Design and Applications, Fourth edition, Springer Publications,</li> <li>3. Introduction to solid states Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.</li> <li>4. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.</li> <li>5. Heat and Thermodynamics, Anandamoy Manna, Pearson Publishers 2011</li> </ol>		
<b>e-sources:</b> <ol style="list-style-type: none"> <li>1. NPTEL Quantum Mechanics course: <a href="https://nptel.ac.in/courses/122106034">https://nptel.ac.in/courses/122106034</a></li> <li>2. NPTEL Fundamentals of semiconductor devices: <a href="https://nptel.ac.in/courses/108108122">https://nptel.ac.in/courses/108108122</a></li> </ol>		

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

**Course Objectives:**

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

**Course Outcomes:**

1. To demonstrate concepts of optics by performing experiments using optical instruments
2. To formulate and solve Engineering Physics problems by applying experimental method.

**Guidelines:** Group A: Student will perform any eight experiments. Based on this student will be having practical exam of 50 marks

Group B: Student will perform any seven experiments.

**Detailed Syllabus**

<b>Expt. No.</b>	<b>Group A: Any Eight Experiments</b>
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	An experiment based on laser I
6	To determine compressibility of given liquid using Ultrasonic Interferometer
7	To study IV characteristics of solar cell and determine fill factor.
8	To determine band gap of given semiconductor.
9	To determine electrical resistivity of given semiconductor using four probe method
10	To determine Plank's constant "h"
<b>Expt. No.</b>	<b>Group B: Any Seven Experiments</b>
1	Testing of properties of semiconductor materials using Hall Effect
2	Testing of magnetic susceptibility of different magnetic material using Quinke's method
3	Testing of sound absorption coefficient of different material
4	Study of solar cell using series and parallel combinations with intensity variation
5	Data analysis using Origin/Mat lab and its interpretation
6	Design and assemble Solar based appliances
7	Laser and fiber optics-based experiment
8	Sensor/Ardino based experiment

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

<b>Program: B. Tech. (E &amp;TC)</b>				<b>Semester: I</b>		
<b>Course: Basic Electrical and Electronics Engineering</b>				<b>Code: BET21ES01</b>		
Credit	Teaching Scheme (Hrs/Week)			Evaluation Scheme		
	Lecture	Practical	Tutorial	FA		Total
				FA1	FA2	
<b>3</b>	<b>3</b>	<b>-</b>	<b>-</b>	<b>20</b>	<b>20</b>	<b>60</b>
<b>Prior knowledge of</b> Basics of Physics & Mathematics is essential						
<b>Course objectives:</b> <ol style="list-style-type: none"> <li>To build a strong conceptual understanding of single phase and polyphase AC circuits with phasor diagram representation.</li> <li>To impart basic knowledge for conceptual understanding of static and rotating AC machines.</li> <li>To impart basic knowledge for conceptual understanding of DC machines.</li> <li>To make students understand the basics of PN Junction diode, rectifiers and special types of diodes.</li> <li>To make students understand the working of transistor, biasing circuits, its characteristics &amp; applications.</li> </ol>						
<b>Course Outcomes:</b> After the completion of this course, the students will be able to <ol style="list-style-type: none"> <li>Apply the knowledge of single phase and three phase circuits to determine unknown electrical quantities.</li> <li>Explain the constructional features and operation of single phase transformer and single phase induction motors.</li> <li>Describe the constructional features and working principles of DC Machines.</li> <li>Describe the working and functionality of PN junction diodes, rectifiers &amp; special purpose diodes.</li> <li>Explain the working of different types of transistors and its biasing circuits with their applications.</li> </ol>						
<b>Detailed Syllabus:</b>						
Unit	Description					Duration (Hrs)
<b>I</b>	<b>AC Circuits</b> 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					09
<b>II</b>	<b>AC Machine</b> 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)					09
<b>III</b>	<b>DC Machines</b> 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.					09

<b>IV</b>	<b>Diode Circuits</b> Intrinsic and extrinsic semiconductors, conduction mechanism in extrinsic semiconductors, carrier concentrations, drift and diffusion mechanism, drift and diffusion current densities, excess carriers, recombination process, mean carrier lifetime, conductivity, mobility. Mass action law and Einstein relationship. 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, Zener diode, Zener voltage regulator, Light Emitting Diode, and Photodiode along with their V-I characteristics, Schottky diode, Varactor diode	09
<b>V</b>	<b>Transistor Circuits</b> 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. <b>Field effect transistor</b> JFETs, MOSFETs: Introduction, Types, Construction, Operation, Characteristics, Industrial applications	09
<b>Total</b>		<b>45</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>1. V. N. Mittal and Arvind Mittal, "Basic Electrical Engineering", 2nd Edition. (McGraw-Hill), 2010</li> <li>2. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010</li> <li>3. Thomas L. Floyd, "Electronics Devices", Sixth edition, Pearson Education, 2022</li> <li>4. Donald Neaman "Electronic Circuit Analysis and Design", Third Edition, Tata McGraw Hill, 2001</li> </ol> <b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. D. C. Kulshreshtha, "Basic Electrical Engineering", 1st Edition (Tata McGraw hill), 2009</li> <li>2. B. L. Theraja and A. K. Theraja S. Chand &amp; Co. Pvt. Ltd. New Delhi, "A textbook of Electrical Technology Vol I" 2021</li> <li>3. B. L. Theraja and A. K. Theraja S. Chand &amp; Co. Pvt. Ltd. New Delhi, "A textbook of Electrical Technology Vol II", 2020</li> <li>4. Jacob Milman, Christos Halkias, Chetan Parikh "Millman's Integrated Electronics", Second edition, McGraw Hill, 2017</li> <li>5. R. L. Boylestad, L. Nashelsky, "Electronic Devices and Circuits Theory", 11<sup>th</sup> Edition, Prentice Hall of India, 2017</li> </ol> <b>NPTEL:</b> <ol style="list-style-type: none"> <li>1. Basic Electrical Technology: <a href="https://nptel.ac.in/courses/108108076">https://nptel.ac.in/courses/108108076</a></li> <li>2. Introduction to Basic Electronics :<a href="https://nptel.ac.in/courses/122106025">https://nptel.ac.in/courses/122106025</a></li> <li>3. Fundamentals of Electrical Engineering :<a href="https://onlinecourses.nptel.ac.in/noc22_ee113">https://onlinecourses.nptel.ac.in/noc22_ee113</a></li> </ol> <b>Coursera :</b> <ol style="list-style-type: none"> <li>1. Introduction-to-electricity-magnetism: <a href="https://www.coursera.org/specializations/introduction-to-electricity-magnetism">https://www.coursera.org/specializations/introduction-to-electricity-magnetism</a></li> </ol>		



Program: B. Tech. (E&TC)					Semester: I		
Course: Basic Electrical and Electronics Engg. Laboratory					Code: BET21ES02		
Credit	Teaching Scheme			Evaluation Scheme			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
1	–	2	–	50	–	–	50
<b>Prior knowledge of:</b> Basic Measuring instruments (Ammeter, Voltmeter, DMM) is essential							
<b>Course objectives:</b> 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							
<b>Course outcomes:</b> After the completion of this 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							
<b>General Guidelines: Ten experiments are to be performed.</b>							
<b>Detailed Syllabus</b>							
<b>Exp. No.</b>	<b>List of Experiments</b>						
<b>GROUP A</b>							
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 and line quantities in three phase balanced star and delta connected load.						
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.						
<b>GROUP B</b>							
9	Testing of various Electronic Components and equipment.						
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
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. R. L. Boylestad, L. Nashlesky, “Electronic Devices and Circuits Theory”, 11<sup>th</sup> Edition, Prentice Hall of India, 2017</li> <li>2. Thomas L. Floyd, “Electronics Devices”, Sixth edition, Pearson Education, 2022</li> </ol> <b>E-Sources:</b> <ol style="list-style-type: none"> <li>1. NPTEL Course Link  <a href="https://nptel.ac.in/courses/122106025">https://nptel.ac.in/courses/122106025</a>(Introduction to Basic Electronics)  Links to Virtual Lab  <a href="https://ems-iitr.vlabs.ac.in/exp/dcshunt-motor-armature-control/theory.html">https://ems-iitr.vlabs.ac.in/exp/dcshunt-motor-armature-control/theory.html</a>  <a href="http://vlabs.iitkgp.ernet.in/be/exp5/index.html">http://vlabs.iitkgp.ernet.in/be/exp5/index.html</a>  <a href="http://vlabs.iitkgp.ac.in/psac/exp3/index.html">http://vlabs.iitkgp.ac.in/psac/exp3/index.html</a>  <a href="http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAE/exp6/index.html">http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAE/exp6/index.html</a> </li> </ol>	

Program: B. Tech. (E&TC)				Semester: I			
Course: Programming for Problem Solving				Code: BET21ES03			
Credit	Teaching Scheme			Evaluation Scheme			
				FA		SA	Total
	Lecture	Practical	Tutorial	FA1	FA2	30	50
2	2	-	-	10	10		
Prior knowledge of: Fundamentals of computers is essential							
<b>Course objectives:</b> 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.							
<b>Course Outcomes:</b> After learning the course, the students will be able to: 1.Implement conditional branching and iteration. 2. Apply programming concepts to solve arrays, matrix operations, searching and sorting problems. 3.Develop a problem into functions and synthesize a complete program using divide and conquer approach. 4. Utilize pointers and structures to formulate algorithms and programs.							
Detailed Syllabus:							
Unit	Description						Duration (Hrs)
I	<b>INTRODUCTION TO PROGRAMMING</b> 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
II	<b>ARRAYS, SEARCHING &amp; SORTING ALGORITHMS</b> 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
III	<b>FUNCTIONS</b> <i>Functions:</i> Syntax of function declaration and definition, functions including using built in libraries. Parameters and return types: passing arguments, returning values, call by value, call by reference Passing arrays to functions. Recursion: Introduction to recursion, Examples of recursive functions: factorial, Fibonacci series, Benefits and limitations of recursion.Quick sort or Merge sort using functions						8
IV	<b>STRUCTURES &amp; POINTERS</b> <i>Structures:</i> Defining structures, Array of Structures, Accessing individual elements of arrays of structures, nested structures. <i>Pointers:</i> Syntax of pointer declaration and initialization,Use of Pointers in self-referential structures, Relationship between pointers and arrays, 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

<b>Program: B. Tech. (E&amp;TC)</b>				<b>Semester: I</b>			
<b>Course: Programming for Problem Solving Laboratory</b>				<b>Code: BET21ES04</b>			
<b>Credit</b>	<b>Teaching Scheme (Hrs/Week)</b>			<b>Evaluation Scheme</b>			
	<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>TW</b>	<b>Oral</b>	<b>Practical</b>	<b>Total</b>
1	-	2	-	50	-	-	50
<b>Prior knowledge of:</b> Fundamentals of computers is essential							
<b>Course Objectives:</b> 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							
<b>Course Outcomes:</b> 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. Develop an solution using iterative as well as recursive functions. 4. Use the concepts of structures and pointers of different types of problems.							
<b>List of Experiment:</b>  <b>General Guidelines:</b> <b>All Experiments are to be performed.</b> <b>Experiments from the following list need to be completed using Code Blocks /Turbo C / Online GDB.</b>							
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. Write a C program for: Matrix Operations using 2D Array							
5. Write a C program for: any five String operations							
6. Programming for solving Numerical methods problems							
7. Recursive functions							
8. Structures							
9. Pointers							
10. Call by value Program							
11. Call by Reference							
12. 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

Program: B. Tech. (E & TC)							Semester: I	
Course: Electrical and Electronics Maintenance							Code: BET21VS01	
Credit	Teaching Scheme Hrs/Week				Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	Credit	TW	PR	OR	Total
2	-	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)								
1	To study and get familiarized with the lab facilities, equipment, standard operating procedures & lab safety. Introduction to Practical Maintenance <ul style="list-style-type: none"><li>Familiarization with the electrical and electronics lab.</li><li>Safety guidelines and procedures for lab work.</li><li>Proper usage of hand tools and test equipment.</li></ul>							
2	Electrical Installations and Wiring Practice <ul style="list-style-type: none"><li>Practical wiring exercises with different cable types.</li></ul>							
3	Electrical Installations and Wiring Practice. <ul style="list-style-type: none"><li>Circuit breaker testing and replacement.</li><li>Earthing and grounding practices</li></ul> Study the operation of a circuit breaker, test its tripping characteristics, and perform routine maintenance tasks.							
4	Basic Electrical Circuit Experiments <ul style="list-style-type: none"><li>Ohm's law verification and resistor circuits.</li><li>Series and parallel circuits.</li><li>Measurement of voltage, current, and resistance, power.</li></ul>							
5	Electricity Bill verification. <ul style="list-style-type: none"><li>Power and Energy calculations.</li><li>Understanding various components of HT and LT bills.</li></ul>							
6	Basic Electronics Circuit Experiments <ul style="list-style-type: none"><li>Measurement using electronic equipment DMM, DSO, and Function generator, frequency Counter.</li></ul>							
7	Basic Electronics Circuit components <ul style="list-style-type: none"><li>Study of different active and passive electronic components: Resistor, capacitor, inductor, diode, BJT, MOSFET, switches, relays, etc</li></ul>							
8	Passive Component Testing <ul style="list-style-type: none"><li>Capacitor testing and measurement.</li><li>Inductor testing and measurement.</li><li>Use of an LCR-Q meter.</li></ul>							

9	<b>Active Component Testing</b> <ul style="list-style-type: none"> <li>• Diode testing and identification.</li> <li>• Transistor testing and characterization.</li> <li>• Operational amplifier testing.</li> </ul>
10	<b>Power Supply and Inverter Maintenance</b> <ul style="list-style-type: none"> <li>• Troubleshooting linear and switch-mode power supplies.</li> <li>• Inverter testing and repair.</li> <li>• Motor drive maintenance.</li> </ul>
11	<ul style="list-style-type: none"> <li>• <b>Electrical Machine Maintenance</b></li> <li>• Generator and alternator inspection</li> </ul>
12	<b>Electrical Machine Maintenance</b> <ul style="list-style-type: none"> <li>• AC motor testing and troubleshooting.</li> </ul>
13	<b>Testing of batteries</b> <ul style="list-style-type: none"> <li>• The state of charge, capacity, and overall health of different types of batteries.</li> </ul>
<b>GROUP B (Any three experiments)</b>	
14	<b>Electronics Troubleshooting</b> <ul style="list-style-type: none"> <li>• Troubleshooting digital logic circuits.</li> <li>• Troubleshooting analog electronic circuits.</li> <li>• Use of an oscilloscope and logic analyzer.</li> </ul>
15	<b>Electrical Machine Maintenance</b> <ul style="list-style-type: none"> <li>• DC motor testing and troubleshooting</li> </ul>
16	<b>Single Line Diagram of Power System</b> <ul style="list-style-type: none"> <li>• 132 or 220 or 400 kV substation (based on actual field visit) Symbols, Plate or Pipe earthing. (Drawing sheets)</li> </ul>
17	<b>Measurement of insulation</b> <ul style="list-style-type: none"> <li>• Resistance of motors and cables.</li> </ul>
18	<b>Study of troubleshooting of electrical equipment</b> <ul style="list-style-type: none"> <li>• Based on an actual visit to repair workshop (Any One) i) Transformer ii) Cable iii) Electronic Circuit</li> </ul>
19	<b>Troubleshooting of household equipment –</b> <ul style="list-style-type: none"> <li>• Construction, working and troubleshooting of any two household Electrical equipments (Fan, Mixer, Electric Iron, Washing Machines, Electric Oven, Microwave - Limited to electrical faults)</li> </ul>
<b>GROUP C (Any three experiments)</b>	
20	<b>Introduction to PCB design software</b> <ul style="list-style-type: none"> <li>• To understand schematics and layout of PCBs.</li> </ul>
21	<b>Testing PCB</b> <ul style="list-style-type: none"> <li>• The functionality of single-layer PCB.</li> </ul>
22	<b>Diagnosis and Troubleshooting of Damaged PCB</b> <ul style="list-style-type: none"> <li>• Diagnose and Repair Damaged PCB Traces</li> <li>• Identify and replace faulty components on a PCB.</li> </ul>
23	<b>Maintenance Protocols Presentation</b> <ul style="list-style-type: none"> <li>• Investigate an electronic or electrical failure of a circuit</li> </ul>
24	<b>Technical Report Writing:</b> <ul style="list-style-type: none"> <li>• Write a formal report detailing the diagnosis and solution.</li> <li>• Prepare and deliver a presentation on standard maintenance protocols.</li> </ul>
<b>Text Books:</b> 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. NagendraKrishnapura, 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)					Semester: I	
Course:	Indian Knowledge System (IKS)					Code: BSH21IK01	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	25	25	-	50
Prior Knowledge: Nil							
<b>Course Objectives:</b> This course aims at enabling students, 1. To familiarize with the concepts of Indian Knowledge System 2. To get acquainted with the applications of Indian Knowledge System							
<b>Course Outcomes:</b> After learning the course, the students will be able to; 1. Demonstrate elementary knowledge of various ancient Indian Knowledge Streams 2. Identify/Select Indian Knowledge Stream of Interest 3. Evaluate the chosen aspect Indian Knowledge Stream which in turn may be of assistance in the career of the learner							
Detailed Syllabus:							
Units	Description						Duration (Hrs)
I	<b>Indian Knowledge System – Philosophy and Culture</b> <b>A.Philosophy</b> Introduction to Sāṃkhya, Vaiśeṣika, Nyaya, Pūrva-Mīmāṃsā, Vedānta, Ashtanga Yoga–Yamas,Niyamas, Āsana, Prāṇāyāma, Pratyāhāra, Dhāraṇā, Dhyāna, Samādhi <b>B. Culture</b> Foundational aspects of Sangeeta, Natya Shastra, Shilpashastra						15
II	<b>Indian Knowledge System – Economics, Science and Technology</b> Ayurveda, Architecture and Planning, Metallurgy and Material Science, Astronomy, Kautalya Arthashatra						15
Total							30
<b>Text Books:</b> 1. Mahadevan, B., Bhat Vinayak Rajat, Nagendra Pavanan R.N. (2022), 2. “Introduction to Indian Knowledge System: Concepts and Applications”, PHI Learning Private Ltd. Delhi. Dharampal (2021), “Indian Science and Technology in the Eighteenth Century”,ISBN10:8175310936.							
<b>Reference Books:</b> Kapil Kapoor, Avadhesh Kumar Singh. (2005), “Indian Knowledge Systems”, (Vol.1 and Vol.2), ISBN-10:9788124603369.							

Program:	B. Tech. (E &TC)				Semester: I		
Course:	Life Skills I				Code:	BSH21CC01	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100
Prior knowledge of: Nil							
<b>Course Objectives:</b> <ol style="list-style-type: none"><li>To equip them with essential competencies that complement their academic education, preparing them to excel not only as engineers but also as well-balanced individuals.</li><li>To develop students’ vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.</li></ol>							
<b>Course Outcomes:</b> <p>After learning the course, the students will be able to:</p> <ol style="list-style-type: none"><li>Demonstrate self-awareness and inner harmony conducive to understanding the essence of happiness.</li><li>Exhibit proficient interpersonal skills in fostering and sustaining healthy relationship with others.</li><li>Employ diverse strategies for rational decision-making and problem solving.</li><li>Display enhanced emotional intelligence through the recognition and management of emotions in various contexts.</li></ol>							
<b>Course Guidelines:</b> <ol style="list-style-type: none"><li>The students are instructed to perform all the activities suggested by the course faculty.</li><li>The assessment of life skills activities will be done on the basis of students’ performance, attitude, behavior and understanding of subject.</li><li>The students are suggested to attend all the sessions of the life skills course.</li></ol>							
Detailed Syllabus							
Unit	Description						Duration (Hrs)
I	<b>Happy You, Happy Life!</b> Healthy Mind - Music Therapy, Yoga, Meditation, Happiness and Success, Self-Awareness - Know your personality, Develop your Self-Esteem, <i>Johari</i> Window, SWOT, Setting goals for yourself (SMART), Healthy Lifestyle - Nutrition, Significance of Physical Activity in Daily routine. <ul style="list-style-type: none"><li>Activity/Worksheet 1: Music Therapy</li><li>Activity/Worksheet 2: Johari Window</li><li>Activity/Worksheet 3: Physical &amp; Mental Health</li></ul>						15
II	<b>Building Relationships</b> People Skills - Networking, Developing Healthy Relationships, Collaboration, Reliability, Respectfulness, Open- Mindedness, Effective Communication in Relationships-My Relationship Web, Relationship Recipe, Active Listening and Conflict Resolution, Embracing Diversity: Respect for Different Perspectives and Cultures.						15

	<ul style="list-style-type: none"> <li>• Activity/Worksheet 4: Building Relationships</li> <li>• Activity/Worksheet 5: Building String Relationships- The Key to Success in Business &amp; Life</li> </ul>	
III	<p><b>The Reflective Engineer</b></p> <p>Critical Thinking - Fact or Fiction, Convergent &amp; Divergent Thinking, Creative Thinking - Imagination, Formulate and Articulate Ideas, Perspective Thinking – Understanding others view Points, Respecting Others Opinions, Decision Making – Rational, Analytical &amp; Ethical Solutions.</p> <ul style="list-style-type: none"> <li>• Activity/Worksheet 6: Creative &amp; Critical Thinking</li> <li>• Activity/Worksheet 7: Decision Making</li> <li>• Activity/Worksheet 8: Perspective Thinking</li> </ul>	15
IV	<p><b>You CAN DO IT...</b></p> <p>Managing Stress - Good Stress , Bad Stress, Anxiety, Managing time - Planning, Prioritization, Delegation, Productivity and Positivity, Managing Emotions – Self-Regulation, Self-Motivation, Empathy, Assertiveness, Anger Management, Dealing with addictions, 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.</p> <ul style="list-style-type: none"> <li>• Activity/Worksheet 9: Managing Emotions</li> <li>• Activity/Worksheet 10: Stress Management &amp; Peer Pressure</li> </ul>	15
<b>Total</b>		<b>60</b>
<p><b>Reference Books:</b></p> <p>The 7 Habits of Highly Effective Teens" by Sean Covey Publisher: Simon &amp; Schuster, 2017</p> <p>How to Win Friends and Influence People" by Dale Carnegie Publisher: Simon &amp; Schuster. 2020</p> <p>Emotional Intelligence: Why It Can Matter More Than IQ" by Daniel Goleman Publisher: Bantam Books, 2021.</p> <p>Mindset: The New Psychology of Success" by Carol S. Dweck Publisher: Ballantine Books, 2019.</p> <p>5. The Power of Habit: Why We Do What We Do in Life and Business" by Charles Duhigg Publisher: Random House, 2016</p>		
<p><b>E Sources -</b></p> <ol style="list-style-type: none"> <li>1. Psychology Today (<a href="http://www.psychologytoday.com">www.psychologytoday.com</a>): Psychology Today publishes articles and insights from psychologists and mental health experts that can be useful for improving life skills and emotional intelligence.</li> <li>2. Lifehack (<a href="http://www.lifehack.org">www.lifehack.org</a>): Lifehack shares practical tips, techniques, and advice on personal development, productivity, and life skills improvement.</li> <li>3. Coursera (<a href="http://www.coursera.org">www.coursera.org</a>): Coursera offers online courses on various life skills topics, often provided by universities and experts, to help individuals develop essential skills</li> </ol>		

# **Course Syllabus**

## **Semester II**

<b>Program:</b>	<b>B. Tech. (E &amp; TC)</b>				<b>Semester: II</b>		
<b>Course:</b>	<b>Multivariate Calculus</b>				<b>Code:</b>	<b>BSH22BS07</b>	
<b>Credits</b>	<b>Teaching Scheme (Hrs./Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>FA</b>		<b>SA</b>	<b>Total</b>
				<b>FA1</b>	<b>FA2</b>		
2	2	-	-	10	10	30	50
<b>Prior knowledge of:</b> 1. Elementary Mathematics 2. Elementary Calculus <b>is essential.</b>							
<b>Course Objectives:</b> This course aims at enabling students, 1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation, area and volume 2. To make students acquainted with advanced Mathematical techniques to represent Fourier series and to evaluate integrals							
<b>Course Outcomes:</b> After learning the course, the students should be able to: 1. <b>Evaluate</b> Partial Differentiation and <b>apply</b> the concept of partial differentiation to find Maxima & Minima and Error & Approximation 2. <b>Represent</b> Fourier series for the periodic time domain continuous and discrete function into signal form 3. <b>Compute</b> definite improper integrals like Gamma, Beta function, DUIS 4. <b>Apply</b> multiple integration techniques to find Area and Volume							
<b>Detailed Syllabus:</b>							
<b>Unit</b>	<b>Description</b>						<b>Duration [Hrs]</b>
I	<b>Partial Differentiation:</b> Partial derivatives, Composite function, Chain Rule, variable to be treated as constant, total derivatives. Euler's theorem for homogeneous functions. <b>Application of Partial derivatives:</b> Jacobian for explicit function, Errors and Approximations, Maxima and Minima of two variable functions.						8
II	<b>Fourier Series:</b> Definition, Dirichlet's conditions, full range Fourier series, Harmonic analysis, and engineering application.						7
III	<b>Integral Calculus:</b> Beta and Gamma functions, differentiation under integral sign (DUIS).						7
IV	<b>Multiple Integral:</b> 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
	<b>Total</b>						<b>30</b>
<b>Text Books:</b> 1. Higher Engineering Mathematics by B.V. Ramana (Tata McGraw-Hill) 2. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson Learning)							
<b>Reference Books:</b> 1. Higher Engineering Mathematics, 22e,by H. K. Das (S. Chand Publication, Delhi). 2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd. 3. Advanced Engineering Mathematics, 4e, by S.R.K. Iyengar, Rajendra K. Jain (Alpha Science International, Ltd) 4. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education) 5. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi)							
<b>e-sources:</b> 1. NPTEL Multivariable Calculus course <a href="https://nptel.ac.in/courses/111107108">https://nptel.ac.in/courses/111107108</a> 2. NPTEL Video for Fourier series <a href="http://nptel.iitm.ac.in">http://nptel.iitm.ac.in</a>							

<b>Program:</b>	<b>B. Tech. (E &amp; TC)</b>					<b>Semester: II</b>	
<b>Course:</b>	<b>Multivariate Calculus Laboratory</b>					<b>Code:</b>	<b>BSH22BS08</b>
<b>Credits</b>	<b>Teaching Scheme (Hrs. /Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
1	-	2	-	25	-	25	50
<b>Prior knowledge of</b> 1. Elementary Mathematics 2. Elementary Calculus 3. Basics of MATLAB/Open Source <b>is essential.</b>							
<b>Course Objectives:</b> This course aims at enabling students to solve problems based on concepts 1. Multivariate calculus and its application in maxima & minima, error & area, and volume. 2. Continuous and discrete systems require knowledge of Fourier series and Harmonic analysis. 3. Advanced techniques to evaluate multiple integrals							
<b>Course Outcomes:</b> After completion of this course, the students will be able to, 1. Solve problems related to the concepts of multivariate calculus, such as partial differentiation and its application, Fourier series, integral calculus, and the application of multiple integrals. 2. Use MATLAB/Open source software to solve problems such as partial differentiation, maxima-minima, Fourier series, and multiple integrals.							
<b>Detailed Syllabus</b>							
<b>Expt. No.</b>	<b>Suggested List of Experiments</b>						
<b>1</b>	Problems on Partial derivatives, Euler's theorem on homogeneous functions, implicit functions, and variables treated as constant, total derivatives.						
<b>2</b>	Partial derivatives of two variable functions by using MATLAB						
<b>3</b>	Problems on Jacobians and their applications, errors, and approximations. Maxima and Minima: maxima and minima of functions of two and three variables.						
<b>4</b>	Maxima and Minima (global and local) by using MATLAB with visualization						
<b>5</b>	Problems on Jacobians and errors and approximations.						
<b>6</b>	Absolute and Relative error for two variable functions by MATLAB						
<b>7</b>	Assignment on Programming-1						
<b>8</b>	Problems on half-range Fourier series, Harmonic analysis, and application to engineering						
<b>9</b>	Fourier series and its plots by using MATLAB						
<b>10</b>	Problems on Beta and Gamma functions, differentiation under integral sign (DUIS),						
<b>11</b>	Problems on Introduction of curve tracing, double integration, change of order of integration, conversion into polar form, Triple integration: with limits and without limits, Dirichlet's theorem						
<b>12</b>	Three-dimensional Cartesian, polar, and cylindrical systems by using GeoGebra						
<b>13</b>	Evaluation of Double and triple Integration by MATLAB						
<b>14</b>	Problems with evaluation of Area and volume. Visualization of Area, Volume by Geogebra						
<b>15</b>	Assignment on Programming-2						

#### References:

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



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

**Prior knowledge of:**

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

**Course Objectives:**

This course aims at enabling students,

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

**Course Outcomes:**

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

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

**Detailed Syllabus:**

<b>Unit</b>	<b>Description</b>	<b>Duration [Hrs]</b>
<b>I</b>	<b>Water Technology and Green Chemistry:</b> 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.	<b>8</b>
<b>II</b>	<b>Fuels and combustion</b> 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 calorimeter 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 <sub>2</sub> gas. b) Combustion: chemical reactions, calculations on air requirement for combustion.	<b>7</b>

III	<b>Corrosion and Corrosion control</b> 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.	7
IV	<b>Chemistry of Polymers and Novel Carbon Compounds</b> 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).	8
	<b>Total</b>	<b>30 Hrs</b>
<b>Text Books:</b> 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 Shashi Chawla, Dhanpat Rai & Co. (2015). 4. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014). 5. Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.(2016). 6. Engineering Chemistry by Wiley India (2012). 7. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education. 8. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).		
<b>Reference Books:</b> 1. Hydrogen as a fuel by Ram D. Gupta, C.R.C. Publication (2009). 2. Polymer Science by V.R. Gowariker,, New Age International Publication (2015). 3. Nanotechnology by T. Gregory, Springer Verlag New York (1999). 4. Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003) 5. Engineering Chemistry by Wiley India Pvt.Ltd,First edition 2011.		

<b>Program:</b>	<b>B. Tech (E &amp; TC)</b>					<b>Semester: II</b>	
<b>Course:</b>	<b>Engineering Chemistry Laboratory</b>					<b>Code:</b>	<b>BSH22BS06</b>
<b>Credits</b>	<b>Teaching Scheme (Hrs. /Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Theory</b>	<b>Practical</b>	<b>Tutorial</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
2	-	4	-	50	-	50	100
<b>Prior knowledge of</b> 1. Theory of acids and bases 2. Molarity, normality and molality 3. Titration method							
<b>Course Objectives:</b> 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.							
<b>Course Outcomes:</b> After completion of this course, the students will be able to, 1. Volumetric analysis for determination of quality of water. 2. Apply various instrumental methods for quantitative and qualitative chemical analysis. 3. Demonstrate the skill for synthesis of engineering materials. 4. Learn the chromatographic separation technique and impact of corrosion. 5. Explore mini projects which are relevant to societal and environmental issues, to develop research attitudes.							
<b>Guidelines:</b> 1. Under Group A category, students have to perform all experiments from the list given below. 2. Under Group B category, students have to perform five experiments from the list given below and one mini project.							
<b>Detailed Syllabus</b>							
<b>Expt. No.</b>	<b>Group A: Suggested List of Experiments</b>						
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 a 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 $\text{KMnO}_4$ , 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.						
8	To prepare the Phenol formaldehyde resin.						
9	Chromatographic separation of ortho- and para nitro-phenol.						
10	Study of corrosion of metal in various mediums						
<b>Expt. No.</b>	<b>Group B: Suggested List of Experiments</b>						
1	Safety in the Chemistry Laboratory						
2	To determine the chloride ion ( $\text{Cl}^-$ ) present in a given water sample by argentometric method/ Determination of residual chlorine in water.						

<b>3</b>	To estimate the amount of Fe (II) present in the given solution potentiometrically.
<b>4</b>	To synthesize p-bromoacetanilide from acetanilide as per Green Chemistry.
<b>5</b>	Determination of acid value of oil.
<p style="text-align: center;"><b>Topics for Mini project:</b>  <b>(Student has to choose one of the topics from list given below but not limiting to)</b></p>	
<b>1</b>	Adsorption studies of Methylene blue on bio adsorbents prepared from agricultural waste.
<b>2</b>	Synthesis of nano-materials
<b>3</b>	Determination of active ingredients from medicines / concentration of dyes in commercial beverages using UV
<b>4</b>	Water audit of water samples
<b>5</b>	One-pot synthesis of biologically active compounds
<b>6</b>	Microwave assisted chemical reactions.
<b>7</b>	Soil analysis of agricultural soil samples
<b>8</b>	Adulterants in food materials.
<b>9</b>	Colloidal synthesis of 2-6 or 3-5 semiconductor quantum dots nanoparticles.
<b>10</b>	Detection of presence of carbohydrates, fats and proteins in given foodstuffs.
<b>11</b>	Preparation of biodiesel.

References:

1. Vogels Text book of Qualitative Chemical Analysis by J.Mendham, R.C,Denny, J.D.Barnes, M.J.K.Thomas, 6 e, Pearson Education ltd.
2. Applied Chemistry Theory and Practice by O.P.Virman and A.K.Narula, 2e, New age International (P) Ltd.

<b>Program: B. Tech. (E&amp;TC)</b>				<b>Semester: II</b>			
<b>Course: Digital Systems</b>				<b>Code: BET22ES01</b>			
Credit	Teaching Scheme			Evaluation Scheme			
				FA		SA	Total
	Lecture	Practical	Tutorial	FA1	FA2	60	100
3	3	-	-	20	20		
<b>Prior knowledge of:</b> Basics of Electronics							
<b>Course objectives:</b> This course aims at enabling students, <ol style="list-style-type: none"> <li>1. To explore the basic concepts of digital electronics and programmable devices.</li> <li>2. To introduce the students to implementation of combinational and sequential logical operations for digital applications.</li> <li>3. To lay the foundation for the design and implementation of digital circuits for various applications in VLSI</li> </ol>							
<b>Course Outcomes:</b> After learning the course, the students will be able to: <ol style="list-style-type: none"> <li>1. Understand basic fundamentals of number systems, codes and combinational logic circuits.</li> <li>2. Build modular combinational circuits with MUX/DEMUX, Decoder, and Comparator etc.</li> <li>3. Construct sequential logic circuits.</li> <li>4. Apply knowledge of the digital logic family for the selection of ICs used in applications.</li> <li>5. Design and simulate arithmetic and sequential circuits using HDL tool flow.</li> </ol>							
<b>Detailed Syllabus:</b>							
Unit	Description					Duration (Hrs)	
<b>I</b>	<b>Number system and codes:</b> Binary, octal, hexadecimal and decimal Number systems and their inter conversion, BCD numbers, gray code, excess-3 code, Binary addition and subtraction, signed and unsigned binary numbers, 1's and 2's complement representation. <b>Combinational Logic Design-I:</b> Definition of combinational logic, Introduction to Logic gates, 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					9	
<b>II</b>	<b>Combinational Logic Design-II:</b> Multiplexers and their use in combinational logic designs, multiplexer trees, De-multiplexers and their use in combinational logic designs, Decoders, Demultiplexer trees, Design Examples: Arithmetic Circuits. BCD - to - 7 segment decoder, Code converters. 4-bit Binary Adder, 4-bit BCD adder, Digital Comparator, Parity generators/checkers					9	
<b>III</b>	<b>Sequential Logic Design:</b> 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.					9	
<b>IV</b>	<b>Logic Families:</b> Logic Families: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, TTL, ECL, CMOS families. Programmable logic devices: Concept of Programmable logic devices, Study of PROM, ROM, DRAM, SRAM, PAL, PLA, Introduction to FPGA and CPLD					9	

<b>V</b>	<b>Introduction to HDL:</b> VLSI Design flow: Design entry: Schematic, different modeling styles in VHDL, Dataflow, Behavioral and Structural Modeling, VHDL constructs and codes for combinational and sequential circuits.	9
<b>Total</b>		<b>45</b>
<b>Text Books:</b> <ol style="list-style-type: none"> <li>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.</li> <li>2. D. L. Perry, "VHDL Programming by Example" 4th Edition, McGraw Hill Publication, 2002.</li> <li>3. Digital Logic with VHDL Design" 3rd Addition, McGraw Hill Publication, 2017</li> </ol>		
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. C.H. Roth, “Digital System Design using VHDL”, 3rd Edition, CENGAGE Learning, 2016.</li> <li>2. J.F.Wakerly, “Digital Design: Principles and Practices", 3rd Edition, Pearson Education, 2010 <ul style="list-style-type: none"> <li>A. Anand Kumar, “Fundamentals of digital circuits”, 4th Edition, Prentice Hall of India Learning, 2016.</li> </ul> </li> <li>3. D.P. Leach, A. P. Malvino and G. Saha, " Digital Principles And Application" 7th Edition, Tata McGraw Hill Publication, 2011</li> </ol>		

Program: B. Tech. (E&TC)					Semester: II		
Course: Digital Systems Laboratory					Code: BET22ES02		
Credit	Teaching Scheme Hrs/week			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100
Prior knowledge of: Basics of Electronics							
<b>Course Objectives:</b> 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.							
<b>Course Outcomes:</b> 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							
<b>List of Experiment</b>							
<b>Part A: Combinational Logic Circuit Implementation</b>							
a. Verification of truth table of basic logic and universal gates. b. Design and implement Code Converter using basic gates							
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							
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)							
Study of IC-74LS85 as a magnitude comparator: a. Design and Implement 5 bit comparator							
To design and verify the truth table of a Parity generator and checker.							
Study of IC-74LS83 as a BCD adder: a. Design and implement single digit BCD adder.							
<b>Part B: Sequential Logic Circuit Implementation</b>							
To verify the truth –table of SR,JK,D & T Flip-flops.							
Study of Counters (IC-74LS90): a. Design and Implement MOD N counter.							
Study of Counters (IC74HC191/ IC74HC193): a. Design & Implement MOD-N Up/down Counter using IC74HC191/ IC74HC193							
Design and Simulate 4-bit right shift and left shift register using D-flip flop using EDA Tool.							
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.							
<b>Part C: VHDL based Design and Simulation</b>							
Design and Simulate adder, subtractor and multiplexer using VHDL.							

Design and Simulate 3 bit up/ down counter using VHDL.
Design 1 bit Full adder using VHDL & implement using FPGA
Mini project
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. S. Brown and Z. Vranesic, "Fundamentals of Digital Logic with VHDL Design" 3rd Addition, McGraw Hill Publication, 2017</li> <li>2. Anand Kumar, "Fundamentals of digital circuits", 4e, Prentice Hall of India Learning, 2016,</li> <li>3. Charles Roth, "Digital System Design using VHDL", 3rd Edition, CENGAGE Learning, 2016,</li> <li>4. J.F. Wakerly, "Digital Design: Principles and Practices", 3e, Pearson Education, 2010,</li> <li>5. D. L. Perry, "VHDL Programming by Example" 4th Edition, McGraw Hill Publication, 2002.</li> </ol>
<b>E sources:</b> <ol style="list-style-type: none"> <li>1. <a href="http://vlabs.iitkgp.ac.in/dec/index.html#">http://vlabs.iitkgp.ac.in/dec/index.html#</a></li> <li>2. <a href="https://da-iitb.vlabs.ac.in/">https://da-iitb.vlabs.ac.in/</a></li> <li>3. <a href="https://dld-iitb.vlabs.ac.in/">https://dld-iitb.vlabs.ac.in/</a></li> </ol>



Program:	B. Tech.(E&TC)					Semester: II	
Course:	Network Theory					Code:	BET22PC01
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	2	-	-	10	10	30	50

**Prior knowledge of:** Passive components & Mathematics is essential.

**Course Objectives:**

This course aims at enabling students,

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 learning the course, the students should be able to:

1. Understand the fundamental concepts of DC electrical circuits.
2. Analyze DC electrical circuits using different network simplification techniques.
3. Apply various theorems to DC electrical circuits with dependent and independent sources.
4. Solve the given resistive network using graph theory for current, voltage and power.

**Detailed Syllabus:**

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

**Text Books:**

1. Ravish Singh, "Network Analysis and synthesis TMH", 2<sup>nd</sup> Edition, 2019.
2. William HHyat, JackE Kimmerly and Steven M. Durbin, "Engineering circuit Analysis", Tata McGraw-Hill, 9th edition, 2002.

**Reference Books:**

1. M.E.VanValkenburg, "NetworkAnalysis", 2002.
2. David E.Johnson, JohnL. 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.  
William H.Hayt, Jr.and JackE. 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](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>

<b>Program: B. Tech. (E&amp;TC)</b>				<b>Semester: II</b>			
<b>Course: Problem Solving with Python Programming</b>				<b>Code: BET22VS01</b>			
<b>Credit</b>	<b>Teaching Scheme Hrs/Week</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>TW</b>	<b>OR</b>	<b>PR</b>	<b>Total</b>
2	-	4	-	100	-	-	100
<b>Prior knowledge of: basic computer programming is essential</b>							
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. To introduce basic python programs using problem-solving aspects, programming and debugging.</li> <li>2. To acquaint to python functions to achieve code reuse.</li> <li>3. To aware students about problems based on strings and its operation using python.</li> </ol>							
<b>Course Outcomes:</b> After the completion of this course, the students will be able to: <ol style="list-style-type: none"> <li>1. <b>Acquire</b> problem solving and basic programming skills in Python.</li> <li>2. <b>Apply</b> decision control structures in python programming.</li> <li>3. <b>Build</b> program using functions, modules and libraries to facilitate code reuse.</li> <li>4. <b>Make use of</b> various operations on strings in python programs.</li> </ol>							
<b>Experiment list based on the Content:</b> Basics of Python Programming, Decision Control Statements, Functions and Modules, Strings and Operations.							
<b>General Guidelines: 16 experiments covering Course Outcomes along with Mini Project.</b>							
<b>Detailed Syllabus:</b> Experiments from the following list need to be completed using any Python Compiler /IDE							
<b>Exp. No.</b>	<b>List of Experiments</b>						
<b>1</b>	Basics of Programming: 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.						
<b>2</b>	Operators and Expressions: 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						
<b>3</b>	To accept the total number of minutes as input and then output as hrs + minutes. Ex:- 90 minutes=1hr 30 mins .						
<b>4</b>	Accept the temperature in celsius from user &convert into Fahrenheit.						
<b>5</b>	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.						
<b>6</b>	Accept the data from the user in a decimal number and return its equivalent binary representation. Note that the decimal number will always be less than 1,024, so the resulting binary number will be ten digits long.						
<b>7</b>	Decision Control statements: 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 $60 \geq$ and $<75$ then the grade is First division. If aggregate is $50 \geq$ and $<60$ , then the grade is Second division. If aggregate is $40 \geq$ and $<50$ , then the grade is Third division.						
<b>8</b>	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).						
<b>9</b>	Write a program to display “Hello” if a number entered by the user is a multiple of five, otherwise print “Bye”.						
<b>10</b>	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 years age, there is a 15% discount. A customer does not receive both discounts. Given the above data, print the cost of the room.						

11	Loop Control Statements: 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.
12	a) Accept the four numbers from the user & find out the larger number among. b) Write a program to find the sum of even numbers from 1 to 20.
13	Functions and Modules: 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.
14	Import math: 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 $x!$ .
15	List: Accept number from 1 to 12 and print equivalent month of a year .
16	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
17	Write a program to print the numbers of a specified list after removing even numbers from it.
18	Tuples, Sets and Dictionaries: 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)
19	Strings and Operations: 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
20	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)
21	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 (@, \$, #) .
22	<b>Mini Project to use all the concepts of course</b>

**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

Program	B. Tech. (E &TC)					Semester: II	
Course:	AEC-I- English					Code: BSH22AE01	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50
Prior Knowledge: Basic knowledge of English Language is essential.							
<b>Course Objectives:</b> 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.							
<b>Course Outcomes:</b> After learning the course, the students will be able to; 1. Understand the role of effective listening skills, grammar and vocabulary in effective communication. 2. Formulate grammatically correct sentences and Enrich their vocabulary 3. Demonstrate reading skills to comprehend various documents 4. Communicate effectively and enhance their phonetic skills.							
Detailed Syllabus:							
Units	Description						Duration (Hrs)
I	Listening Skills: Importance of Listening Skills, Types of Listening: Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills.,						3
II	Writing Skills: Grammar & Vocabulary: Common Errors in English, Modal Auxiliaries. Processes of Word Formation, Words often Confused Elements of Effective Writing, Writing Styles (Formal & Informal), Paragraph Writing (Descriptive, Technical). Professional Writing: Job Application, Leave Application, Enquiry and Complaint Letter. Features of Technical Writing, Report Writing						4
III	Reading Skills: Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension: Factual / Expository / Informative texts, Case Studies, Reading Research Articles. Lesson:1 The Story of An Hour by Kate Chopin, Lesson: 2 The Classical Student by Anton Chekhov.						4
IV	Speaking Skills: Basic Sounds-IPA, Word Stress, Intonation, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking, etc ) Art of Asking and Responding to Questions, Impromptu Speaking, Art of Extempore & Presentations, Role Play, Delivering Welcome Speech, Vote of Thanks, Group Discussion.						4
Total						15	
Lab Session	Activities						Duration (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
<b>Total</b>		<b>30</b>
<b>Text Books:</b>		
1. Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015		
<b>Reference Books:</b>		
1. Michael Swan, Practical English Usage, Oxford, 3 <sup>rd</sup> 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.		
<b>E Sources -</b>		
1. <a href="https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&amp;sa=D&amp;source=editors&amp;ust=1654924489543365&amp;usg=AOvVaw0vWIA1-FXdmtGD4TbPCXo-">https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&amp;sa=D&amp;source=editors&amp;ust=1654924489543365&amp;usg=AOvVaw0vWIA1-FXdmtGD4TbPCXo-</a> 2. <a href="https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&amp;sa=D&amp;source=editors&amp;ust=1654924489545718&amp;usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC">https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&amp;sa=D&amp;source=editors&amp;ust=1654924489545718&amp;usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC</a> 3. <a href="https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1">https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1</a>		

Program:	B. Tech. (E &Tc)				Semester: II		
Course:	AEC-1-German				Code:	BSH22AE02	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	30	50
<b>Prior knowledge of</b> English Language is essential.							
<b>Course Objectives:</b> This course aims at enabling students, 1. To get familiar with the basics of German language and develop their interest in the language. 2. To identify the desired information while reading and listening simple German texts. 3. To acquire basic knowledge of German speaking countries. 4. To frame simple sentences in German.							
<b>Course Outcomes:</b> After learning the course, the students should be able to: 1. Demonstrate an understanding of simple texts in German. 2. Apply basic grammar rules to frame simple sentences in German. 3. Develop simple dialogues in German reflecting situations encountered in daily life. 4. Construct simple texts in German.							
Detailed Syllabus:							
Unit	Description						Duration [Hrs]
I	<b>Introduction to German Language</b>  <b>Topics:</b> Greetings; Alphabet; Numbers; Days; Months; Seasons; Personal details; Family; Hobbies; Self-introduction; Things of day-to-day use; Food & Beverages; Buying goods of day-to-day use; Clock time; Basic knowledge of German speaking countries  <b>Listening skills:</b> Listen and understand spellings, numbers, clock time, details of persons, short easy day-to-day conversations in German  <b>Reading skills:</b> Read and comprehend from visiting cards, brief profiles, simple instruction boards and advertisements, short easy texts, short messages, short letters, and emails in German, read texts aloud and respond by answering questions accordingly						4
II	<b>Basic German Grammar and Sentence Structure</b> <ul style="list-style-type: none"><li>• <b>Personal Pronouns:</b> Nominative</li><li>• <b>Verbs and Verb-Conjugation:</b> Regular, irregular, separable, modal auxiliaries</li><li>• <b>Types of Articles:</b> Definite, indefinite, negative, possessive</li><li>• <b>Cases:</b> Nominative, accusative</li><li>• <b>Prepositions:</b> With accusative case</li><li>• <b>Types of the sentences:</b> Declarative, interrogative, imperative</li><li>• <b>Tenses:</b> Present</li></ul> Solving simple grammar exercises to get used to basic sentence structure in German						4
III	<b>Speaking Skills</b> <ul style="list-style-type: none"><li>• Spelling and pronouncing words correctly</li><li>• Giving brief self-introduction in German</li><li>• Asking for personal details and providing the required information</li><li>• Requesting for things of day-to-day use and reacting on requests in appropriate manner</li></ul> Writing short easy German dialogues and presenting them with expressions						3

IV	<b>Writing Skills</b> <ul style="list-style-type: none"> <li>• Writing short easy sentences in German</li> <li>• Using German punctuation and orthographic rules correctly in given texts</li> <li>• Taking dictation for words and simple sentences</li> <li>• Correcting errors in given texts</li> </ul> Writing simple texts, short messages, letters emails on given topics	4
	<b>Total</b>	15
<b>Lab</b>	<b>Activities</b>	<b>Duration (Hrs)</b>
1	<b>Vocabulary:</b> Exercises to recall and enhance vocabulary	2
2	<b>Listening 1:</b> Listen to the audio and repeat (phonetics)	2
3	<b>Listening 2:</b> Listen to the audio and select the correct option	2
4	<b>Reading 1:</b> Read short easy texts and fill up the information in table	2
5	<b>Reading 2:</b> Read short easy texts and mark true or false	2
6	<b>Reading 3:</b> Read short easy texts and answer the questions	2
7	<b>Grammar 1:</b> Solve simple grammar exercises	2
8	<b>Grammar 2:</b> Construct correct sentences by applying grammar rules	2
9	<b>Speaking 1:</b> Spell and pronounce the words correctly	2
10	<b>Speaking 2:</b> Give your short introduction	2
11	<b>Speaking 3:</b> Frame simple questions, requests and reply	2
12	<b>Writing 1:</b> Fill up simple data in registration forms	2
13	<b>Writing 2:</b> Correct errors in given draft	2
14	<b>Writing 3:</b> Fill in the sentences and rewrite the texts, short messages, emails, and letters	2
15	<b>Presentation:</b> Basic information of India and German speaking countries in German	2
	<b>Total</b>	30
<b>Text Books:</b> 1. Menschen A1.1: Sandra Evnas, Angela Pude, Franz Pecht, Hueber Verlag, Ismaning Germany, 2016		
<b>Reference Books:</b> 1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015 2. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag, Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018 3. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005		
<b>e-sources:</b> 1. <b>NPTEL Course lectures (IIT Madras) link:</b> <a href="https://onlinecourses.nptel.ac.in/noc24_hs29/preview">https://onlinecourses.nptel.ac.in/noc24_hs29/preview</a> 2. <b>DW Learn link:</b> <a href="https://learngerman.dw.com/en/learn-german/s-9528">https://learngerman.dw.com/en/learn-german/s-9528</a> 3. <b>Goethe-Institut Link:</b> <a href="https://www.goethe.de/en/spr/ueb.html">https://www.goethe.de/en/spr/ueb.html</a> 4. <b>Easy German link:</b> <a href="https://www.easygerman.org">https://www.easygerman.org</a>		



<b>Program:</b>		<b>B. Tech. (E &amp; TC)</b>				<b>Semester: II</b>	
<b>Course:</b>		<b>AEC-I (Japanese)</b>				<b>Code:</b>	<b>BSH22AE03</b>
<b>Credits</b>	<b>Teaching Scheme (Hrs./Week)</b>			<b>Evaluation Scheme and Marks</b>			
	<b>Lecture</b>	<b>Practical</b>	<b>Tutorial</b>	<b>FA</b>		<b>SA</b>	<b>Total</b>
				<b>FA1</b>	<b>FA2</b>		
<b>2</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>10</b>	<b>10</b>	<b>30</b>	<b>50</b>
<b>Prior knowledge of:</b> English/Marathi/Hindi language for learning Japanese language.							
<b>Course Objectives:</b> This course aims at enabling students, 1. To be aware of Japanese Scripts (Hiragana, Katakana) and basic Kanjis 2. To familiarize themselves with the Japanese language and use basic greetings in day-to-day life. 3. To express themselves using basic sentences and develop cross cultural skills and understanding of gestures, family and community, perceptions. 4. To develop language skills namely Listening, Speaking, Reading and Writing skills for socializing, at basic level.							
<b>Course Outcomes:</b> After learning the course, the students should be able to: 1. <b>Recognize</b> Japanese scripts through oral and written communication. 2. <b>Interact</b> with the people using Japanese greetings in to their day-to-day life. 3. <b>Demonstrate</b> the basic Kanjis with meanings. 4. <b>Construct</b> simple demonstrative sentences.							
<b>Detailed Syllabus:</b>							
<b>Unit</b>	<b>Description</b>						<b>Duration [Hrs]</b>
I	Introduction: <b>Hiragana Script.</b> Listening: Short video skit on self-introduction Speaking: Song of greetings. Reading: Hiragana words Writing: Japanese scripts (Hiragana) Test on Hiragana						5
II	Introduction: <b>Katakana script</b> Listening: English words Speaking: Song on body parts. Reading: Katakana words Writing: Locating countries on map, Word hunt.						4
III	Introduction to Kanjis Writing: Learn to write kanjis with stroke order.						3
IV	わたしはマイク. ミラーです。 Listening: Conversation based on L-1 Speaking: Self introduction Reading: Lesson reading no.-1 Writing: Writing about yourself. Grammar: Introduction to1.Particles (は、か、も、か) 2.Verbs (です、ではありません)						3
	<b>Total</b>						<b>15</b>

Practical/Lab sessions		
Lab session	Activities	Duration (Hrs)
1	Writing Skill 1: Hiragana script	2
2	Speaking skill 1: Japanese greetings	2
3	Reading Skill 1: Reading and recognizing 'Hiragana' words	2
4	Listening Skill 1: Listening and writing 'Hiragana' words	2
5	Reading Skill 2: Reading 'Katakana' words	2
6	Writing Skill 2: World map activity	2
7	Speaking Skill 2: Self introduction	2
8	Listening Skill 3: Listening and identifying the numbers.	2
9	Reading Skill 3: Reading Numbers with writing practice.	2
10	Speaking Skill 3: Practicing Japanese Greetings.	2
11	Writing Skill 3: Creating Kanjis chart using strokes, 'Kun Yomi' and 'On Yomi'	2
12	Listening Skill 4: Conversation in the office	2
13	Speaking Skill 4: Dialogues between people of different nationality.	2
14	Reading Skill 4: Chapter-1 reading	2
15	Writing Skill 4: Basic sentence formation using grammar.	2
	<b>Total</b>	<b>30 Hrs.</b>
<b>Textbook:</b> 1. Minna no Nihongo Part I and II Publication: GOYAL PUBLISHERS & DISTRIBUTORS PVT. LTD., Author: TsuruoYoshiko (Compiled), Edition:2018 2. Nihongo Shoho Publication:J ALTAP, Author:JALTAP(With permission of Japan Foundation, Tokyo), Edition:April 2008		
<b>Reference Books:</b> 1. Genki 2. MOMO Author: Japan Foundation, NewDelhi, Publication: Goyal Publisher & Distributors(P) Ltd., Edition: October2007 3. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P)Ltd., Edition: October2007 4. MOMO Japanese workbook Japan Foundation, New Delhi, Publication: Goyal Publisher & Distributors(P)Ltd., Edition: October2007 <b>e references:</b> 1. <a href="https://onlinecourses.nptel.ac.in/noc23_hs120/preview">https://onlinecourses.nptel.ac.in/noc23_hs120/preview</a> 2. <a href="https://nptel.ac.in/courses/121104005">https://nptel.ac.in/courses/121104005</a>		

Program	B. Tech. (E & TC)					Semester: II	
Course:	Business Storytelling					Code: BSH22AE04	
Credit	Teaching Scheme (Hrs./Week)			Evaluation Scheme			
	Lecture	Practical	Tutorial	FA		SA	Total
				FA1	FA2		
2	1	2	-	10	10	- 30	50
Prior Knowledge of: Basic knowledge of English Language is essential.							
<b>Course Objectives:</b> 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.							
<b>Course Outcomes:</b> After learning the course, the students will be able to 1. <b>Identify</b> nuances of storytelling method as an influential communication 2. <b>Demonstrate</b> the ability to engage and inspire others through the development of narratives, tone and style 3. <b>Apply</b> storytelling techniques to communicate effectively in a business context 4. <b>Develop</b> stories to build, maintain professional relationships, deliver messages and motivate others toward action.							
Detailed Syllabus:							
Units	Description						Duration (Hrs)
I	<b>Concept and Scope:</b> What is a story? A Brief History & Importance of Storytelling, Basics of Storytelling - Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling, Activity: Analysis of Steve Jobs Commencement Speech at Stanford (2005)						3
II	<b>Process of Storytelling:</b> 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 <b>Activity:</b> Analysis of a Short Story: ‘The Three Hermits by Leo Tolstoy’, The Last Painting by O’ Henry						4
III	<b>Types of Stories</b> - 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 <b>Case studies</b> - Brand storytelling -Steve Jobs / Jack Maa - Product Presentation, Lido Anthony "Lee" Iacocca.						4

IV	<b>Crafting a Story</b> 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 <b>Activity-</b> Developing and Delivering Presentation through Storytelling on the Given Situation/Context	4
<b>Total</b>		<b>15</b>
<b>Lab Session</b>	<b>Activities</b>	<b>Duration (Hrs)</b>
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
<b>Total</b>		<b>30</b>

**Text Books:**

- 1. Kendall Haven, Story Smart, Libraries Unlimited, 2014

**Reference Books:**

- Kendall Haven, Story Proof, Libraries Unlimited, 2007.
- Rob Biesenbach, Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results, Eastlawn Media, 2018.
- Yiannis Gabriel, Storytelling in Organizations: Facts, Fictions, and Fantasies, Oxford University Press, 2011.

**E-resources:**

- The Art of Business Storytelling | Ameen Haque | Talks at Google ,<https://www.youtube.com/watch?v=77FUr6ZsWjY>
- Marketing Storytelling - <https://www.referralcandy.com/blog/storytelling-examples/>
- 5 examples of great storytelling from Jack Ma <https://www.youtube.com/watch?v=3nHOxONWfEs>
- Six words story - Nicole Kahn <https://www.youtube.com/watch?v=16sY1iLc2d4>
- Kevin Hart - Telling great stories [https://www.youtube.com/watch?v=vn\\_L4OPU\\_rg](https://www.youtube.com/watch?v=vn_L4OPU_rg)

Program:	B. Tech. (E & TC)				Semester: II		
Course:	Life Skills II				Code:	BSH22CC02	
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	100	-	-	100
Prior knowledge of: Nil							
<p><b>Course Objectives:</b> This course aims at:</p> <ol style="list-style-type: none"><li>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.</li><li>2. To develop students’ vital life skills that promotes personal growth, resilience, and success in their academic journey and beyond.</li></ol>							
<p><b>Course Outcomes:</b></p> <p>After learning the course, the students will be able to</p> <ol style="list-style-type: none"><li>1. <b>Demonstrate</b> the ways to nurture their passion.</li><li>2. <b>Develop</b> skills growth mindset to be successful in personal and professional life.</li><li>3. <b>Demonstrate</b> adaptability and flexibility for any environment.</li></ol> <p><b>Apply</b> essential skills for successful and happy life management.</p>							
<p><b>Course Guidelines:</b></p> <ol style="list-style-type: none"><li>1. The students are instructed to perform all the activities suggested by the course faculty.</li><li>2. The assessment of life skills activities will be done on the basis of students’ performance, attitude, behavior and understanding of subject.</li><li>3. The students are suggested to attend all the sessions of the life skills course.</li></ol>							
Detailed Syllabus							
Unit	Description						Duration (Hrs)
I	<p><b>Nurture Your Passion</b></p> <p>Developing Hobbies- Importance, Ways and Benefits , Exploring Skills - Singing/Painting/Dancing etc, Sports: Basketball, Table tennis, Football and Volleyball, Performing Arts: Painting/ Sketching/ Drawing, Stage performance, Let’s Play to Learn - games and play forms possible, like, Puzzles &amp; Brainteasers, quiz.</p> <ul style="list-style-type: none"><li>• Activity/Worksheet 1: Nurture Your Passion</li><li>• Activity/Worksheet 2: Importance of Hobbies</li><li>• Activity/Worksheet 3: Stage Performance</li><li>• Activity/Worksheet 4: Performing Arts: Painting/ Sketching/ Drawing</li></ul>						15
II	<p><b>Lead Yourself - Growth Mindset</b></p> <p>Understanding the concept for personal development, Embracing change: Coping with the dynamic nature of life, Resilience and perseverance: Overcoming obstacles and setbacks, Developing self-leadership skills and taking initiative/ responsibilities.</p> <ul style="list-style-type: none"><li>• Activity/Worksheet 5: Understanding the Concept of Personal Development</li></ul>						15

	<ul style="list-style-type: none"> <li>• Activity/Worksheet 6: Embracing Change: Coping with Dynamic Nature of Life</li> <li>• Activity/Worksheet 7: Resilience &amp; Perseverance: Overcoming Obstacles &amp; Setbacks</li> </ul>	
III	<b>Adaptability and Flexibility</b> Adaptability in a rapidly changing world, Problem-solving and decision-making in dynamic situations. Approaching Problem Differently, Embracing uncertainty: Coping with ambiguity and making the most of new opportunities, Flexibility in teamwork: Navigating diverse team dynamics effectively <ul style="list-style-type: none"> <li>• Activity/Worksheet 8: Adaptability in Rapidly Changing World</li> <li>• Activity/Worksheet 9: Flexibility in Teamwork</li> </ul>	15
IV	<b>Life Management</b> Financial Literacy-Saving is earning, Value of money, Coping up with Virtual Life and Reality, Understanding the responsibilities and impact of Global Citizenship, Environmental awareness and sustainable practices (v) Social responsibility: Contributing positively to the community. <ul style="list-style-type: none"> <li>• Activity/Worksheet 10: Financial Literacy &amp; Virtual Life</li> </ul>	15
<b>Total</b>		<b>60</b>
<b>Reference Books:</b> 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		
<b>E Sources -</b> 1) Skills You Need (www.skillsyouneed.com): This website offers comprehensive information and practical guidance on a wide range of life skills, including communication, time management, problem-solving, and more 2) Mind Tools (www.mindtools.com): Mind Tools provides resources on personal effectiveness, leadership, communication skills, and other essential life skills to enhance professional and personal development 3) TED Talks (www.ted.com): TED Talks offer inspiring and informative speeches by experts and thought leaders covering various life skills topics, including resilience, emotional intelligence, and personal growth 4) Very well Mind (www.verywellmind.com): This website covers mental health, emotional well-being, and self improvement topics that contribute to overall life skills development		

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

### **Vision**

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

### **Mission**

Being a student-centric department, our mission is –

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



## **Vision and Mission of E & TC Department**

### **Vision**

To be recognized as a distinguished department in the field of electronics and telecommunication transforming students into competent technocrats by providing an Ethical, Sustainable and Value-Added Quality Education.

### **Mission**

- 1.To create competent Electronics and Tele-communication engineers with Knowledge, Skill and Attitude by establishing a conducive learning environment.
- 2.To nurture technical competency, entrepreneurship skills and promote higher studies through the state-of-art facilities for building successful careers.
- 3.To facilitate research by engaging in projects of industrial requirement and national importance.
- 4.To impart Life skills, Ethical and Social values for self-sustainability.