SIPNA COLLEGE OF ENGINEERING & TECHNOLOGY, AMRAVATI

An Autonomous Institute Affiliated to

Sant Gadge Baba Amravati University, Amravati, Maharashtra (India)

(Approved by AICTE, New Delhi and Recognized by DTE, Maharashtra)

(Accredited with 'A+' Grade by NAAC)

Bachelor of Technology

Syllabus: Semester-I and II

Department of Electronics and Telecommunications Engineering

B. Tech. Electronics and Telecommunications Engineering

(Semester Pattern)

Effective from Academic Year 2026-27

(Applicable to Previous Batches)

Prepared by: Board of Studies - Electronics and Telecommunications Engineering

Approved by: Academic Council Sipna COET, Amravati

			22/09/2026	1.1
Chairman Board of Studies	**Dean Academics**	**Chairman Academic Council**	**Date of Release**	**Version**

Syllabus: Semester I

Program:	B.Tech. (All Branches)	Semester:	I
Course:	Engineering Mathematics-I	Code:	BTALBS01SH1T

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Class Tests, Assignments, Quiz & Class Attendance

Course Objectives: To understand the basic concepts of Differential calculus and Complex numbers.

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

CO	Course Outcomes	BT Level
CO-1	Distinguish between various types of functions to find n^{th} derivative.	L4
CO-2	Explain the basic concepts of partial differentiation.	L5
CO-3	Classify different forms of complex number.	L4
CO-4	Distinguish between various forms of differential equations.	L4
CO-5	Solve higher order differential equations.	L3
CO-6	Apply differential equations to find orthogonal trajectories and in electrical field.	L3

Unit I: Differential Calculus I	**(6 Hrs.)**
Successive Differentiation, Leibnitz's theorem, Taylor's and Maclaurin's theorems.	
Unit II: Differential Calculus II	**(6 Hrs.)**
Partial differentiation, Euler's theorem on homogenous function. Maxima and Minima of a function of several connected independent variables (Lagrange's Multipliers).	
Unit III: Complex Number	**(6 Hrs.)**
De-Moivre's theorem, Separation of real and imaginary parts, Logarithm of complex numbers.	
Unit IV: Ordinary differential equation of first order and first degree	**(6 Hrs.)**
Ordinary differential equation of first order and first degree in variable separable, Linear differential equation, Exact differential equation, non-exact differential equation.	
Unit V: Differential equations of first order and higher degree	**(6 Hrs.)**
Differential equations of first order and higher degree by solvable for p, Clairaut's differential equation by solvable for y, Reducible to Clairaut's differential equation (type-I, II and III).	
Unit VI: Applications of Differential Equation	**(6 Hrs.)**
Application to Orthogonal trajectories, Electrical circuits and Growth Problems.	
Total Lecture	**36 Hours**

Textbooks:

1. Wartikar P. N., Wartikar J. N – A textbook of applied Mathematics. Volume I, II. V.G. Prakashan, Pune
2. Grewal B. S. – Higher Engineering Mathematics, Khanna Publishers.
3. Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
4. Singh R. R. & Bhatt M. - Engineering Mathematics.
5. Ramana B.V. - Higher Engineering Mathematics.

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Reference Books:

1. N. P. Bali & Manish Goyal- A textbook of Engineering Mathematics, Laxmi Publications.
2. Veera Rajan T - Engineering Mathematics for first Year, (TMH)

MOOCs Links and additional reading, learning, video material	
1.	NPTEL : Mathematics - NOC: Engineering Mathematics - I
2.	Differential Calculus - Course (swayam2.ac.in)
3.	https://www.mooc-list.com/tags/differential-equations
4.	Complex Number - Definition, Formula, Properties, Examples (cuemath.com)

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Program:	B. Tech. (All Branches)			Semester:	I			
Course:	Engineering Chemistry			Code:	BTALBS02SH1T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Assignments, Class Tests, Viva Voce, Case Study Report, Attendance

Course Objectives: To impart a sound knowledge of the fundamental concepts of chemistry, involved in the study of several Engineering materials and related applications.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Apply the knowledge of chemistry for treatment of water	L5
CO-2	Understand the importance, need and applications of green technology for power generation by using renewable energy sources	L6
CO-3	Understand the construction, working and applications of advanced batteries.	L6
CO-4	Identify the application of various useful engineering materials such as nanomaterial, cement and lubricants, based on their properties	L3
CO-5	Understand the preparation, properties and uses of various polymeric materials.	L2
CO-6	Identify the need of reducing, reusing and recycling of E-waste to protect the environment.	L6

Unit I: Water Treatment **(6 Hrs.)**

Hardness of water, Types of hardness- Temporary & Permanent Units of Hardness, Disadvantages of hard water, Softening of water, Softening methods like Ion-Exchange, Reverse Osmosis. Numerical Problem based on calculation of hardness of water.

Unit II: Green Technology **(6Hrs.)**

A] Solar Power System: Introduction to solar energy, Need of solar energy, Conversion of solar energy, Photovoltaic cells-construction, working, advantages and disadvantages.
B] Green Hydrogen: Introduction to hydrogen energy, Production of hydrogen from fossil fuels and electrolysis of water, Storage and transportation of hydrogen energy, Use of green hydrogen as a fuel. Case study on green energy

Unit III: Battery Technology **(6 Hrs.)**

Introduction and definition of battery, classification of batteries with examples-
A] Electrochemical cell: Principle, construction, working and applications of Lead-Acid battery, Nickel-Cadmium battery, Lithium- ion battery.
B] Fuel Cells: Principle, construction, working and application of H2-O2 fuel cell and DMFC.

Unit IV: Engineering Material **(6 Hrs.)**

A) Nanomaterial: Definition and classification of Nanomaterial, Methods of preparation. Properties and Application of nanomaterials.
B) Cement: Introduction of cement, Ingredients of cement and their functions, Wet process of manufacturing of cement, Properties of cement- setting and hardening, heat of hydration, soundness of cement.
C) Lubricant: Introduction and Functions of lubricant, Classification of lubricant, Mechanism of lubrication, Properties of liquid lubricant, Viscosity, Viscosity index, Flash point, Fire point, Cloud point and Pour point.

Unit V: Polymer Science **(6 Hrs.)**

Introduction, Methods of Polymerization, Addition and Condensation Polymerization, Examples of Polymer-
A] Thermo softening and Thermosetting polymers- Preparation, Properties & uses of PVC, TEFLON, Bakelite, Epoxy resins (Araldite).
B] Rubber: Preparation and properties of Natural Rubber, Vulcanization of natural rubber and its advantages, Synthetic rubber-Buna-S, Buna-N, Butyl rubber.
C] Biodegradable Polymer: Introduction, Classification of biodegradable polymer with examples and Industrial applications of biodegradable polymer.

Unit VI: E-Waste Management **(6 Hrs.)**

Introduction, Need of E-waste management, Sources of E-waste, Types of E-waste, Toxic materials in E-waste and their health hazards, Recycling of E-waste (Separation and direct recycling), Recovery of metals from E-waste by Pyrometallurgy and Hydrometallurgy technique, Controlling steps of E-waste. Case study on E-waste management.

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Total Lecture	**36 Hours**

Textbooks:	
1.	A Text Book of Engineering Chemistry by S.S.Dara ,S. Chand & Company Ltd.
2.	Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company (P) Ltd.
3.	A Text book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company (P) Ltd.
4.	An Introduction to Nano material & Nanoscience by A K.Das & M.Das (CBS Publisher & Distributor)
5.	A Text book on experiments a calculation in Engineering Chemistry by S.S. Dara, S. Chand & Company Ltd.
6	Advanced Practical in Physical Chemistry by J.B. Yadav, Krishna's Prakashan Media (P) Ltd.

Reference Books:	
1.	Chemistry in Engineering & Technology, Vol I & Vol II by J. Rajaram & J.C. Kuriacose. McGraw-Hill Education
2.	A Text Book of Polymer Science & Tech by V. Gowarikar, New age International Publisher
3.	Nanotechnology Fundamentals and Applications by Manasi Karkare, I K International Publisher
4.	Solar energy: Principles of Thermal collection and storage, S.P. Sukhatme, Tata McGraw-Hill
5.	Solar photovoltaic: Fundamental Technologies and Applications, Chetan singh Solanki Prentice Hall
6.	E-waste: Implications, regulations, and management in India and current global best practices, Johri R., TERI Press, New Delhi

MOOCs Links and additional reading, learning, video material	
1.	https://nptel.ac.in/courses/105107207
2.	https://archive.nptel.ac.in/courses/105/105/105105178/
3	https://onlinecourses.nptel.ac.in/noc20_ph21/preview
4	https://onlinecourses.nptel.ac.in/noc22_ee71/preview
5	https://onlinecourses.nptel.ac.in/noc22_ch66/preview
6	https://onlinecourses.nptel.ac.in/noc21_mm34/preview
7	https://archive.nptel.ac.in/courses/112/102/112102014/
8	https://archive.nptel.ac.in/courses/104/105/104105124/
9	https://archive.nptel.ac.in/courses/113/105/113105028/
10	https://archive.nptel.ac.in/courses/105/105/105105169/

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Program:	B. Tech. (All Branches)			Semester:	I
Course:	Engineering Chemistry Lab			Code:	BTALBS03SH1P
Teaching Scheme				Evaluation Scheme	
Practical	Tutorial	Hours	Credit	INT	EXT	Total
1	-	2	1	30	20	50

Course Objectives:

- To enable the students to get hands-on experience on the concepts discussed during theory classes.
- To provide practical knowledge of quantitative analysis of materials by volumetric and chemical method.
- To impart knowledge about instrumental methods for developing experimental skills.

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

CO	Course Outcomes	BT Level (L1 to L6)
1	Determine the hardness and dissolved oxygen in water.	L5
2	Analyze, interpret & utilize the engineering materials in various engineering field.	L4
3	Determine important properties of lubricants like viscosity, flash point, by using suitable methods and instrumentation.	L5
4	Synthesize polymers by using suitable chemicals.	L6
5	Interpret data of conductivity change during acid base reaction as well as relate the cell potential (EMF) to the concentration of electrolyte	L5
6	Analyze the coal sample by proximate analysis.	L4

General Guidelines: Minimum 8 Experiments are to be conducted covering entire syllabus

Expt. No.	List of Experiments
1	Determination of NaOH and Na_2CO_3 in given alkali mixture.
2	Determination of hardness of water by EDTA complexometric titration.
3	Determination of Dissolved oxygen from water.
4	Determination of % of Fe_2O_3 from cement sample
5	Determination of Acid value of lubricating oil.
6	Study of variation in viscosity of lubricating oil on increase temperature by using Redwood viscometer No.1.
7	Determination of Flash point of lubricating oil by using Abel's flash point apparatus.
8	Preparation of Phenol and Urea formaldehyde polymer.
9	To find out strength of acid by titrating it with dilute Alkali conductometrically.
10	Study of EMF of a Daniel cell at varying concentration of electrolyte.
11	To carry out proximate analysis of coal.

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Program:	B. Tech. (All Branches)			Semester:			I	
Course:	Engineering Graphics			Code:			BTALES01ME1T	
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE - I	MSE - II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment. Viva

Course Objectives:

- Inculcate knowledge and develop the essential skills among students to communicate technical information effectively & contribute to the design, manufacturing & analysis of engineering processes.

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

CO	Course Outcomes	BT Level
CO-1	Read/Interpret/prepare the engineering drawings	L 2
CO-2	Show the projections of Lines in different possible positions	L 1
CO-3	Show the projections of 2D objects	L 1
CO-4	Interpret and draw the projections and sectional views of 3D objects	L 2
CO-5	Develop the orthographic views of 3D objects	L 3
CO-6	Develop the isometric views & projections of 3D objects	L 3

Unit I: Introduction to Engineering Graphics **(06 Hrs.)**

Projections of points in all possible positions w.r.t. reference planes. Projections of lines when it is parallel to both reference planes, perpendicular to one of the reference planes, when line is inclined to one and parallel to other reference plane & when line is inclined to both reference planes.

Unit II: Projection of Planes **(06 Hrs.)**

Projection of planes parallel to one and perpendicular to other reference plane, inclined to one reference plane, inclined to both the reference planes.

Unit III: Projection of Right Regular Solids **(06 Hrs.)**

Projection of solid when axis is perpendicular to one of the reference planes and parallel to other reference plane, when axis is inclined to one and parallel to other reference plane, when axis is inclined to both the reference planes, Projection of cube, right regular prisms, right regular pyramids, right circular cylinder, right circular cone & Tetrahedron.

Unit IV: Section of Solids **(06 Hrs.)**

Section of right regular Solids including cube, right regular prisms, right regular pyramids, tetrahedron, right circular cylinder and right circular cone in simple position.

Unit V: Orthographic Projection **(06 Hrs.)**

Principles of Orthographic Projections, Conventions, Multi view orthographic projections for parts/ patterns with isometric/ non-isometric surfaces and circular features and sectional views. Reading of orthographic.

Unit VI: Isometric View and Projection **(06 Hrs.)**

Principles of Isometric projection, Isometric Scale, Isometric Views, Isometric Views of Simple Solids; conversion of Orthographic views to Isometric views and Isometric Projection.

Total Lectures **36 Hrs.**

Textbooks:

1. Bhatt N. D., Panchal V.M. Engineering Drawing, Charotar Publishing House.
2. Jolhe D. A. Engineering Drawing with an Introduction to Auto CAD, Tata McGraw- Hill Publishing Co. Ltd., New Delhi.
3. Shah P. J., Engineering Drawing, S. Chand Publication

Reference Books:

1. Naraynan K. L., Kannaiah P. – Engineering Drawing, Scitech
2. Dhawan R. K. – Engineering Drawing, S. Chand Publication

MOOCs Links and additional reading, learning, video material

1. NPTEL Course: Engineering Drawing & Computer Graphics, Link: https://nptel.ac.in/courses/112105294

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Program:	B. Tech. (All Branches)			Semester:		I
Course:	Engineering Graphics Lab			Code:		BTALES02ME1P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives: Inculcate knowledge and develop the essential skills among students to communicate technical information effectively & contribute to the design, manufacturing & analysis of engineering processes.

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

CO	Course Outcomes	BT Level
CO-1	Read/Interpret/prepare the engineering drawings	L 2
CO-2	Show the projections of Lines in different possible positions	L 1
CO-3	Show the projections of 2D objects	L 1
CO-4	Interpret and draw the projections and sectional views of 3D objects	L 2
CO-5	Develop the orthographic views of 3D objects	L 3
CO-6	Develop the isometric views & projections of 3D objects	L 3

General Guideline: Prepare any six drawing sheets out of seven listed below

Sheet No.	List of Drawing Sheets
1	Projection of Lines
2	Projection of Planes
3	Projection of Solids
4	Section of Solids
5	Orthographic Projection
6	Isometric View & Projection
7	Free hand sketches of simple machine elements, like: (a) Screw threads ISI profile, (b) Types of nuts, bolts, studs, set screws, washers, locking arrangement of nuts & bolts (c) Foundation bolts – Rag, eye, lewis types

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:				I
Course:	Introduction to Digital Electronics			Course Code:				BTETES03ET1T
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
2	-	2	2	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Viva Voce

Course Objectives:

- Students learn the fundamental concepts of digital electronics, including binary arithmetic, logic gates, and Boolean algebra.
- Introducing sequential circuits involving memory elements (flip-flops) and how to design them for various applications
- Familiarizing students with essential digital components such as registers, counters, multiplexers, and decoders.
- Providing examples of digital electronics applications in various fields like computing, telecommunications, and control systems.

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	To study basic concepts of number systems and codes.	L1
CO-2	To understand the techniques of Boolean Algebra and its implementation for minimization of Boolean expression.	L2
CO-3	To realize the different types of Logic Gates.	L3
CO-4	To work out the formal procedures for design of combinational circuits.	L4

Unit I: Number Systems	**(6 Hrs.)**
Number system and their conversions: Binary, octal, Decimal, Hexadecimal number, BCD code, gray code, one's and two's complements.	
Unit II: Boolean Algebra	**(6 Hrs.)**
Boolean Algebra, De-Morgan's Theorem, Simplifications using Boolean Algebra, SOP and POS form	
Unit III: Logic Gates	**(6 Hrs.)**
Introduction of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR logic Gates, Realization of Logic Expressions, K map (up to four variable).	
Unit IV: Combinational Circuits	**(6 Hrs.)**
Arithmetic Circuits: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Introduction to Multiplexers and Demultiplexers.	
Total Lecture	**24 Hours**

Textbooks:

1. M. Morris Mano and M. D. Ciletti, "Digital Design", Pearson Education
2. R P Jain, "Modern Digital Electronics", 3rd Edition TMH.

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Reference Books:	
1.	Wakerly, "Digital Design: Principles and Practices", 3rd edition, Pearson Education, 2004.
2.	Charles H. Roth, "Fundamentals of Logic Design", 4th Edition, Jaico Publication
3.	Lee S.C, "Digital Circuits and Logic Design", PHI
4.	Richard S. Sandige, "Modern Digital Design", McGraw-Hill Series in Electrical Engineering.

MOOCs Links and additional reading, learning, video material	
1.	**Coursera** • Digital Systems by University of Illinois at Urbana-Champaign • Introduction to Digital Electronics by Rice University

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:		I
Course:	Introduction to Digital Electronics Lab			Course Code:		BTETES04ET1P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

- Provide practical experience in building, testing, and debugging digital circuits using breadboards, logic gates and other components.
- To design simple combinational logic circuits to achieve specific functions or tasks.
- Strengthen theoretical understanding through the hands-on construction of logic circuits and direct observation of their operational characteristics.

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Apply theoretical concepts learned in lectures to design and implement basic digital logic circuits.	L 1
CO-2	Realize Boolean expressions using Logic Gates.	L 2
CO-3	Understand the operation of various logic gates and their implementation using digital IC's.	L 2
CO-4	Implement various combinational logic circuits.	L 2

Expt. No.	List of Experiments
1	To Perform Binary to Gray code conversion and Gray to Binary
2	To verify the operation of logic gates
3	Verify the operation of Adders using logic gates.
4	Verify the operation of Subtractors using logic gates.
5	Verify the truth table of multiplexer using logic gates.
6	Verify the truth table of demultiplexer using logic gates.
7	Verify the operation of Universal logic gates.
8	To study and verify the operation of various digital logic families.

Minimum 8 experiments are to be conducted covering on entire syllabus.

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:		I
Course:	Electronics Appliances and Maintenance Lab			Course Code:		BTETVS01ET1P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	50	-	50

Course Objectives:

- Familiarize students with basic electronic components used in household appliances, such as resistors, capacitors, diodes, transistors, and integrated circuits.
- Provide practical exposure in diagnosing, repairing, and maintaining common electronic appliances found in households or small businesses.
- Imparting the students with various repair techniques for electronic appliances, including soldering, component replacement.
- Understand the principles of preventive maintenance for electronic appliances to prolong their lifespan and minimize breakdowns.

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	To Study the different tools, electrical materials, symbols and abbreviations.	L1
CO-2	To understand different parameters of signal and its observations using CRO.	L2
CO-3	To study single-phase and two-way wiring for household application.	L1
CO-4	To study the different properties, parameters and characteristics of solar cell.	L1
CO-5	To study working of different electronics devices like of Home Inverter, UPS, SMPS.	L1
CO-6	To understand measurement of capacitance and inductance using LCR meter.	L2

Expt. No.	List of Experiments
1	Introduction of tools, electrical materials, symbols and abbreviations.
2	To measure the signal amplitude & frequency using CRO.
3	Design and implementation of single-phase wiring for household application.
4	To design and implement two-way wiring for stairs.
5	Execute soldering & de-soldering of various electrical components for electronic circuits.
6	Testing of PV Panel parameters like Pmax, Vmp, Imp, Voc, Isc.
7	To study the principle of conversion of solar energy into electricity
8	To study the basics of solar cell, module, arrays and panels
9	To identify the different types of cables and connectors
10	To measure the resistor value by color code and verify the same using multimeter
11	To Estimate energy consumptions and verify it using energy meter.
12	To study circuit of SMPS
13	To study circuit and working of UPS.
14	To study circuit and working of Home Inverter.
15	To identify different Capacitor and measure the values using LCR meter.

Minimum 8 experiments are to be conducted covering on entire syllabus.

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Program:	B.Tech. (Electronics and Telecommunication Engineering)			Semester:			I	
Course:	Design Thinking			Code:			BTETVS02ET1T	
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
01	--	01	01	50	--	--	--	50

Methods of Teacher Assessment (TA): Attendance, Presentation, Class Test, Viva Voce

Course Objectives:

- To introduce students to the fundamental principles and stages of design thinking, including empathy, ideation, and prototyping.
- Show students how to use design thinking techniques in everyday situations to come up with innovative solutions.

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Know the steps of design thinking and how to use them to create new solutions for problems.	L3
CO-2	Make simple models and improve them by evaluating the best solutions.	L4

Unit I: An Overview & Applications of Design Thinking	**(06 Hrs.)**
Introduction to Design Thinking, Creativity and Innovation- The Drivers of Design Thinking, Attributes of Design Thinking, Critical Success Factors, Principles of Design Thinking, Evolution of Design Thinking, 3Ps of Design Thinking, Design Thinking as a Business Strategy, Features and Applications of Design Thinking, Phases of Design Thinking, Applications of Design Thinking	
Unit II: Double Diamond Design Thinking and Sustainability: Growth and Ethics	**(06 Hrs.)**
Design Thinking Tools and Techniques, Double Diamond Design Thinking: Double Diamond Model, the 4 D's of Double Diamond, Designing for Business Growth, Ethics in Design Thinking. Design Thinking for Sustainability: Introduction, Pillars of Sustainability.	

Textbooks:

1. E. Balagurusamy, Bindu Vijaykumar, "Design Thinking: A Beginner's Perspective", McGrawHill Publications.
2. E. Balagurusamy, Developing Thinking Skills.

Reference Books:

1. Anuja Agarwal, "Design Thinking: A Framework for Applying Design Thinking in Problem Solving", Cengage Publications.
2. Pavan Soni, "Design Your Thinking.

MOOCs Links and additional reading, learning, video material

1. https://onlinecourses.nptel.ac.in/noc22_mg32/ (Design Thinking - A Primer By Prof. Ashwin Mahalingam, Prof. Bala Ramadurai | IIT Madras

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Program:	B. Tech. (All Branches)			Semester:	I
Course:	Professional Communication			Code:	BTALAE01SH1P
Teaching Scheme				Evaluation Scheme	
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	1	3	2	30	20	50

Course Objectives:

- To impart knowledge and orient students about:
- Communication, barriers to communication and non-verbal cues of communication
- Basic writing, oral communication, business communication, & computer proficiency skills
- Providing hands-on experience through group discussion, mock interview, group and individual presentation

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

CO	Course Outcomes	BT Level (L1 to L6)
1.	Understand the process of communication and overcome the barriers.	L3
2.	Prepare and present effective presentations aided by ICT tools.	L5
3.	Develop a comprehensive understanding of some specific forms of writing used in professional communication.	L6
4.	Demonstrate the formats, strategies and content of business communication at workplace.	L5
5.	Ability to communicate effectively in both formal and informal situations.	L6
6.	Ability to handle the interview process confidently.	L5

General Guidelines: All practical are mandatory

Expt. No.	List of Experiments	CO Mapping
	Introduction to Communication	
1	Types of communication & Barriers to communication	1, 5
2	Introduction to body language: gestures, posture & facial expressions	1, 5
	Computing Skills	
3	Introduction to MS-Office: Word, Power-point &Excel	2, 3, 4, 5
4	Creating Google Forms, arranging Google meet	2, 5
	Business Communication:	
5	Email Writing	3, 4, 5
6	Vocabulary for business correspondence	3, 5
	Team Building Skills	
7	Group Discussion	5
8	Presentation	2, 5
	Job Readiness Skills	
9	Self-Introduction + Interview Techniques	5, 6
10	Resume writing + Digital Resume	3, 6
11	Creating LinkedIn profile	2, 3

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Reference Books:	
1.	Sanjay Kumar & Pushp Lata – Communication Skills
2.	Meenakshi Raman & Sangeeta Sharma – Technical Communication: Principles and Practice
3.	M. Ashraf Rizvi – Effective Technical Communication
4.	R.C. Sharma & Krishna Mohan – Business Correspondence and Report Writing

MOOCs Links and additional reading, learning, video material	
1.	Preview: Soft Skill Development | SWAYAM
2.	Preview: Body Language: Key to Professional Success | SWAYAM
3.	nptel.ac.in/courses/109107195

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Program:	B.Tech. (All Branches)			Semester:	I			
Course:	Values & Ethics			Code:	BTALVE01SH1T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-I I	ESE	Total
2	-	2	2	10	15	15	60	100

Methods of Teacher Assessment (TA): Assignment, Class Test, Attendance, Quiz

Course Objectives: To understand universal human values & ethics.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Identify the need of value education	L3
CO-2	Understand harmony in human being and society	L2
CO-3	Outline the relationship and natural ethical justice	L2
CO-4	Evaluate the case studies of holistic systems.	L5

Unit I: Introduction to Value Education	(6 Hrs.)
Need, Basic Guidelines, Content and Process for Value Education, Skill education, Value based education Vs. Skill based education, Importance of universal human values in technical education, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority, understanding and living in harmony within self- Self- Exploration-what is it? - Its content and process; 'Natural Acceptance' and Experiential Validations the process for self-exploration, Success, Stress Management in engineering life, self-confidence and self-discipline in engineering career.	
Unit II: Understanding Harmony in the Human Being and Society	**(6 Hrs.)**
Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - happiness and physical facility, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony in the society-Social responsibility of engineers, teamwork and project management	
Unit III: Understanding Harmony in the Family and Nature	**(6Hrs.)**
Harmony in Human-Human Relationship, Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships), Understanding the meaning of Trust; Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation. Understanding the harmony in the Nature, Interconnectedness, and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature.	
Unit IV: Holistic Development Towards Universal Human Orders	**(6Hrs.)**
Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations.	
Total Lecture	**24Hours**

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Textbooks:	
1.	A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Asthana, G.P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2.	Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R.R. Gaur, R. Asthana, G.P. Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:	
1.	JeevanVidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3.	The Story of Stuff website, https://www.storyofstuff.com/
4.	The Story of My Experiments with Truth - by Mohandas Karamch and Gandhi
5.	Small is Beautiful - E. F Schumacher.
6.	Slow is Beautiful - Cecile Andrews
7.	Economy of Permanence - J C Kumarappa
8.	Bharat Mein Angreji Raj – Pandit Sunderlal
9.	Rediscovering India - by Dharampal
10.	Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11.	India Wins Freedom - Maulana Abdul Kalam Azad
12.	Vivekananda - Romain Rolland (English)
13.	Gandhi - Romain Rolland (English)

MOOCs Links and additional reading, learning, video material	
1.	Universal Human Values website, http://www.uhv.org.in/
2.	https://aktu.ac.in
3.	https://onlinecourses.nptel.ac.in/noc20_ee67/preview

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Program:	B.Tech. (All Branches)			Semester:				I
Course:	Environmental Studies			Code:				BTALVE02SH1T
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
1	0	1	1	50	-	-	-	50

Methods of Teacher Assessment (TA): Assignment, Project work, Quiz, Attendance

Course Objectives:

- Comprehend Sustainable Development Goals for present generation
- Appreciate concept and method from ecological and physical science and their application in environmental problem solving.
- Analyze the status of environment with respect to precautionary mechanisms and control measures.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Understand and evaluate the concept of scope of environment and it's social issues.	L2
CO-2	Apply and analyze the concept of causes, effect and control of different types of environmental pollution.	L4

Unit I: The Multidisciplinary Approach in Environmental Studies and it's Ecosystem **(06 Hrs.)**

Definition, scope and importance, Need for public awareness. Unsustainable to Sustainable Development.

Natural Resources: Renewable and Non-Renewable resources:

Availability, Use, Over exploitation and associated environmental problems related to following Natural resources: Forest resources, Water resources, Mineral resource, Food resources, Energy resources, Land resources, Role of individual in conservation of natural resources, Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids, Introduction, types, characteristic features, structure and function of the following ecosystem: - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries.

Unit II: Biodiversity Conservation and Environmental Pollution **(06 Hrs.)**

Introduction – Definition: genetic, species and ecosystem diversity, Bio geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega diversity nation, Hot-spot of biodiversity,Threatstobiodiversity:habitatloss,poachingofwildlife,man-wildlifeconflicts,Endangeredand endemic species of India, Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. Case Studies: • Visit to a local area to document environmental assets- river/ forest/grassland.

Study of local ecosystems – pond, lake, river, forest etc. Definition, Cause, effects and control measures of: -Air pollution, Water pollution (CETP, ETP), Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards, Solid waste Management : Causes, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides.

Case Studies: Visit to a local polluted site –industrial/agricultural/rural/urban.

Total Lectures 12 Hours

Text Books:

1. Text Book of Environmental studies, Erach Bharucha, UGC
2. Miller T.G.. Jr., Environmental Science. Wads worth Publications
3. Clark R.S., Marine Pollution, Clanderson Press Oxford
4. Mhaskar A.K., Matter Hazardous, Techno-Science Publications

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Reference Books:	
1.	Agrawal, K.C.,2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2.	De A. K., Environmental Chemistry, Wiley Eastern Ltd.
3.	Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders CO., U.S.A.,574p.
4.	Shrama B.K. 2001, Environmental Chemistry, Goel Publ. House, Meerut.
5.	Fundamental concepts in Environmental Studies, D D Mishra, S. Chand & Co Ltd.
6.	Ecology, M.P. Arora, Himalaya Publishing House.
7	Ecology and Environment, P. D. Shrama

MOOCs Links and additional reading, learning, video material:	
1.	https://onlinecourses.swayam
2.	https://www.ugc.gov.in
3.	https://www.hzu.edu.in
4	https://www.researchgate.net

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Syllabus: Semester II

Program:	B. Tech. (All Branches)			Semester:				II
Course:	Engineering Mathematics - II			Code:				BTALBS04SH2T
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Class Tests, Assignments, Quiz & Class Attendance

Course Objectives: To acquire the basic concepts of integral calculus, Matrix and Infinite Series.

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

CO	Course Outcome	BT Level
CO-1	Utilize concepts of matrix through different problems.	L2
CO-2	Find Fourier series for different functions	L1
CO-3	Explain the concepts of differential under integral sign, curve tracing	L5
CO-4	Apply the knowledge of double integration to find area.	L3
CO-5	Find volume by triple integration	L1
CO-6	Test convergence of series by various tests.	L4

Unit I: Matrix	**(6 Hrs.)**
Rank of a matrix, system of linear equations, Eigen values & Eigen vectors.	
Unit II: Fourier Series	**(6 Hrs.)**
Fourier expansion of periodic function in (C, C+2L), Half range Fourier series, Practical harmonic analysis.	
Unit III: Integral calculus & Curve tracing	**(6 Hrs.)**
Tracing of curve in Cartesian form, polar form, Rectification.	
Unit IV: Integral Calculus I	**(6 Hrs.)**
Double Integration, Transformation to polar coordinates, Evaluation of area by double integration.	
Unit V: Integral Calculus II	**(6 Hrs.)**
Triple Integration, Transformation to spherical polar coordinates, Volume by triple integration.	
Unit VI: Infinite Series	**(6 Hrs.)**
Test of convergence, Comparison test, Cauchy's Root test, D'Alembert's Ratio test.	
Total Lectures	**36 Hours**

Textbooks:

1. Wartikar P. N., Wartikar J. N – A text book of applied Mathematics. Volume I, II. Vidyarthi Griha Prakashan, Pune
2. Grewal B. S. – Higher Engineering Mathematics, Khanna Publishers.
3. Kreyszig E.K. - Advanced Engineering Mathematics, John Wiley.
4. Singh R. R. & Bhatt M. - Engineering Mathematics.
5. Ramana B.V. - Higher Engineering Mathematics.

Reference Books:

1. N. P. Bali & Manish Goyal- A text book of Engineering Mathematics, Laxmi Publications.
2. Veera Rajan T - Engineering Mathematics for first Year, (TMH)

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MOOCs Links and additional reading, learning, video material	
1.	NPTEL :: Mathematics - NOC: Engineering Mathematics - I
2.	leep203.pdf (ncert.nic.in)
3.	Integral Calculus Engineering Mathematics - YouTube
4.	Convergence tests - Wikipedia
5.	Summary of Convergence Tests - Mathematics LibreTexts

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Program:	B. Tech. (Electronics and Telecommunication Engineering)	Semester:	II
Course:	Engineering Physics	Code:	BTETBS05SH2T

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credits	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Quiz

Course Objectives: To acquire the fundamental knowledge about

- Semiconducting materials.
- Physics of modern engineering and electromagnetic phenomenon.
- Study of optical phenomena.

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

CO	Course Outcomes	BT Level (L1 toL6)
CO-1	Utilize the fundamental knowledge in Physics about the semiconducting materials, semiconducting devices & it's applications	L3
CO-2	Explain electromagnetic phenomena and its applications.	L2
CO-3	Develop the knowledge about fiber optics and LASER and its applications.	L3
CO-4	Make use of theoretical principles and fundamentals of modern aspects in Physics.	L3
CO-5	Illustrate and distinguish the optical phenomena.	L4

Unit I: Fundamentals of semiconductors	**(6 Hrs.)**
Classification of solids on the basis of band theory, Types of semiconductors, Fermi level in intrinsic semiconductors & its derivation, Electrical conductivity of semiconductor, P-N junction diode, Zener diode, Light Emitting Diode.	
Unit II: Electric and magnetic Fields	**(6Hrs.)**
Motion of electron in uniform transverse electric field and transverse magnetic field, Motion of electron incross fields, Positive rays & it's properties, Bainbridge Mass Spectrographs, CRO (Block diagram of CRO)	
Unit III: Fibers Optics	**(6 Hrs.)**
Propagation of light through optical fiber (Principle & construction of fiber optics), Acceptance angle & Acceptance cone, Numerical Aperture, Classification of optical fiber on the basis of R.I. profile, Attenuation & different mechanisms, Applications and advantages of optical fibers in engineering.	
Unit IV: LASER	**(6 Hrs.)**
Spontaneous & stimulated emission of radiation, population inversion, pumping- types, active medium, active center, resonant cavity, characteristics of LASER beam, three level energy system, Ruby laser (construction & working), Application of LASER.	
Unit V: Introduction to quantum physics	**(6 Hrs.)**
Planck's Hypothesis, Properties of photon, De-Broglie's concept of matter waves & it's properties, Heisenberg's Uncertainty Principle (Statement) and its time energy relation, Application of uncertainty principle (electron cannot exit in the nucleus), Compton effect (statement and experimental setup).	
Unit VI: Interference and diffraction	**(6Hrs.)**
Interference: Fundamental conditions of interference, thin film interference due to reflection of light, Newton's rings; equation for radius of bright and dark rings, determination of wavelength of sodium light using Newton's ring. Diffraction: Fresnel & Fraunhoffer class of diffraction, plane diffraction grating, construction & determination of wavelength of light using grating.	

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Total Lecture	**36 Hours**

Textbooks:	
1.	M.N. Avadhanulu & P. G. Kshirsagar, TVS Arun Murthy: A Textbook of Engineering Physics, S. Chand and company limited,2022

Reference Books:	
1.	R. K. Gaur & S. L. Gupta: Engineering Physics, Dhanpat Rai & Sons.
2.	Hitendra K. Malik & A. K. Singh: Engineering Physics, Tata McGraw Hill
3.	Mani & Mehta: Mordern Physics, Affiliated East- West Press
4.	N. Subrahmanyam, Brijlal, M. N. Avadhanulu: A Text Book of Optics, S. Chand & Company.
5.	A.J.Dekkar,Solid State Physics,Mc Millan Publishers.

MOOCs Links and additional reading, learning, video material	
1.	https://archive.nptel.ac.in/courses/115/102/115102124/
2.	https://archive.nptel.ac.in/courses/115/107/115107095/
3.	https://archive.nptel.ac.in/courses/115/105/115105099/

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:		II
Course:	Engineering Physics Lab.			Code:		BTETBS06SH2P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
1	-	2	1	30	20	50

Course Objectives:

At the end of the course students would be exposed to fundamental knowledge in

- Study of semiconducting devices.
- To enhance the basic knowledge about the cathode ray oscilloscope.
- To Study optical phenomenon.

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

CO	Course Outcomes	BT Level (L1 toL6)
CO-1	Apply and estimate the basic knowledge about semiconducting diode.	L3
CO-2	Acquire the knowledge of Cathode Ray Oscilloscope and its applications	L3
CO-3	Understand the diffraction phenomenon and its applications.	L2
CO-4	Make use of theoretical knowledge of interference and examine its application.	L3
CO-5	Relate the principles of optics with practical knowledge.	L2
CO-6	Interpret the knowledge of electric and magnetic fields and its applications.	L2

General Guidelines: Minimum 8 Experiments are to be conducted covering entire syllabus	
Expt. No.	List of Experiments
1	To Study the forward and reverse characteristics of P-N Junction Diode.
2	To Study the reverse characteristics of Zener Diode.
3	To Study the forward characteristics of Light Emitting Diode.
4	Study of CRO
5	To determine unknown frequency with the help of CRO and also to measure Voltage across the resistance and current flowing through it.
6	To determine resolving the Power of Telescope.
7	To determine the wavelength of monochromatic light by Newton's ring method.
8	Determination of wavelength of spectral lines using diffraction grating.
9	Determination of grating element of a diffraction grating using LASER beam.
10	Determination of specific charge (e/m) of electron by using Thomson's method (Beyond syllabus).
11	To study the concept of fiber optics communication and determine the Numerical aperture of optical fiber

Suggested Books/Reference Books:

1.M.N. Avadhanulu and P.G Kshirsagar: Engineering Physics, S Chand Publication

2.N. Subrahmanyam, Brijlal, M.N. Avadhanulu : A Text Book of Optics, S. Chand & company Ltd.

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Program:	B.Tech. (All Branches)	Semester:	II
Course:	Basic Electrical Engineering	Course Code:	BTALES05ET2T

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Viva Voce

Course Objectives:

- Understanding the fundamental concepts of electrical circuits, including AC and DC circuits.
- Gaining knowledge about different types of electrical components and their functions.
- Learning about the operation and working principles of electrical machines such as transformers, motors.
- Understanding the principles of electrical installation and safety procedures.
- Exploring various energy sources used in electrical engineering.

Course Outcomes:

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	To establish fundamental terms in electrical engineering and outline essential electrical laws and various theorems.	L1
CO-2	To understand AC circuits and their applications, including star and delta three-phase AC circuits.	L2
CO-3	To explore magnetic circuits and their practical application in transformers.	L3
CO-4	To explain the operational knowledge and working principles of DC motors and their various types.	L2
CO-5	To understand the concepts of electrical installation and safety.	L2
CO-6	To understand the concept of energy sources in electrical engineering.	L2

Unit I: Basic Fundaments	**(8 Hrs.)**
Basic concept of voltage, current, power and energy, Elementary calculation for energy consumption, Analysis of series and parallel circuit, Ohm's law, Current Division and voltage division, Kirchhoff's law, nodal and mesh analysis, Superposition theorem and Thevenin theorem.	
Unit II: AC Circuit	**(8 Hrs.)**
Representation of sinusoidal waveform, phasor representation, analysis of single-phase ac circuit consisting of R, L, C, RL, RC, RLC combination, Three phase balanced circuit, voltage and current relation in star and delta connection.	
Unit III: Electromagnetism & Transformer	**(4 Hrs.)**
Faraday law, Lenz law, Fleming rule, Statically and dynamically induced emf, Self and mutual induction, Construction and working principle of single-phase transformer, types of transformer, turns ratio.	
Unit IV: DC Motor	**(6 Hrs.)**
Introduction to DC motor, working principle, types and application, Introduction to Three phase induction motor, construction and working, speed control and application.	
Unit V: Electrical Installation and safety	**(5 Hrs.)**
Components of LT switchgear: Switch fuse unit (SFU), MCB, ELCB, MCCB, types of wire and cables, Selection of Cables and Wires based on Current Ratings, Electrical safety and precaution.	
Unit VI: Energy Sources	**(5 Hrs.)**
Sources of Electrical Power, Introduction to Wind, Solar, Fuel cell, Geothermal, Hydroelectric, Thermal-Steam, diesel, gas nuclear power generation.	
Total Lecture	**36 Hours**

Textbooks:

1. Principle of Electrical Engineering, 4th Edition, Del Toro V., PHI2005
2. Basic Electrical Engineering, First Ed., Kulshreshtha D.C., TMH-2008.
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku

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Reference Books:	
1.	D.P. Kothari and I.J Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2.	L.S. Bobrow," Fundamentals of Electrical Engineering", Oxford University Press, 2011
MOOCs (Massive Open Online Courses) Links and additional reading, learning, video material	
1.	**Coursera** • Introduction to Electrical Engineering • Fundamentals of Electrical Engineering
2.	**Udemy** • Electrical Engineering Fundamentals

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Program:	B. Tech. (All Branches)			Semester:		II
Course:	Basic Electrical Engineering Lab.			Course Code:		BTALES06ET2P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
01	---	2	01	30	20	50

Course Objectives:

- Developing problem-solving skills related to electrical circuit analysis and design.
- Applying theoretical knowledge to practical applications through laboratory experiments.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Utilize fundamental knowledge of current and voltage to verify Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL).	L1
CO-2	Able to verify current and voltage using the superposition theorem and Thevenin's theorem.	L2
CO-3	To analyze the relationship between line voltage, phase voltage, line current, and phase current in star and delta three-phase connections.	L3
CO-4	Demonstrate the working principles and operations of DC motors and transformer through hands-on experiments.	L3
CO-5	Summarize overload and short-circuit conditions in order to observe the tripping mechanism of the MCB.	L3

General Guidelines: Minimum 8 experiments are to be conducted covering Entire syllabus

Expt. No.	List of Experiments
1	To design and verify Kirchhoff's Current Law.
2	To design and verify Kirchhoff's Voltage Law.
3	To design and verify Superposition Theorem.
4	To design and verify Thevenin's Theorem.
5	To verify Vector relation between current and voltage in R-L-C Series circuit.
6	To study the Line voltage and Phase voltage, line current and phase current relation for star three phase connection.
7	To study the Line voltage and Phase voltage, line current and phase current relation for Delta three phase connection.
8	To study working and construction of transformer.
9	To verify relation between armature current and speed of DC motor.
10	To demonstrate the overload and short-circuit conditions to observe the tripping mechanism of the MCB.

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Program:	B. Tech. (All Branches)			Semester:				II
Course:	Programming for Problem Solving			Code:				BTETES07IT2T
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
3	-	3	3	10	15	15	60	100

Methods of Teacher Assessment (TA): Assignments/Quizzes, Attendance, Viva VOCE

Course Objectives:

Throughout the course students will be expected to demonstrate their understanding of **Programming for Problem Solving** by being able to do each of the following:

- To express algorithms and draw flowcharts in a language independent manner.
- To demonstrate how to write modular, efficient and readable C programs.
- To gain knowledge in creating and using Control statements and Loops.
- To implement knowledge in creating and using Arrays of the C data types and Strings.
- To familiarize pointers, functions and recursive functions in C to efficiently solve problems
- To demonstrate creation of derived data types and perform operations on files.

Course Outcomes: On completion of the course students will be able to

CO	Course Outcome	BT Level (L1 to L6)
CO-1	Write, compile and debug programs in C language.	L3
CO-2	Use different data types in a computer program.	L3
CO-3	Design programs involving decision structures, loops, arrays and functions.	L6
CO-4	Identify the difference between call by value and call by reference.	L2
CO-5	Use pointers to understand the dynamics of memory.	L3
CO-6	Create file and perform different operations on it.	L6

Unit I: Introduction to Problem Solving	**(6 Hrs.)**

Introduction to functional components of a computer system, Number System: Binary, Decimal, Octal and Hexadecimal, Conversion of numbers, binary arithmetic operations, Idea of Algorithm: Representation of Algorithm, Flowchart and its components, Pseudo code with examples

Unit II: C Programming Basics	**(6 Hrs.)**

Structure of C program, C program execution lifecycle (preprocessor, assembler, compiler, interpreter, loader and linker), writing and executing the first C program. Components of C language: Identifiers, Data Types, Variables, Constants. Standard I/O in C (printf(), scanf() etc),Format Specifiers, Operators (Arithmetic, relational, logical, bitwise etc.), Expressions, Precedence and Associatively, Expression Evaluation, Type conversions.

Unit III: Control Constructs	**(6 Hrs.)**

Control Statements: Decision making: if, if-else, nested if, if-else-if ladder and switch statements, ternary operator and its Examples

Looping statements: for, while and do-while statements and its examples,

Jump statements: go to, break, continue and its examples.

Unit IV: Arrays & Strings	**(6 Hrs.)**

Arrays: Array notation and representation, manipulating array elements, multi-dimensional arrays. Searching &Basic Sorting Programs (Linear Search, Binary Search, Bubble Sort).

Strings: Concepts of Strings, String Input / Output functions, string manipulation functions

Unit V: Functions & Pointers	**(6 Hrs.)**

Functions: Introduction, types of functions, functions with array, passing parameters to functions, call by value, call by reference, recursive functions.

Pointers: Introduction, declaration, pointer examples, pointer arithmetic, pointer to pointer. Introduction to dynamic memory allocation (malloc, calloc, realloc, free), Introduction to structures and unions

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Unit VI: File I/O	(6 Hrs.)
File I/O: Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions (standard library input / output functions for files), command-line arguments, introduction to macros.	
Total Lecture	**36 Hours**

Textbooks:	
1.	Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
2.	Let Us C By Yashwant P. Kanetkar
3.	Computer Fundamentals & Programming in C, Pradeep Day & Manas Ghosh

Reference Books:	
1.	Mastering in C , K R Venugopal and S R Prasad
2.	Schaum's Outline of Programming with C by Byron Gottfried , McGraw-Hill
3.	Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
4.	Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015

MOOCs Links and additional reading, learning, video material	
1.	C Programming | moocs.org|:https://www.edx.org/learn/c-programming?hs_analytics_source=referrals
2.	Swayam |:https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3.	C Programming Tutorial for Beginners | freecodecamp.org|: https://www.youtube.com/watch?v=KJgsSFOSQv0

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Program:	B. Tech. (All Branches)			Semester:		II
Course:	Programming for Problem Solving - Lab			Code:		BTETES08IT2P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

Throughout the course, students will be expected to demonstrate their understanding of **Programming for Problem Solving** by being able to do each of the following:

- To express algorithms and draw flowcharts in a language independent manner.
- To demonstrate how to write modular, efficient and readable C programs.
- To gain knowledge in creating and using Control statements and Loops.
- To implement knowledge in creating and using Arrays of the C data types and Strings.
- To familiarize pointers, functions and recursive functions in C to efficiently solve problems
- To demonstrate creation of derived data types and perform operations on files.

Course Outcomes: On completion of the course students will be able to

CO	Course Outcome	BT Level (L1 to L6)
CO-1	Write, compile and debug programs in C language.	L3
CO-2	Use different data types in a computer program.	L3
CO-3	Design programs involving decision structures, loops, arrays and functions.	L6
CO-4	Identify the difference between call by value and call by reference.	L2
CO-5	Use pointers to understand the dynamics of memory.	L3
CO-6	Create and perform different file operations.	L6

General Guidelines: Take any 2 or 3 programs from each section.

(Note: The programs are provided for reference. Course teacher can modify it as per his/her perspective)

Section 1

1. Write a c program that accepts the marks of 5 subjects and finds the sum and percentage marks obtained by the student.
2. Write a c program that calculates the simple interest and compound interest. The principal, amount, rate of interest and time are entered through the keyboard.
3. Write a c program to calculate the area and circumference of a circle.
4. Write a c program that accepts the temperature in centigrade and converts into Fahrenheit using the formula c/5=(f-32)/9.
5. Write a c program that swap values of two variables using a third variable.
6. Write a c program that checks whether the two numbers entered by the user are equal or not.

Section 2

1. Write a c program to find the greatest of three numbers.
2. Write a c program that finds whether a given number is even or odd.
3. Write a c program that tells whether a given year is a leap year or not.
4. Write a c program that accepts marks of five subjects and finds percentage and prints grades according to the following
5. Criteria:

a. Between 90-100%----------print 'a'
b. 80-90%----------print 'b'
c. 60-80%----------print 'c'
d. Below 60%----------print 'd'

6. Write a c program that takes two operands and one operator from the user and perform the operation and prints the result by using switch statement.
7. Write a c program to print the sum of all numbers up to a given number.
8. Write a c program to find the factorial of a given number.
9. Write a c program to print sum of even and odd numbers from 1 to n numbers.
10. Write a c program to print the Fibonacci series.

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11. Write a c program to check whether the entered number is prime or not.
12. Write a c program to find the sum of digits of the entered number.
13. Write a c program to find the reverse of a number.

Section 3

1. Write a c program that simply takes elements of the array from the user and finds the sum of these elements.
2. Write a c program that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and Prints them.
3. Write a c program to find the minimum and maximum element of the array.
4. Write a c program to search an element in a array using linear search.
5. Write a c program to sort the elements of the array in ascending order using bubble sort technique.
6. Write a c program to add and multiply two matrices of order n x n.
7. Write a c program that finds the sum of diagonal elements of a m x n matrix.

Section 4

1. Write a c program to find cube of any number using function.
2. Write a c program to find diameter, circumference and area of circle using functions.
3. Write a c program to find maximum and minimum between two numbers using functions.
4. Write a c program to check whether a number is even or odd using functions.
5. Write a c program to implement strlen (), strcat (),strcpy () using the concept of functions.
6. Write a c program to create, initialize, assign and access a pointer variable.
7. Write a c program to swap two numbers using pointers.
8. Write a c program to change the value of constant integer using pointers.
9. Write a c program to print a string using pointer.
10. Write a c program to count vowels and consonants in a string using pointer.

Section 5

1. Write a c program to read name and marks of n number of students and store them in a file.
2. Write a c program to read name and marks of n number of students from and store them in a file. If the file previously exits, add the information to the file.
3. Write a c program to write all the members of an array of structures to a file using fwrite(). Read the array from the file and display on the screen.
4. Write a c program to compare the contents of two files and determine whether they are same or not.
5. Write a c program to check whether a given word exists in a file or not. If yes then find the number of times it occurs.

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:		II
Course:	Workshop Practice Lab			Code:		BTALES09ME2P
Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	1	30	20	50

Course Objectives:

- To give students 'hands on experience' of craftsmanship which can boost confidence in their abilities and prepare them for future challenges & make students familiar with different work trades.
- To develop quality, safety consciousness & skill sets for creating entities from primitive engineering materials.
- This exercise aims at inculcating respect for physical work and hard labor.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Explain concept of dimensional accuracy and tolerances and different manufacturing processes which are commonly employed in industry using various manufacturing techniques.	L2
CO-2	Create/fabricate the components in Sheet metal shop	L6
CO-3	Create/fabricate job using Taps & Dies	L6
CO-4	Create/fabricate the components in Carpentry shop	L6
CO-5	Explain the different operations in Smithy shop	L2
CO-6	Explain the different types of welding	L2

Sr. No.	Syllabus
1	**Introduction to Workshop Practice:** Introduction to different shops, tools and equipment used in workshop, Safety measures to be followed.
2	**Sheet Metal shop:** Introduction to tools and equipment, different operations like marking, cutting, bending, joining, etc. different sheet metal joints and their uses.
3	**Taps and Dies:** Introduction to different Taps & Dies and their uses, Preparation of Job involving External and Internal threads on plate or pipe, marking, centre punching, cutting, filing and drilling.
4	**Smithy shop:** Introduction to different tools, equipment and Smithy operations like upsetting, drawing, bending, forming, flattering etc.
5	**Carpentry shop:** Introduction to different wood working tools, equipment and machines used, types of joints and operations performed in Carpentry Shop.
6	**Welding shop:** Introduction to Welding, welding tools and equipment, different welding joints and their uses. Introduction to different welding processes.

Job No.	List of Practical's
1	Identify the different tools & equipment commonly employed in workshop along with prevailing safety practices.
2	To prepare one job in Sheet Metal shop.
3	To prepare one job in Taps and Dies shop.
4	To prepare one job in Carpentry shop.
5	Demonstration of preparation of job in Smithy shop.
6	Demonstration of preparation of job in Welding shop.

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Program:	B.Tech. (Electronics and Telecommunication Engineering)			Semester:	II
Course:	PC Maintenance and Troubleshooting - Lab			Course Code:	BTETVS03ET2P

Teaching Scheme				Evaluation Scheme		
Practical	Tutorial	Hours	Credit	INT	EXT	Total
2	-	2	2	50	-	50

Course Objectives:

- To prepare students for hardware and software of PC maintenance with recovery procedures in case of system failure.
- To get hands on experience of computer hardware and networking with exposure to real time applications

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

1. Handling, testing and troubleshooting of PC Hardware problems.
2. Upgrade and restoration of windows Operating system.

General Guidelines:

1. Avoid standing on metal surfaces or wet concrete. Keep your shoes dry.
2. Handle the equipment and toolkit with caution and gentleness.

Expt. No.	List of Experiments
1	Crimping practice with straight and cross CAT 5 cables.
2	Install and configure the Hard Disk, different RAM in the PC and troubleshoot problem of its.
3	Configure BIOS setup program and troubleshoot the typical problems using BIOS utility.
4	Create a reliable backup plan for data protection
5	Understand the working principles of an SMPS device and install it in a PC.
6	Create a simple LAN and Diagnose, troubleshoot connectivity problems in LAN.
7	Installation and accessing Remote Computer desktop and share printer between window PCs on local area network.
8	Analyze a Windows operating system's present condition to find possible updates and fixes it.
9	Format and partition the personal computer's hard drive (PC) and install the Network Interface Card and troubleshooting its drivers.
10	Install and troubleshooting of Laser printer, inkjet printer and dot matrix printer
11	List out different problems of Keyboard and troubleshoot Keyboard and display Problem
12	Understand File system of PC and recover data from corrupted hard disk by open source tool.
13	Apply basic network security measures, such as firewall setup, and analyze the effectiveness of these measures.
14	Create virtual machines using Oracle VM Ware and apply management skills for efficient operation.
15	Analyze the compatibility of operating systems and apply the knowledge to set up a dual-booting mode.

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Program:	B. Tech. (Electronics and Telecommunication Engineering)			Semester:				II
Course:	Sensor and transducers			Code:				BTETPC01ET2T
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
24	-----	24	2	10	15	15	60	100

Methods of Teacher Assessment (TA): Attendance, Assignment, Class Test, Viva Voce

Course Objectives:

The objective of this course is to provide students with a foundational understanding of sensor and transducer. This includes:

- To provide students with a comprehensive understanding of the principles, classifications, and applications of sensors and transducers.
- To explain the operating principles of various types of sensors and transducers used in measurement and control systems.
- To teach students how to select appropriate sensors and transducers for specific applications based on performance characteristics and environmental conditions.
- To introduce the concepts and techniques of signal conditioning required for accurate measurement and data acquisition.

Course Outcomes:	**BT Level**
After completion of the course, the students will be able to:	
1. To understand the fundamental principles and classifications of sensors and transducers used in engineering applications.	L1
2. To provide an introduction to temperature sensors and their fundamental principles.	L2
3. To introduce pressure sensors and their fundamental principles.	L2
4. To provide an introduction to displacement and level sensors, along with their fundamental principles.	L2

Unit I: Basic Measurement System	**(6 Hrs.)**
Concept of measurement system, methods of measurement, various types of error in measurement system, introduction to calibration process, sensor and transducer, classification of transducer, static and dynamic characteristic, selection criteria.	
Unit II: Introduction to Temperature sensor	**(6 Hrs.)**
Thermocouple, thermistor, RTD, Radiation Pyrometer, Bimetallic strip. Flow Sensor: Hot wire anemometer, electromagnetic flow meter, turbine flow meter.	
Unit III: Introduction to Pressure Sensor	**(6 Hrs.)**
Elastic pressure sensor (Bourdon tube, diaphragm), secondary pressure sensor (Strain gauge, piezo-electric), low pressure measurement (Pirani gauge, Ionization chamber), Capacitive. Introduction to Speed measurement: Photoelectric tachometer, magnetic pick up.	
Unit IV: Introduction to Displacement and Level Sensor	**(6 Hrs.)**
Displacement sensor: LVDT, RVDT, LDR, capacitive, potential type, ultrasonic Level Sensor: Resistive Level sensors, float displacer, radioactive type gauge	
Total Lecture	**24 Hours**

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Textbooks:	
1.	D. Patranabis "Principle of Industrial Instrumentation", Tata McGraw Hill, second edition, 1999
2.	B.G. Liptak, "Process Measurement & Analysis", Chilton Book Company, Fourth ed., 2003
3.	A.K. Sawhney, "Electrical & Electronic Instruments & Measurement", Dhanpat Rai and Sons, Eleventh ed.,2000.
4	B.C. Nakra and K.K. Choudhari, "Instrumentation Measurements and Analysis", by Tata McGraw Hill Education, Second ed., 2004.
5	D.V.S. Murthi, "Instrumentation and Measurement Principles" PHI, New Delhi, Second ed. 2003

Reference Books:	
1.	Sensors and Transducers" by Ian R. Sinclair
2.	Principles of Measurement Systems" by John P. Bentley

MOOCs (Massive Open Online Courses) Links and additional reading, learning, video material

Coursera:

- Introduction to Sensor Systems by University of California, San Diego
- Sensor Fusion and Non-linear Filtering for Automotive Systems by Chalmers University of Technology

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Program:	B. Tech. (All Branches)			Semester:	II			
Course:	Indian Knowledge System			Code:	BTALIK01SH2T			
Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Hours	Credit	TA	MSE-I	MSE-II	ESE	Total
2	--	2	2	50	--	--	-	50

Methods of Teacher Assessment (TA): Quiz, Assignment & Viva, Case Study, Attendance

Course Objectives:
To create awareness amongst students of Engineering about Indian Knowledge System.

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

CO	Course Outcomes	BT Level (L1 to L6)
CO-1	Understanding Indian Knowledge System through ancient history.	L2
CO-2	Recognize the role and importance of governance with public administration by the use of Viduraniti.	L1
CO-3	Analyze the Historical Number Systems and its features.	L4
CO-4	Aware with Indian Mathematics and Contributions of Indian Mathematicians	L2

Unit I: Overview of Indian Knowledge System	**(6 Hrs.)**
Importance of ancient knowledge, defining IKS, IKS classification framework, Historicity of IKS, Some unique aspects of IKS.	
Unit II: Governance and Public Administration	**(6 Hrs.)**
Ramayana on grate attributes, Dos and Don'ts of a King, Vidura niti-Advice to a King, The administrative set up, Public Administration perspectives from epics.	
Unit III: Number Systems and Units of Measurement	**(6 Hrs.)**
Number systems in India – Historical evidence, Salient features of the Indian Numeral System, Unique approaches to represent numbers, Measurements for time, distance, and weight, Pingala and the binary system.	
Unit IV: Mathematics	**(6 Hrs.)**
Unique aspects of Indian Mathematics, Great Mathematicians and their Contributions, Algebra, Geometry, Trigonometry, Binary mathematics and combinatorial problems in Chandaḥ Sastra of Pingala, Magic squares in India.	
Total Lecture	**24 Hours**

Textbooks:	
1.	B. Mahadevan, Vinayak Rajat Bhar, Nagendra Pavana R. N.: Introduction to Indian Knowledge System: Concepts & Applications, PHI, 2022

Reference Books:	
1.	Indian Knowledge System Introduction & Prospects, Acharya Shreyas Charudatta Kurhekar

MOOCs Links and additional reading, learning, video material	
1.	Swayam NPTEL: Indian Knowledge System (IKS)-Concepts and Applications in Science

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Course-Wise Details of Syllabus Revisions
(Version 1.0 to Version 1.1)
This Version 1.1 is also applicable to the students from previous batches appearing for these courses in session 2026-27 and onwards.

Sr. No.	Course Code	Course Name	Sem	Nature of Change	Remark
1	BTALBS01SH1T	Engg. Maths-I	First	**Added topic in: Unit-5** "Type-III in non-Clairaut's D.E."	
				Deleted topic from: Uni-5 "Solvable for x"	
2	BTALBS04SH2T	Engg. Maths-II	Second	**Added topic in: Unit-3** "Rectification"	
				Deleted topic from: Unit-3 "Differentiation under integral sign"	
3	BTALOE11SH3T	Quantitative Aptitude	Third	**Added topic in: Unit-2** **"Average"** Added topic in: Unit-3 **"Number System"** Added topic in: Unit-4 **"Coding-Decoding"**	
4	BTALVE01SH1T	Values & Ethics	First	**Added topic in: Unit-1** 1. "Skill education, Value based education Vs. Skill based education, Importance of universal human values in technical education" 2."Stress Management in engineering life, self-confidence and self-discipline in engineering career. **Added topic in: Unit-2** "Social responsibility of engineers, teamwork and project management"	
				Deleted topic from: Uni-1 1. "Recapitulation from Universal Human Values-1" 2. Method to fulfil the Human aspirations: understanding and living in harmony at various level" **Deleted topic from: Uni-2** "Society being an extension of family"	
5	BTALBS02SH1T	Engg. Chemistry	First	**Deleted topic from: Uni-2** "Utilization, Panels and arrays, various hydrogen production methods" **Deleted topic from: Uni-3** "Classification of fuel cells" **Deleted topic from: Uni-5** "Polyurethane (Foam)"	

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				Added topic in: Unit-4 "Mechanism of lubrication" **Added topic in: Unit-5** "Synthetic rubber-Buna-S, Buna-N, Butyl rubber" **Added topic in: Unit-6** "Need of E-waste management"	
6	BTMEBS05SH2T	Engg. Physics	Second	**Added topic in: Unit-6** "Poiseuille's equation"	
7	BTMEBS06SH2P BTCS/IT/AD/ET/CEBS06SH2P	Engg. Physics	Second	**Added Practical no. 11** "To study the concept of fibre optics communication and determine N.A. of optical fibre"	
8	BTCS/IT/AD/ET/CEBS05SH2T	Engg. Physics	Second	**Deleted topic from: Uni-4** "He-Ne LASER" **Added topic in: Unit-4** **"**Pumping-types, active medium, active center, resonant cavity" **Added topic in: Unit-5** "Time-Energy Uncertainty relation"	
9	BTALAE01SH1P	Professional Communication	First	1. Merged Practical 1 'Types of Communication: Formal, Informal' with Practical 2 'Understanding various Barriers to Communication'. 2.Merged the topic 'Self-Introduction' from Practical 11 with Practical 13 'Interview Techniques'. 3.Merged the topic 'Digital Resume' from Practical 11 with Practical 12 'Resume Writing'. **Deleted** Practical 6 'Letter Writing'.	
10	BTALES05ET2T	Basic Electrical Engineering	II	Added Topic in Unit V "Selection of Cables and Wires based on Current Ratings"	

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