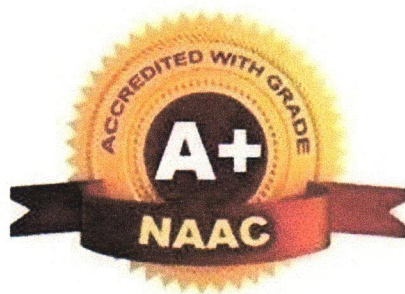




TULSIRAMJI GAIKWAD-PATIL

College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108



Bachelor of Technology

SoE and Syllabus 2026

(Department of Basic Science and Humanities)

Vision of Institute

To emerge as a learning Center of Excellence in the National Ethos in domains of Science, Technology and Management.

Mission of Institute

- M1- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.
- M2- To provide facilities and services to meet the challenges of Industry and Society.
- M3- To facilitate socially responsive research, innovation and Entrepreneurship.
- M4- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.



Tulsiramji Gaikwad - Patil College of Engineering and Technology

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Scheme of Instruction for B. Tech First Year (UG) Programme Group-B (ECE/ECS/ EE) Scheme 2026-27

SN	Sem	Type	BoS / Dept	Sub. Code	Subject	T/ P	Contact Hours			Cred its	% Weightage			TOT AL	ESE Duration Hours	
							L	P	SL		Hrs	CT/ IA	C A			ES E
FIRST SEMESTER (GROUP-B)																
1	1	BSC	S&H	BSH51101	Linear Algebra and Calculus	T	4	0	2	6	4	30	10	60	100	3
2	1	BSC	S&H	BSH51109	Energy Battery Technology	T	3	0	2	5	3	30	10	60	100	3
3	1	BSC	S&H	BSH51110	Energy Battery Technology -Lab	P	0	2	-	2	1	25	-	25	50	-
4	1	ESC	EE	BEE51101	Principle of Electrical Engineering	T	3	0	2	5	3	30	10	60	100	3
5	1	ESC	EE	BEE51102	Principle of Electrical Engineering - Lab	P	0	2	-	2	1	25	-	25	50	-
6	1	IKS	S&H	BSH51107	Indian Ancient Technology	T	2	0	2	4	2	18	2	30	50	1
7	1	ESC	CSE	BCS51103	Fundamentals of Python Programming-Lab	P	0	2	-	2	1	25	-	25	50	-
8	1	AEC	S&H	BSH51108	Basics of Career Development	P	0	4	-	4	2	50	-	-	50	-
9	1	VSEC	ECE	BEC51103	IDEA-Lab with IOT	P	0	4	-	4	2	50	-	-	50	-
10	1	CC	S&H	BSH51X01-12	Liberal Learning Module I	P	0	4	-	4	2	50	-	-	50	-
TOTAL FIRST SEM							12	18	08	38	21	333	32	285	650	10

SECOND SEMESTER (GROUP-B)																
1	2	BSC	S&H	BSH51201	Differential Equation and Statistics	T	4	0	2	6	4	30	10	60	100	3
2	2	BSC	S&H	BSH51207	Solid State Physics & Optics	T	3	0	2	5	3	30	10	60	100	3
3	2	BSC	S&H	BSH51208	Solid State Physics & Optics-Lab	P	0	2	-	2	1	25	-	25	50	-
4	2	ESC	ECE	BEC51201	Digital Circuit & Design	T	3	0	2	5	3	30	10	60	100	3
5	2	ESC	ECE	BEC51202	Digital Circuit & Design Lab	P	0	2	-	2	1	25	-	25	50	-
6	2	ESC	ME	BME51201	Engineering & Computer Graphics	T	2	0	2	4	1	18	2	30	50	2
7	2	ESC	AIML	BAIML51201	Fundamental of Generative AI-Lab	P	0	4	-	4	2	25	-	25	50	-
8	2	VSEC	CE	BCE51201	Computer Aided Drawing-Lab	P	0	4	-	4	2	50	-	-	50	-
9	2	PCC	ECE	BEC51203	Electronics workshop	P	0	4	-	4	2	50	-	-	50	-
10	2	CC	S&H	BSH51Y01-12	Liberal Learning Courses II- Lab	P	0	4	-	4	2	50	-	-	50	-
TOTAL SECOND SEM							12	20	8	40	21	333	32	285	650	11

Course Category	BSC/ESC (Basic Science Course/ Engineering Science Course.)	PCC (Programme Core courses)	Multidisciplinary courses	VSEC (Skill Course)	Social Science & Management		Experiential Learning Courses	CC (Co-Curricular Courses)
					AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits SEM-I	08 / 05	-	-	02	02	2	-	02
Credits SEM-II	08 / 07	02	-	02	-	-	-	02
Cumulative Sum	16 / 12	02	-	04	02	02	-	04

PROGRESSIVE TOTAL CREDITS: 21+21=42

				July, 2026	5.00	Applicable for AY 2026-27 Onwards
Chairperson	Dean Academics	Vice Principal	Principal/Director (Administration)	Date of Release	Version	



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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (ECE/ECS/ EE)

Semester-I Linear Algebra & Calculus: BSH51101

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	4 Hrs./week	CT-I	12 Marks	-	-
Practical (P)	-	CT-II	12 Marks	-	-
Total Credits	4 (Th) = 4	CT-III	6 Marks	-	-
Duration of ESE:3Hrs		CA	10 Marks	-	-
		ESE	60 Marks	-	-
		Total Marks	100 Marks	-	-

Pre-Requisites: NA

Course Objectives:

1	To identify algebraic problems from practical areas and obtain the solution in certain cases.
2	To expose students to understand the basic importance of Differential Calculus and Integral Calculus.
3	To understand different solution techniques of solving Beta and Gama Function and also understand solution of simultaneous equation by matrix method.
4	To apply your understanding of the concepts, formulas, and problem-solving procedures.
5	To analyze and apply properties of sequences and series, including their convergence and sums, in mathematical and real-world problems.

Unit I	Matrices: Introduction to rank of a matrix; Rank nullity theorem, Eigen values and Eigen vectors, Consistency of a system of equations, Cayley Hamilton Theorem, Sylvester 's theorem
	Activity 1: Perform basic operations of matrices by Sage math Activity 2: Illustrate Eigen values and Eigen Vectors by Sage math
Unit II	Differential Calculus: Indeterminate Forms L'Hôpital Rule, Taylor 's and Maclaurin 's series (for one variable), Maxima and Minima, Successive differentiation, Rolle 's theorem, Lagrange 's mean value theorem, Cauchy 's mean value theorem
	Activity1: To Learn Calculus with Sage Math Activity 2: Differential Calculus and its Application by Sage math
Unit III	Integral Calculus: Introduction to Gamma Function & Properties of Gamma Function, Introduction to Beta Function & Properties of Beta Function, Relation between Beta & Gamma Function, Leibnitz 's rule for differentiation under integral sign, Tracing of Cartesian and Polar curves
	Activity1: To trace the curve with Scilab Activity 2: To trace the curve with Maple
Unit IV	Calculus of Function of several variables: Differentiability of function of several variables, Partial Derivatives, Euler 's theorem on homogeneous function, Implicit function, Jacobian and their applications, Chain Rule
	Activity1: To solve partial derivative by Sage math
Unit V	Sequence & Series: Sequence, types of sequence, test of convergence of sequences, Cauchy sequence, infinite series, power series, Alternating series, tests of convergence and absolute convergence of series.
	Activity 1: Find the missing term based on logic or arithmetic rules

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Text Books	
T.1	Higher Engineering Mathematics by Bali Lyenger (Laxmi Prakashan) 9 th Edition
T.2	Advance Engineering Mathematics by Ervin Kreyszig 's 9 th Edition
T.3	H. K. Dass, Advanced Engineering Mathematics, S. Chand, Reprint, 2014.
T.4	Outline Series, McGraw Hills, 4th Edition, 2016.
T.5	P.N. Wartikar and J.N. Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.
T.6	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9 th edition, Pearson, Reprint 2002.
Reference Books	
R.1	Gilbert Strang: Linear Algebra and Its Applications (Paperback), Nelson Engineering (2007)
R.2	Advanced Engineering Mathematics by Erwin Kreyszig 's (Wiley India) 9 th edition
R.3	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
R.4	Higher Engineering Mathematics by B. S. Grewal, Khanna Publisher 35 th edition.
Useful Links	
1	https://archive.nptel.ac.in/courses/111/108/111108157/
2	https://archive.nptel.ac.in/courses/111/104/111104144/
3	https://archive.nptel.ac.in/courses/111/104/111104092/

CO	Course Outcomes	CL	Class Sessions
CO1	Implement the concept of matrices to check existence of solution of system of linear Simultaneous equation.	3	9
CO2	Apply the concept of maxima, minima and successive differentiation in analysis of engineering problems.	3	9
CO3	Solve improper integrals using beta, gamma functions	3	9
CO4	Use of Partial differentiation to Solve Jacobian and Chain Rule	3	9
CO5	Utilize the concepts of sequences and series to address problems across mathematical and scientific domains	3	9



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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (ECE/ECS/ EE)

Semester-I Energy and Battery Technology: BSH51109

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	3Hrs/week	CT-I	12 Marks	-	-
Practical(P)	2Hrs/week	CT-II	12 Marks	-	-
Total Credits	3(Th)+1(P)=4	CT-III	6 Marks	-	-
Duration of ESE:3Hrs		CA	10Marks	CA	25 Marks
		ESE	60Marks	ESE	25 Marks
		Total Marks	100Marks	-	50 Marks

Pre-Requisites: AICTE Bridge Course, Energy sources, Electrochemistry, Water technology, Battery technology, polymers

Course Objectives:

1. To gain the knowledge of Energy sources, types & Application.
2. To inculcate knowledge about Electrochemistry.
3. To enable to students to upgrade the existing knowledge of water technology.
4. To enlighten the students to the basic process of battery technology.
5. To gain the knowledge on synthesis, properties and applications of polymers.

Course Contents

Unit I	Energy Sources: Introduction of energy, types of Energy (conventional and non-conventional energy sources), Introduction of fuels, classification and application, Calorific value determination of solid, liquid and Gas, Analysis of solid fuels, Fractional distillation, CNG and Bio-Diesel. Class activity: Creative poster making on any one non-conventional energy source.
Unit II	Electrochemistry: Basics of Electrochemistry, Conductors and Insulators, Specific Conductance, Molar Conductance, Equivalent Conductance, Laws of Electrochemistry, Concept of Galvanic Series, Electrode potential, Standard electrode potential, Cell potential and EMF of a cell, Nernst equation and its application, Electroplating Process: Principle, Factors Influencing Electroplating and their applications, Numerical. Class activity: MCQ based quiz base on basics of Electrochemistry.
Unit III	Water pollution and Softening processes: Introduction, Sources of pollution, Hardness Coagulation, Sterilization, Softening process (Zeolite process and Ion Exchange Process) Boiler trouble due to scale and sludge, Desalination of water by Reverse osmosis. Class activity: Crossword Puzzle on the basis of softening process of water.
Unit IV	Battery Technology: Introduction of batteries, Primary and secondary batteries, Types of Batteries with construction, working and their applications (Carbon-Zn, Alkaline Zinc, Ni-Cd, Lead Acid battery, Lithium-ion battery) H ₂ -O ₂ Fuel cell, Methanol Fuel Cell and its applications, Differences between Battery and Fuel cell, Recycling and safe disposal of batteries. Class activity: Pattern based quiz on application of battery
Unit V	Polymer Science: Introduction, Classification of Polymers, Uses of commercially important polymers with synthesis, properties and applications, Polyethylene, PVC, Teflon, Terylene, Conducting & Insulating Polymers, polyaniline, polypyrrole and polylactic acid. Class activity: Prepare the chart of types of polymers with their monomers, properties and application.

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Text Books	
T.1	Engineering Chemistry by S.S. Dara, 10th Edition. S. Chand & Co
T.2	Engineering Chemistry Dr. Avinash Bharti, V.K. Walekar, 1st Edition. Tech Max.
T.3	Textbook of Engineering Chemistry: P.C Jain & Monica Jain, 15th Edition. Dhanpatrai publication Ltd
Reference Books	
R.1	Applied Chemistry: Narkhede & Bhake, 1st Edition. Das Ganu Prakashan.
R.2	Engineering Chemistry Dr. Avinash Bharti, V.K. Walekar, 1st Edition. Tech Max
Useful Links	
1	https://nptel.ac.in/courses/103/103/103103206/
2	https://nptel.ac.in/courses/103/108/103108162/
3	https://nptel.ac.in/courses/104/105/104105124/

LIST OF EXPERIMENTS (Energy and Battery Technology: BSH51110)		
1	Determination of Moisture Content or Volatile Matter & Ash Content of Coal sample.	CO1
2	Determination of Flash Point of given Oil by Pensky Martine or Abel's Apparatus	CO1
3	Determination of pH of given Solution.	CO2
4	Determination of Electrode Potential by Galvanic Cell	CO2
5	Determination of Hardness of Water Sample by Complexometric Method.	CO3
6	Determination of Calcium Ion & Magnesium Ion Separately.	CO3
7	Determination of Current by using salt water battery.	CO4
8	Estimation of amount of zinc liberated during electrolysis.	CO4
9	Determination of Saponification value of Bio-Degradable Polymer.	CO5
10	Synthesis of Conducting Polymer. (Poly Aniline)	CO5

Text Books	
T.1	Experiments and Calculations in Engineering Chemistry by S. Chand
T.2	Practical Engineering Chemistry: By S.N. Narkhede, Dr. R.T. Jadhav, Dr. A.B. Bhake
Reference Books	
R.1	A textbook on experiment and calculation By S.S. Dara
R.2	Inorganic Quantitative analysis, Vogel
Useful Links	
1	https://nptel.ac.in/courses/108/104/10810412345/
2	http://nptel.ac.in/courses/1171012546/



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C0	Course Outcomes	CL	Class Sessions
CO1	Understand the types of Energy sources and its properties and application	2	9
CO2	Illustrate different laws of Electrochemistry.	3	9
CO3	Differentiate water pollution and its softening process.	3	9
CO4	Interpret different types and applications of batteries.	3	9
CO5	Predict the types and applications of commercial polymers.	3	9



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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (ECE/ECS/ EE)

Semester-II Principle of Electrical Engineering: (BEE51101)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	3Hrs/week	CT-I	12 Marks	-	-
Practical (P)	2Hrs/week	CT-II	12 Marks	-	-
Total Credits	3(Th)+1(P) = 4	CT-III	6 Marks		
Duration of ESE:3Hrs		CA	10 Marks	IA	25Marks
		ESE	60 Marks	ESE	25Marks
		Total Marks	100 Marks	-	50Marks

Pre-Requisites: NA.

Course Objectives:

1. To understand and analyze basic electric and magnetic circuits.
2. To study the working principles of electrical machines and power converters.
3. To introduce the components of low-voltage electrical installations.

Course Contents

Unit I	Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation Superposition Theorem.
Unit II	Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections
Unit III	Magnetic materials, BH characteristics, series and parallel magnetic circuits, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Autotransformer and three-phase transformer connection
Unit IV	Introduction to Power Generation Thermal Hydro, Nuclear, Wind, Solar with Block Schematic Presentation Only. Single line diagram for Generation Transmission, Distribution through different Voltage levels. Low voltage distribution system Overhead Underground Single Phase Three Phase. Basic operation of UPS Invertors Block schematic representation.
Unit V	Protective Devices: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup. Illuminance: Lamps- fluorescent, CFL, LED. Electrical measuring instruments principle and applications energy meter, megger, tong tester.

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Useful Links	
1	https://digimat.in/nptel/courses/video/108105112/L01.html
2	https://archive.nptel.ac.in/courses/108/105/108105112/
3	https://archive.nptel.ac.in/courses/108/105/108105053/

List Of Experiments (Principle of Electrical Engineering Lab: BEE51202)

1	Verification of Kirchhoff's laws (KVL & KCL) for given network.	CO1
2	Verification of Superposition theorem for given network.	CO2
3	Determination of resistance and inductance of choke coil	CO2
4	Execute RLC series circuit operation and to plot Phasor diagram for it.	CO3
5	Determination of Permeability & Saturation point for given magnetic material	CO3
6	Detection of core losses and copper losses by performing open circuit test and short circuit test on single phase transformer	CO3
7	Perform direct loading test on single-phase transformer to determine its efficiency & voltage regulation.	CO3
8	Investigate the performance and efficiency of a UPS and an inverter in providing backup power during utility power interruptions.	CO4
9	Explore the construction and working principles of a separately excited DC motor, including the role of field windings and armature.	CO4
10	Explore the principles of insulation resistance measurement with a megger and clamp-on current measurement with a tong tester.	CO5

Text Books

T.1	A Text Book of Electrical Technology: B. L. Thareja and A. K. Thareja, S. Chand Publication (Volume I, II & III). 2011
T.2	Rashid M.H., —Power Electronics: Circuits Devices and Applications, 3rd Edition, Pearson, 2011.

Reference Books

R.1	E. Hughes, —Electrical and Electronics Technology, Pearson, 2010.
R.2	D. C. Kulshreshtha, —Basic Electrical Engineering, McGraw Hill, 2009.

Useful Links

1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

CO	Course Outcomes	CL	Class Sessions
CO 1	Describe Kirchhoff's current and voltage laws to analyze and solve complex DC electrical circuits.	2	9
CO 2	Interpret single-phase and three-phase AC circuits, calculate power parameters, and make informed decisions regarding their applications.	2	9
CO 3	Illustrate and optimizing transformers and magnetic circuits with a focus on factors such as material characteristics, losses, and connection configurations.P	3	9
CO 4	Construct various electric machines, including three-phase induction motors, separately excited DC motors, and synchronous generators.	3	9
CO 5	Analyze the types of wires and cables commonly used in electrical installations, considering their specifications and applications.	4	9



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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (ECE/ECS/ EE)

Semester-I Indian Ancient Technology: BSH51107

Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	2Hrs/week	CT-I	5 Marks	-	-
Practical(P)	-	CT-II	5 Marks	-	-
Total Credits	2 (Th)	CT-III	4 Marks	-	-
Duration of ESE: 2Hrs		CA	6 Marks	-	-
		ESE	30 Marks	-	-
		Total Marks	50 Marks	-	-

Pre-Requisites:

Course Objectives:

1.	To understand the foundational concepts and key developments in ancient Indian technology.
2.	To summarize ancient Indian innovations in metallurgy, architecture, agriculture, and medicine.
3.	To paraphrase the ecological and societal impact of these technologies and their relevance today.

Course Contents

Unit-I	Foundations of Indian Ancient Technology - Definition and scope, Sources: archaeological, literary (Vedas, epics, treatises), Chronological overview (Indus Valley to Gupta period and beyond)
	Activity 1: Group presentation on selected ancient technology or scientist. Activity 2: Quiz format with speed challenges.
Unit-II	Technological Innovations & Metallurgy: Wootz steel and its global influence, Iron Pillar of Delhi and corrosion resistance, Zinc smelting at Zawar mines, Bronze and copper tools in the Harappan civilization.
	Activity 1: Poster creation on sustainability in ancient Indian technology. Activity 2: Group discussion on Why did the Iron Pillar resist rust for over 1600 years?
Unit-III	Science, Medicine & Sustainability -Astronomy and ancient scientific instruments, Ayurveda and ancient surgical techniques, Ecological practices and sustainable technology, Revival and modern applications of ancient technology.
	Activity 1: Discussion on integrating traditional technologies in modern practices. Activity 2: Prepare a chart of Tridosha (Vata, Pitta, Kapha) and match herbs to body types.

Text Books :-

T.1	Aspects of Science and Technology in Ancient India Edited by Arun Kumar Jha and Seema Sahay
T.2	The Ancient Engineers by L. Sprague de Camp
T.3	The Golden Road: How Ancient India Transformed the World by William Dalrymple

Reference Books:-

R.1	"The Wonder That Was India" - A. L. Basham
R.2	"Iron and Steel in Ancient India" - B. R. Pant
R.3	"Indian Medicine in the Classical Age" - P. Kutumbiah

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Useful Links:-

1.	https://onlinecourses.nptel.ac.in/noc20_ae10/preview
2.	https://archive.nptel.ac.in/courses/101/104/101104065/
3.	https://hits.digimat.in/nptel/courses/video/101104065/L08.html

Course Code	Course Outcomes	CL	Class Sessions
CO1	State major ancient Indian technologies and their principles.	1	9
CO2	Describe the processes and applications of metallurgy, architecture, and agriculture in ancient India.	1	8
CO3	Explain the sustainability and modern relevance of ancient Indian technologies.	2	8

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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (ECE/ECS/ EE)

Semester-I	Fundamental of Python Programming (BCS51103)				
Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs/week	-	-	-	-
Total Credits	1(P)	-	-	IA	25 Marks
		-	-	ESE	25 Marks
		-	-	Total Marks	50 Marks

Pre-Requisites:

Course Objectives:

1. To introduce the basics of Python programming, including syntax, variables, data types, and simple input/output operations.
2. To develop understanding of data structures and control statements for solving basic programming problems using decision-making and loops.
3. To introduce modular programming using functions, basic file handling, and fundamental concepts of object-oriented programming.

Course Contents

Unit-I	Introduction to Python, features, installation, syntax and structure, variables, identifiers, data types (int, float, string, boolean), input/output, type conversion, operators (arithmetic, relational, logical, assignment).
Unit-II	Conditional statements (if, if-else, elif), loops (for, while), loop control statements (break, continue, pass), data structures (list, tuple, set, dictionary), string operations.
Unit-III	Functions (definition, arguments, return values), scope of variables, modules, file handling (read/write), basics of OOP (classes, objects, constructors, attributes, methods).

Text Books :- operations

T.1	Programming and Problem Solving with Python by Reema Thareja
T.2	Python Crash Course by Eric Matthes

Reference Books:-

R.1	Core Python Programming by Wesley J. Chun
R.2	Think Python by Allen B. Downey
R.3	Learning Python by Mark Lutz

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Sr. No.	List of Experiment	
1	Write a Python program to display "Hello World" and perform basic input/output operations.	CO1
2	Write a program to perform arithmetic operations using operators.	CO1
3	Write a program to check whether a number is even or odd using if-else.	CO2
4	Write a program to find the largest of three numbers using nested if.	CO2
5	Write a program to print multiplication table using a loop.	CO2
6	Write a program using for loop and while loop to demonstrate iteration.	CO2
7	Write a program to perform basic operations on lists (append, remove, sort).	CO2
8	Write a program to perform string operations (length, reverse, slicing).	CO2
9	Write a function to calculate factorial of a number.	CO3
10	Write a program to read and write data into a file.	CO3

CO	Course Outcomes	CL	Class Session
CO1	Understand the fundamentals of Python programming and develop basic programs using variables, data types, and operators.	1	4
CO2	Apply control structures and basic data structures to solve programming problems and perform data manipulation.	2	4
CO3	Develop modular programs, handle files, and understand basic object-oriented programming concepts.	3	4



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Department of Basic Sciences and Humanities

Program: B. Tech First Year (AE/CE/ME/BT)

SEMESTER-I Basics of Career Development - BSH51108

Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs./week	-	-	-	-
Total Credits	1	-	-	IA	25 Marks
		-	-	ESE	25 Marks
		-	-	Total	50 Marks

Pre-Requisites: -

Course Objectives: -

1. To develop career etiquette, self-presentation, and professional behavior.
2. To demonstrate effective communication and workplace etiquette.
3. To apply functional grammar and professional writing skills.
4. To develop personality, self-confidence, and interpersonal skills.
5. To demonstrate presentation, group discussion, and public speaking skills.

Course Contents

Unit-I	Introduction to Career Etiquette: Greeting Etiquette, Body Language, Professional Grooming, Self-Awareness, Personal Identity, Family Values, Self-Presentation, Career Vision, Goal Setting, and Presentation Skills.
Unit-II	Fundamentals of Communication: Communication Process, Elements of Communication, Types of Communication, Verbal and Non-Verbal Communication, Listening Skills, Interpersonal Communication, Communication Barriers, Feedback, and Effective Communication Strategies.
Unit-III	Functional Grammar and Written Communication- Sentence Formation, Functional Grammar, Tenses, Subject-Verb Agreement, Articles, Prepositions, Error Correction, Writing Process, Applications, Official Letters, Report Writing, and Writing Formats.
Unit-IV	Workplace Etiquette and Personality Development- Workplace Etiquette, Digital Etiquette, Email Etiquette, Meeting Etiquette, Workplace Behavior, Self-Confidence, Emotional Intelligence, Interpersonal Skills, Teamwork, Leadership, and Personality Development.
Unit-V	Professional Communication and Presentation Skills – Newspaper Reading, Listening Skills, Observation Skills, Vocabulary Development, Public Speaking, Group Discussion, Presentation Skills, Audience Interaction, Seminar Presentation, and Career Readiness.

Text Books: -

- T1. Sanjay Kumar & Pushp Lata, **Communication Skills**, Oxford University Press, New Delhi.
- T2. Meenakshi Raman & Sangeeta Sharma, **Technical Communication: Principles and Practice**, Oxford University Press, New Delhi.
- T3. Ashraf Rizvi, **Effective Technical Communication**, McGraw Hill Education, New Delhi.

Reference Books: -

- R1. Stephen R. Covey, **The 7 Habits of Highly Effective People**, Simon & Schuster.
- R2. Dale Carnegie, **How to Win Friends and Influence People**, Simon & Schuster.
- R3. Norman Lewis, **Word Power Made Easy**, Goyal Publishers & Distributors Pvt. Ltd.

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Useful Links: -

1.	https://www.grammarly.com/blog/
2.	https://www.bbc.co.uk/learningenglish

Sr. No.	LIST OF EXPERIMENTS (Basics of Career Development - BSH51108)	CO
1	Understanding Essential Etiquette and Its Applications.	CO1
2	Demonstration of Self-presentation skills in day-to-day life.	CO1
3	Exploring the Fundamentals and Types of Communication for Career Development	CO2
4	Developing General Communication Skills for Effective Personal and Professional Interaction	CO2
5	Using Functional Grammar for Effective Oral and Written Communication	CO3
6	Developing Writing Skills through Applications, Official Letters, and Report Writing	CO3
7	Understanding Workplace Etiquette and Appropriate Professional Behavior.	CO4
8	Exploring the Foundations of Personality Development for Career Growth	CO4
9	Enhancing Communication Skills through Reading, Listening, Observation, and Media Analysis	CO5
10	Building Confidence through Group Discussions and Presentations	CO5

CO	Course Outcomes	CL	Class Sessions
CO1	Identify the principles of essential etiquette, self-awareness, self-presentation, and career planning.	1	4
CO2	Outline the fundamentals of communication and effective communication strategies.	1	4
CO3	Understand the concepts of functional grammar and written communication for professional documentation.	2	4
CO4	Explain the importance of workplace etiquette, personality development, and interpersonal skills for professional growth.	2	4
CO5	Apply communication and presentation skills effectively in group discussions, public speaking, and career-related interactions.	3	4



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Department of Basic Sciences and Humanities

Program: B. Tech First Year (ECE/ECS/EE)

Semester-I **IDEA-Lab with IOT: BEC51103**

Teaching Scheme		Examination Scheme	
Lectures	-	IA	50 Marks
Tutorial	-	ESE	-
Practical	4Hr / Week	Total	50 Marks
Practical Credit: 2			

Pre-Requisites: NA

Course Objectives: Students will be able to

- 1 To familiarize students with Arduino Uno and Raspberry Pi hardware and programming.
- 2 To develop interfacing and programming skills for sensors, actuators, and display modules.
- 3 To design and implement basic embedded and IoT applications using Arduino.
- 4 To impart knowledge of electronic circuit design and simulation using Easy EDA and Proteus.
- 5 To provide hands-on experience in PCB fabrication using a CNC PCB Cutting Machine.
- 6 To develop practical skills in embedded system development, testing, and troubleshooting.

Sr. No.	List of Experiment	CO
1	Demonstrate the Arduino Development Board and Arduino IDE.	CO1
2	Execute an Arduino Program for LED Blinking.	CO1
3	Develop an Arduino Program for LED Blinking Using a Push Button Switch.	CO1
4	Develop an Arduino Program to Interface and Control a Buzzer.	CO2
5	Execute an Arduino Program to Interface and Display Data on a 16×2 LCD.	CO2
6	Implement Bluetooth Communication Between Arduino and a Mobile Device.	CO2
7	Develop an Arduino Program to Interface a Seven-Segment Display.	CO3
8	Implement an Arduino Program to Interface an OLED Display.	CO3
9	Execute an Arduino Program to Interface a PIR Motion Sensor.	CO3
10	Develop an Arduino Program to Measure Distance Using an Ultrasonic Sensor.	CO3
11	Design and Simulate a Traffic Light Control System Using Arduino and LEDs.	CO4
12	Demonstrate the Raspberry Pi Development Board and Basic GPIO Operations.	CO4
13	Demonstrate the Operation of the 3018-CNC PCB Cutting Machine.	CO4
14	Design a Printed Circuit Board (PCB) Using EasyEDA.	CO5
15	Design and Simulate a Printed Circuit Board (PCB) Using Proteus Software.	CO5

Text Books

- 1 Arshdeep Bahga, Vijay Madiseti, —Internet of Things – A hands-on approach, Universities Press, 2015.

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2	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), —Architecting the Internet of Things ^l , Springer, 2011.
3	Introduction to IoT by Sudip Mishra, Anandrup Mukherjee, Arijit Roy. Publisher: Cambridge University Press
4	Internet of Things Architecture and Design Principles by Rajkamal. Publisher: McGraw Hill Education (India) Pvt. Ltd.

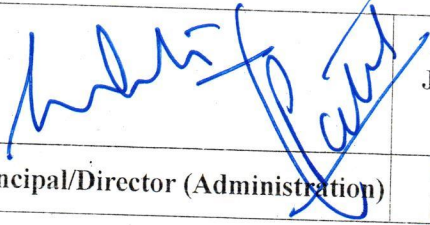
Reference Books

1	Honbo Zhou, —The Internet of Things in the Cloud: A Middleware Perspectiv ^{el} , CRC Press, 2012.
2	Olivier Hersent, David Boswarthick, Omar Elloumi, —The Internet of Things – Key applications and Protocols ^l , Wiley, 2012

Useful Links

1	https://docs.sainsmart.com/?utm
2	https://www.raspberrypi.com/tutorials/?utm
3	https://www.raspberrypi.com/tutorials/?utm
4	https://www.raspberrypi.com/tutorials/?utm
5	https://www.raspberrypi.com/tutorials/?utm

CO	Course Outcomes	CL	Lab Session
CO1	Explain and describe the basics and architecture details of Internet of Things.	2	4
CO2	Analyze IOT techniques in the field of agriculture, health care, smart home and smart city.	4	4
CO3	Design micro project, mini projects using Arduino Uno and Raspberry Pi.	6	4
CO4	Design PCB using CNC PCB Cutting Machine.	6	4
CO5	Design Circuit for PCB making using software Easy EDA, Proteus.	6	4

				July, 2026	5.00	Applicable for AY 2026-27 Onwards
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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-II Differential Equation & statistics: (BSH51201)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	4 Hrs./week	CT-I	12 Marks	-	-
Practical (P)	-	CT-II	12 Marks	-	-
Total Credits	4 (Th) = 4	CT-III	6 Marks	-	-
Duration of ESE:3Hrs		CA	10 Marks	-	-
		ESE	60 Marks	-	-
		Total Marks	100 Marks	-	-

Pre-Requisites: NA

Course Objectives:

1	To utilize consistency of system of equations.
2	To make students acquainted with advance techniques to evaluate integrals.
3	Identify the type of a given differential equation and select and apply the appropriate analytical Technique for finding the solution of first order and selected higher order ordinary differential equations.
4	To gain Statistical knowledge that helps to use the proper methods to collect the data, employ the Correct analyses and find the result.
5	To introduce students to Discrete and Continuous Random Variables concepts and their use in real world phenomena.

Course Contents

Unit I	Differential Equation: Order and Degree of D.E, Linear and Exact Differential Equations, First order & First degree D.E. solvable for p, Equations solvable for y, Equations solvable for x, Application: Newton 's law of cooling, Data Analysis through Programming.
	Activity 1. Mathematically Verification of Newton's law of Cooling Practically. Activity 2. To solve Linear Differential Equation by Sage math.
Unit II	Higher Order Differential Equation: Higher order linear D.E. with constant coefficient, Method of variations of Parameters, Cauchy's form, Legendre's Linear Equations. Application of second order differential equation to R-L-C CIRCUIT, Heat Equations.
	Activity 1. Perform basic operations of Differential equation by Sage math. Activity 2. To solve higher Order Differential Equation by using Sage math
Unit III	Multivariable Calculus (Integration): Double Integration (Cartesian and polar coordinates), Change of Order of Integration, Elementary Triple Integration, And Application: Area by double integration and volume by triple integration.
	Activity 1. Application of integration by using Sage math Activity 2. Evaluation of Integration by using Sage math.
Unit IV	Probability: Conditional Probability, Discrete Random Variable, Continuous Random Variable, Probability Distribution function, Probability density function, Binomial Distribution, Uniform Distribution, Poisson 's Theorem, Moment Generating Function (Discrete random Variable and Continuous Random variable).
	Activity 1. Mathematical model based on Probability. Activity 2. To Evaluate Random variable by using Sage math.

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Unit V	Statistics: Measures of central tendency: Skewness and Kurtosis, Coefficient of variation, Moments, Fitting of straight line, Fitting of parabola and exponential curves, Lines of regression and correlation, Rank correlation.
	Activity 1. To Determine mean, mode & median by sagemath.
	Activity 2. To Fit the straight line, Parabola and Exponential curves by using Scilab.
Text Books	
T.1	Higher Engineering Mathematics by Bali Lyenger (Laxmi Prakashan) 9 th Edition
T.2	Advance Engineering Mathematics by Ervin Kreyszig's 9 th Edition
T.3	H. K. Dass, Advanced Engineering Mathematics, S. Chand, Reprint, 2014.
T.4	Outline Series, McGraw Hills, 4th Edition, 2016.
T.5	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.
T.6	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9 th edition, Pearson, Reprint2002.
Reference Books	
R.1	Gilbert Strang: Linear Algebra and Its Applications (Paperback), Nelson Engineering (2007)
R.2	—Advanced Engineering Mathematics by Erwin Kreyszig's (Wiley India) 9 th edition
R.3	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
R.4	Higher Engineering Mathematics by B. S. Grewal, Khanna Publisher 35 th edition.
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc23_ma61/preview
2	https://onlinecourses.nptel.ac.in/noc21_ma74/preview
3	https://archive.nptel.ac.in/courses/111/107/111107108/

CO	Course Outcomes	PO	CL	Class Sessions
CO1	Use appropriate methods to solve first order differential equation and apply it to find solution of engineering problems.	PO1, PO2, PO5, PO11	3	9
CO2	Apply appropriate methods to solve higher order differential equation	PO1, PO2, PO5, PO11	3	9
CO3	Utilize fundamental theorems to compute integrals of both single-variable and multivariable functions.	PO1, PO2, PO5, PO11	3	9
CO4	Apply Probability concepts to interpret real-world Phenomena.	PO1, PO2, PO5, PO11	3	9
CO5	Inspect scientific data, use proper curve fitting and find correlation, regression of variables.	PO1, PO2, PO5, PO11	3	9


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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-II Solid state Physics & Optics: (BSH51207)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	3Hrs/week	CT-I	12 Marks	-	-
Practical(P)	2Hrs/week	CT-II	12 Marks	-	-
Total Credits	3(Th)+1(P)=4	CT-III	6 Marks		
Duration of ESE:3Hrs		CA	10Marks	CA	25 Marks
		ESE	60Marks	ESE	25 Marks
		Total Marks	100Marks	-	50 Marks

Pre-Requisites: AICTE Bridge Course, Basics of Physics.

Course Objectives:

1. To show the strong conceptual understanding of Crystallography with their types and application in various engineering field.
2. To interpret the motion of charged particle in electric field, magnetic field and cross configured field through Bethe 's law, Cathode ray tube (CRT) and Cathode ray Oscilloscope (CRO).
3. To analyze the concept of cut in voltage, voltage regulator and current gain in PN junction diode, Zener diode and transistor respectively.
4. To compare the interference in parallel and wedge-shaped thin film and their application in engineering field.
5. To explain the characteristics, properties of optical fiber and laser with their application in engineering and medical field.

Course Contents

Unit I	Crystallography: Introduction, Classification of Crystal structure, Simple Cubic cell, Body Centered cubic cell, Face Centered cubic cell (SC, BCC, FCC), Elements of crystal, Unit cell and their types. Characteristics of Unit cell, Effective number of atoms per unit cell, atomic radius, nearest neighbor distance, coordination number, atomic packing factor, void space, density; Crystallographic planes and Miller indices, Bragg 's law of diffraction and its equation.
	Activity 1: Model making of different structure (SC, BCC, FCC) Activity 2: Open Book Test
Unit II	Electron Ballistics & Electron Optics: Introduction of electric and magnetic field, Uniform Electric Field parallel to electron motion, Uniform Electric Field perpendicular to electron motion, Uniform Magnetic Field parallel to electron motion, Uniform Magnetic Field perpendicular to electron motion, Electric and Magnetic fields in cross configuration, Bethe 's law, Devices: Cathode Ray tube, CRO, Block Diagram, Function & working of each block.
	Activity 1: Game Pedagogy - Crossword Puzzle of Electron Ballistics & Electron Optics. Activity 2: Poster Presentation
Unit III	Semiconductor Physics: Introduction, Intrinsic semiconductors and Extrinsic Semiconductor, PN-Junction diode, Hall effect & voltage, Hall coefficient, its application, Zener diode, LED, Transistor (CB, CC& CE mode)
	Activity 1: Circuit model making of Pn Junction Diode/ light emitting diode/ Zener diode/Transistor Activity 2: Case Study on Semiconductor Material Application.

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Unit IV	Interference in thin film: Introduction, thin film, Plane Parallel thin film, Wedge shaped thin film, Newton rings and its application, Antireflection coating.
	Activity 1: PPT on classification of Parallel thin film and Wedge-shaped thin film with their application.
	Activity 2: Preparation of Video clips / Build model
Unit V	Laser: Introduction of Laser and its characteristics, Interaction of radiation with matter, Meta stable state, Active Medium, Condition of Light amplification, Population Inversion, pumping, Three and four level laser, Ruby laser, Properties and engineering applications
	Activity 1: Context based learning & document making based activity.
	Activity 2: Multiple choice questions on LASER
Text Books	
T.1	Avadhanulu, M.N., & Kshirsagar, P.G. (8th Revised Edition). A Textbook of Engineering Physics. S. Chand Publication. New Delhi.
T.2	Subrahmanyam, N., Brij Lal, & Avadhanulu, M.N. (23rd Revised and Enlarged Edition, 2006). A Textbook of Optics. S. Chand Publication. New Delhi.
T.3	Mehta, V.K., & Mehta, Rohit. (Multicolour Illustrative and Thoroughly Revised Tenth Edition, 2006). Principles of Electronics. S. Chand Publication. New Delhi.
Reference Books	
R.1	Modern Physics: Theraja B.L., Reprint 2 nd Edition, S. Chand & CO, New Delhi.
R.2	Solid State Physics: Dekker J., Reprint 1 st Edition, Mc Millan India Ltd, Mumbai.
Useful Links	
1	https://nptel.ac.in/courses/115/102/115102124/
2	https://nptel.ac.in/courses/115/106/115106128/
3	https://nptel.ac.in/courses/104/101/104101130/

LIST OF EXPERIMENTS (Solid State Physics & Optics Lab-BSHS1208)

1	Determination of lattice constant and atomic packing fraction of simple cubic structure.	CO1
2	Determination of e/m ratio of an electron by Thomson method.	CO2
3	Determine the Cut in Voltage and Dynamic Resistance of P-N Junction Diode in Forward and Reverse Biased.	CO3
4	Determine the Break Down Voltage and Dynamic Resistance of Zener Diode	CO3
5	Determine the ripple factor and rectification efficiency by Half Wave and Full Wave Rectifier using CRO.	CO3
6	Determination of Dynamic Resistance and Current Gain of Transistor in Common Base Mode.	CO3
7	Determination of Dynamic Resistance and Current Gain of Transistor in Common Emitter	CO3
8	Calculate the Wavelength of Sodium Light by Using Newton rings experiment.	CO4
9	Determination of Fringe width by using Wedge shaped thin film.	CO4
10	Determination of divergence of laser beam.	CO5

Text Books	
T.1	Experiments in Engineering Physics: M.N. Avadhanulu, A. A.Dani, 2 nd Edition S. Chand (G/L) & Company Ltd, New Delhi.
T.2	A textbook of Practical Physics: SamirKumarGhosh, 1 st Edition, New Central Book Agency, Kolkata.
Reference Books	
R.1	Engineering Physics: Dattu Joshi, Tata Mc Graw Hill Education, NewDelhi.
R.2	A text book of Engineering physics: Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar, S. Chand Publication.



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Useful Links

1	https://nptel.ac.in/courses/115/106/115106128/
2	https://nptel.ac.in/courses/104/101/104101130/

CO	Course Outcomes	CL	Class Sessions
CO1	Interpret the Crystal geometry, the behavior of solids and different characteristics of cubic crystal structure.	3	9
CO2	Illustrate the concept of motion of charged particle in electric field, magnetic field and cross configured field.	3	9
CO3	Explain p n junction diode, Zener diode, Light emitting diode and transistor with their application in engineering field.	4	9
CO4	Analyze the concept of interference in parallel and wedge-shaped thin film and their application in engineering field.	4	9
CO5	Explain the characteristics of laser and their application in engineering.	4	9

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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-I Digital Circuits and Design (BEC51201)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	3Hrs/week	CT-I	12 Marks	-	-
Practical(P)	2Hrs/week	CT-II	12 Marks	-	-
Total Credits	3(Th)+1(P)=4	CT-III	6 Marks		
Duration of ESE:3Hrs		CA	10Marks	CA	25 Marks
		ESE	60Marks	ESE	25 Marks
		Total Marks	100Marks	-	50 Marks

Pre-Requisites: Bridge Course.

Course Objectives:

- To understand different number systems such as Binary, Decimal, Octal, and Hexadecimal.
- To develop and analyze logical expressions and circuits using logic gates, Boolean algebra, and Karnaugh Maps.
- To impart knowledge of fundamental combinational logic circuits such as adders, subtractors, multiplexers, encoders, and decoders.
- To understand the working principles and types of flip-flops used in sequential circuit design and their role in memory elements.
- To introduce various types of counters and shift registers, and their application in digital timing and display systems.

Course Contents

Unit I	Number system: Binary, Decimal, Octal & Hexadecimal, Conversion of one number system to another, BCD number system, Addition & Subtraction of Binary number system, 1's complement, 2's Complement Activity 1: MCQ Test/ Digital Number System Conversion Race
Unit II	Logic Gates: Symbol & truth table of AND gate, OR gate, NOT gate, NAND gate, NOR gate, Ex-OR, Ex-NOR Gate, Laws of Boolean algebra, De-Morgan's theorem, POS, SOP, Min term, Maxterm and Karnaugh Maps (K-map) Activity 2: Game Pedagogy
Unit III	Combinational Logic circuits: Introduction, Half adder, Full adder, Half subtractor, Full subtractor circuit. Multiplexer and DE-multiplexer, Encoder & Decoder Activity 3: Technical Poster Presentation
Unit IV	Flip Flops: R-S Flip-Flop, J-K Flip-Flop, Master-Slave Flip-Flops, D Flip-Flop, J-K Flip-Flop as D Flip-Flop, T- Flip-Flop Activity 4: Mind Mapping/Open Book Test
Unit V	Counter: Introduction, Asynchronous counter, Synchronous counter, Bushing, Type T Design, Ring counter & Johnson counter Shift Register: Introduction, parallel and shift register, Seven Segment displays. Activity 1: Story Board Writing/ Paper Presentation

Text Books

- Electronic Devices and Circuits David A Bell
- Digital Logic and Computer Design McMorris Mano, PHI Learning.

Reference Books

- Electronics Instrumentation and Measurements (3rd Edition) – David A. Bell.
- Fundamental of digital circuits by A. ANAND KUMAR

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Sr. No.	List of Experiment (Digital Circuits and Design Lab BEC51102)	CO
1	Design different logic gates and verify its truth table.	CO1
2	Design universal gates and verify its truth table.	CO1
3	Design Half Adder and Full Adder and verify its truth table.	CO2
4	Design Half Sub tractor and Full Sub tractor and verify its truth table.	CO2
5	Verify proof of De-Morgan 's theorem Boolean algebra with its truth table	CO3
6	Design 4:1 multiplexer and 1:4 demultiplexer and verify its truth table.	CO3
7	Design 8:3 encoders & 3:8 decoder logic circuits and verify its truth table.	CO4
8	Design different flip-flops and verify its truth table.	CO4
9	Design of 3-bit synchronous counter and verify its truth table.	CO5
10	Design of shift register and shift register counter and verify its truth table.	CO5

Text Books

T.1	A Text Book of Modern Digital Electronics by R.P.Jain:Mc Graw Hill
T.2	Digital Electronics: Principles, Devices and Applications by Anil K. Maini, Mc Graw Hill

Reference Books

R.1	E. Hughes, —Electrical and Electronics Technology, Pearson,2023.
R.2	Digital Logic and Computer Design by M.Morris Mano: Pearson

CO	Course Outcome	CL	Class Session
CO1	Summarize the number system & its conversion	2	9
CO2	Interpret the truth table of Logic gates and simplify its logical Expression	2	9
CO3	Implement combinational logic circuit by using half and full adder.	3	9
CO4	Illustrate the functional behavior of flip-flops	3	9
CO5	Apply the working principles of asynchronous and synchronous counters	3	9



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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-II Engineering & Computer Graphics: BME51201

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory (Th)	2Hrs/week	CT-I	5 Marks	-	-
Practical(P)	-	CT-II	5 Marks	-	-
Total Credits	2 (Th)	CT-III	4 Marks	-	-
Duration of ESE: 2Hrs		CA	6 Marks	-	-
		ESE	30 Marks	-	-
		Total Marks	50 Marks	-	-

Pre-Requisites: Basics of drawing such as dimensions, scale, angle, projection

Course Objectives:

- 1 To apply fundamental engineering drawing conventions, including BIS standards, line types, and dimensioning techniques, and **construct** various engineering curves to solve practical problems.
- 2 To **analyze** and **generate** orthographic projections of points, lines, planes, and basic solids in first-angle projection, demonstrating an understanding of spatial relationships.
- 3 To **create** multi-view orthographic drawings of machine components, including sectional views, and **transform** these 2D representations into accurate isometric drawings, demonstrating advanced visualization and communication skills.

Unit I

Fundamentals of Engineering Drawing & Curves: Introduction to Engineering Drawing: Importance and scope in engineering disciplines, Introduction to BIS (Bureau of Indian Standards) drawing conventions, Drawing Instruments and Sheet Layout: Types and uses of drawing instruments (drawing board, T-square, set squares, compass, dividers, etc.), Standard sheet sizes (A-series), sheet layout, title block
Types of Lines and Dimensioning:
Classification of lines as per BIS – visible, hidden, center, construction, and section lines
Methods and conventions of dimensioning – unidirectional and aligned methods
Engineering Curves:
Construction and applications of conic sections: Ellipse, Parabola, Hyperbola
Special curves: Cycloid, Involute (of a circle), Logarithmic Spiral and Archimedean Spiral
Practical applications of curves in engineering components
Activity 1: Hands-on sketching exercise—constructing different types of lines and applying dimensioning standards on practice templates.
Activity 2: Problem-solving session—construction of various engineering curves using geometrical methods and templates.

Unit II

Principles of Orthographic Projection:
Theory and terminology of projection, first angle vs. third angle projection methods (emphasis on first angle), Projection of Points and Lines: Projections of points located in different quadrants, Projections of lines inclined to one or both reference planes (horizontal and vertical planes), Projection of Planes: Projection of plane figures (circle, triangle, square, rectangle, pentagon, hexagon, etc.) inclined to both H.P. and V.P.
Projection of Solids:
Projection of standard 3D solids (cube, prism, pyramid, cylinder, cone) Axis inclined to one reference plane and parallel to the other

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	<p>Activity 1: Group activity—projection of a line and plane with various inclinations using AutoCAD or manual drafting.</p> <p>Activity 2: Visualization quiz—identifying true length, angle, and shape from given orthographic views.</p>
Unit III	<p>Orthographic Projections of Machine Components: Generation of multiview (front, top, side) orthographic drawings from pictorial representations, Use of first angle projection method, Application of sectional views for clarity in representation</p> <p>Isometric Drawing: Understanding isometric axes and planes, Creation and use of the isometric scale, Conversion of orthographic views into isometric views or projections, Interpretation of 2D technical drawings into 3D representations</p> <p>Activity 1: Lab session—generation of multiview orthographic projections of simple machine components using manual drafting and then replicating in CAD software.</p> <p>Activity 2: Practical exercise—Development of isometric views from given orthographic projections using isometric grid paper and CAD tools.</p>
Textbooks	
T.1	Elementary Engineering Drawing - N.D. Bhatt, Charotar Publishing house, Anand, India.
T.2	Engineering Drawing - D. A. Johle, 1 st Edition, 2017, Tata McGraw-Hill Publishing Co. Ltd.
T.3	Engineering Graphics with an introduction to AUTOCAD - A. R. Bapat, 6th reprint Edition, 2012, Allied Publishers, New Delhi.
T.4	Engineering Graphics with AutoCAD - D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Revised Edition, 2010, PHI Publication.
T.5	Engineering Drawing - R.K. Dhawan, 1 st Edition, 2012, S Chand Publications
T.6	Engineering Drawing, M.B. Shah, B.C. Rana, 2nd Edition, 2009, Pearson Publication
Reference Books	
R.1	Engineering Graphics by P.J.Shah, Revised edition 2014, S Chand and Company Ltd., New Delhi, India.
R.2	Engineering Drawing by Basant Agarwal and C.M. Agarwal, 2 nd edition 2015, Tata Magraw Hill Publication Company Ltd., and New Delhi, India.
R.3	Fundamentals of Engineering Drawing - Luzadder Warren J, Duff John, 11th Edition, 2012, PHI Publications.
R.4	Machine Drawing -N.D. Bhatt, 46 th Edition, 2014, Charotar Publishing house, Anand, India.
Useful Links	
1	https://nptel.ac.in/courses/112/103/112103019
2	https://nptel.ac.in/courses/112/102/112102304/
3	https://nptel.ac.in/courses/112/105/112105294/

CO	Course Outcomes	PO	CL	Class Sessions
CO1	Apply BIS standards and drafting techniques to construct technical drawings and engineering curves using appropriate instruments.	PO1, PO5, PO11	3	10
CO2	Analyze and produce orthographic projections of points, lines, planes, and solids based on their spatial orientation with reference planes.	PO1, PO5, PO11	3	9
CO3	Create multiview orthographic and isometric drawings of simple machine components by interpreting 2D and 3D views using manual or CAD tools.	PO1, PO5, PO11	3	10


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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-II Fundamental of Generative-AI-Lab (BAIML51201)

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs/week	-	-	-	-
Total Credits	1(P)	-	-	IA	50 Marks
		-	-	ESE	-
		-	-	Total Marks	50 Marks

Pre-Requisites: NA

Course Objectives:

1. **Understand** the fundamental concepts, applications, and popular tools of Generative AI.
2. **Demonstrate** the use of prompt engineering techniques and Generative AI tools for creating text, images, code, presentations, and chatbots.
3. **Apply** Generative AI technologies to solve simple real-world problems while practicing ethical and responsible use of AI.

Course Contents

Unit I	Fundamentals of Generative AI: Introduction to Artificial Intelligence, Machine Learning, Deep Learning and Generative AI, Evolution of Generative AI, Large Language Models (LLMs): Basic Concepts, Transformer Architecture, Applications of Generative AI in Engineering, Education, Healthcare and Industry, Overview of Popular AI Tools, Introduction to Prompt Engineering, Types of Prompts:
Unit II	Generative AI Applications: Advanced Prompt Engineering: Few-shot Prompting, Chain-of-Thought Prompting, Context-based Prompting AI-assisted Content Generation, Text Summarization, Translation using AI, AI-assisted Code Generation, AI-based Image Generation, AI-assisted Presentation Creation, AI for Data Analysis and Visualization
Unit III	AI Applications, Ethics and Mini Project: Introduction to AI APIs and No-Code AI Platforms, Building Simple AI Chatbots, AI Productivity Tools, Responsible AI, AI Ethics, AI Bias and Hallucinations, Privacy, Security and Copyright Issues, Prompt Optimization, Future Trends in Generative AI, Mini Project Development and Demonstration

Text Books

T.1	Introduction to Artificial Intelligence , Cengage Learning, 2021.
T.2	Artificial Intelligence Basics: A Non-Technical Introduction , Apress, 2nd Edition.
T.3	Artificial Intelligence: Principles and Applications , PHI Learning, 2nd Edition, 2024.
Reference Books	
R.1	Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Norvig.
R.2	Generative AI For Dummies , Wiley, 2024
R.3	AI for Everyone: A Beginner's Handbook for Artificial Intelligence , Pearson, 2025

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Useful Links	
L.1	ChatGPT: ChatGPT (OpenAI)
L.2	Google AI: Google AI Studio
L.3	Google Colab: Google Colab
L.4	Hugging Face: Hugging Face
L.5	NPTEL Courses: NPTEL Online Courses

LIST OF EXPERIMENTS		
1	Identify the fundamental concepts, applications, and tools of Generative AI.	CO1
2	Recognize the capabilities of conversational AI using ChatGPT or similar Large Language Models (LLMs).	CO1
3	Describe basic prompt engineering techniques using simple and role-based prompts.	CO1
4	Explain advanced prompt engineering techniques including Chain-of-Thought and Few-shot prompting.	CO2
5	Interpret AI-generated outputs for content summarization, translation, and document analysis.	CO2
6	Apply AI-assisted code generation using GitHub Copilot or ChatGPT to solve programming problems.	CO3
7	Generate images using AI tools such as DALL·E, Adobe Firefly, or similar platforms.	CO3
8	Create presentations using AI-powered presentation generation tools.	CO3
9	Develop a simple chatbot using no-code AI platforms.	CO3
10	Implement a mini project using Generative AI tools to solve a real-world problem.	CO3

CO	Course Outcomes	CL	Class Sessions
CO1	Remember the fundamental concepts, terminology, popular tools, prompt engineering basics, and applications of Generative AI.	1	10
CO2	Understand advanced prompt engineering techniques and the applications of Generative AI for content generation, summarization, translation, document analysis, and code generation.	2	10
CO3	Apply Generative AI tools to create images, presentations, chatbots, and AI-enabled solutions while demonstrating responsible and ethical use of Generative AI.	3	10


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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-II		Computer Aided Drawing-Lab: BCE51201			
Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs/week	-	-	-	-
Total Credits	1(P)	-	-	IA	50 Marks
		-	-	ESE	-
		-	-	Total Marks	50 Marks
Pre-Requisites: NA					
Course Objectives:					
1.	Demonstrate knowledge of the basic concepts and features of AutoCAD.				
2.	Use the precision drafting tools in AutoCAD to develop accurate technical drawings.				
3.	To learn sketch and transform it into graphics drawing.				
4.	To create assembly drawings and bills of materials.				
5.	Understand the different types of 2D engineering drawings and their applications				
Course Contents					
Unit I	INTRODUCTION: Introduction to concept of Auto CAD drawings, AutoCAD versions Interface, Unit Setting, draw commands: Line command, Poly line command, Rectangle command, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes.				
Unit II	MODIFY COMMANDS: Move, Rotate, Scale, copy, Mirror, erase, trim, extend, Layers, Text and Dimensioning, Blocks. Commands: Initial settings, drawing aids, drawing basic entities, Drawing presentation norms and standards, Annotate Dimension Style Manager: Linear, Aligned, Radius Angular, Arc length, Save files Export pdf plot				
Unit III	SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall				
Unit IV	INTRODUCTION TO 2D INTERFACE: Introduction to 2D interface, 2D coordinates, Isometric views: Isometric top, left, right Isometric diagrams, Isometric diagrams exercise.				
Unit V	BUILDING DRAWING: Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity				

Chairperson

Text Books

T.1	Subhash C Sharma & Gurucharan Singh (2005), —Civil Engineering DrawingI, Standard Publishers
T.2	Sham Tickoo Swapna D (2009), —AUTOCAD for Engineers and DesignersI, Pearson Education
T.3	Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria & Sons
T.4	Malik R.S., Meo, G.S. (2009) Civil Engineering Drawing, Computech Publication Ltd. New Asian

Reference Books

R.1	Engineering Graphics by P.J.Shah, Revised edition 2014, S Chand and Company ltd., New Delhi, India.
R.2	Engineering Drawing by Basant Agarwal and C.M. Agarwal, 2 nd edition 2015, Tata Magraw Hill Publication Company ltd., and New Delhi, India.
R.3	Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
R.4	Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

Useful Links

1	http://www.nptelvideos.in/2012/12/computer-aided-design.html
2	https://nptel.ac.in/courses/105/104/105104148/

Sheet No.	List of Experiments/Drawing sheets	
1	Introduction to various CAD commands, units with simple example.	CO1
2	Introduction to computer aided drafting & coordinate system.	CO1
3	Exercise on Layer, Dimension, Texting & Block etc.	CO2
4	Drawing of building components like walls, lintels, Doors, Windows and Staircases.	CO2
5	Drawing a plan of Building dimensioning using layers and Developing sections and elevations for given Single story buildings.	CO3
6	Drawing a plan of Residential & Commercial Building.	CO4
7	Introduction to 3D commands.	CO4
8	Draw Isometrics & Orthographic views drawing.	CO5

CO	Course Outcomes	CL	Class Session
CO1	Execute the basic commands of AutoCAD software	3	8
CO2	Apply the knowledge of symbols & sign conventions to edit & modify AutoCAD Drawings	3	10
CO3	Use annotation dimension style manager in accordance with properties	3	10
CO4	Draw in accordance with 2D & 3D coordinates	4	8
CO5	Implement Single line drawings in Isometric & Orthographic view	3	9


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Department of Basic Sciences and Humanities

Program: B.Tech First Year (EE/ECE/ECS)

Semester-I Electronics Workshop

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs/week	-	-	-	-
Total Credits	1(P)	-	-	IA	50 Marks
		-	-	ESE	-
		-	-	Total Marks	50 Marks

Pre-Requisites: Bridge Course.

Course Objectives:

1. Students will Identify the basic electronics component and working of multimeter.
2. To express the ability of student for finding the values of resistor by color coding technique and use of multimeter.
3. Student will experiment the knowledge of transistor and Diode by their working.
4. Students will get the knowledge of Bread Board by structuring breadboard with basic components
5. Students will testing the operation of oscilloscopes and apply the knowledge of components on breadboard.

Course Contents

Unit I	Resistors (types, color code, ratings, applications), Capacitors (types, charging and discharging, applications), Inductors (construction, working, applications), Diodes (PN junction, LED, Zener diode), Transistors (NPN and PNP, switching and amplification)
	Activity 1: MCQ Test
Unit II	Semiconductor fundamentals junction diode, Forward bias and reverse bias-I characteristics, introduction to Bipolar Junction Transistors (BJT). NPN and PNP transistors, Transistor terminals (Emitter, Base, Collector), Transistor as a switch, Transistor as an amplifier
	Activity 2: Game Pedagogy
Unit III	Power ON/OFF and intensity control, Focus control, Trigger control, Construction and internal connections, Terminal strips and power rails, Advantages and limitations.
	Activity 3: Technical Poster Presentation

Text Books

T.1	Electronics Circuits and Systems Author: Owen Bishop
T.2	"Basic Electronics" by D P Kothari and I Nagrath

Reference Books

R.1	"Fundamentals of Electronics: (Includes Solved Problems and MCQS)" by B Somanathan Nair and S R Deepa
R.2	"Basics of Electronics Engineering" by Wiley India

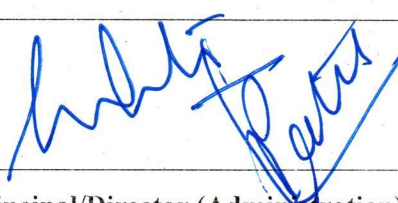
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Useful Links	
1	https://nptel.ac.in/courses/122106025
2	https://nptel.ac.in/courses/108105132
3	https://nptel.ac.in/courses/117104072

Sr. No.	List of Experiment	CO
1	Experiment Basic Electronics Component & their working.	CO1
2	Determine all functions of multimeter and continuity of circuits.	CO1
3	Calculate the Values of Resister By using Color coding & Multimeter.	CO2
4	Illustrate working of Diodes & Transistor.	CO2
5	Analyze all basic Functions of CRO with its working.	CO3
6	Evaluate functionality of Bread Board.	CO3
7	To verify the truth tables of basic logic gates using Multisim.	CO4
8	To Study of various software's used for preparation of layout like Multisim, ORCADE and Ulti board	CO4
9	To study the forward and reverse bias characteristics of a PN junction diode using Multisim	CO5
10	To study soldering and desoldering process.	CO5

Text Books	
T.1	A Text Book of Modern Digital Electronics by R.P. Jain:Mc Graw Hill
T.2	Digital Electronics: Principles, Devices and Applications by Anil K. Maini, Mc Graw Hill
Reference Books	
R.1	E. Hughes, —Electrical and Electronics TechnologyI, Pearson,2023.
R.2	Digital Logic and Computer Design by McMorris Mano: Pearson

CO	Course Outcome	CL	Class Session
CO1	Apply the knowledge of electronics component and multimeter.	2	9
CO2	Analyze operation of diode and transistor and calculate values of resister.	2	9
CO3	Illustrate the functions of CRO.	3	9
CO4	Analyze their logical behavior through simulation.	3	9
CO5	Demonstrate correct soldering and desoldering techniques	3	9

				July, 2026	5.00	Applicable for AY 2026-27 Onwards
Chairperson	Dean Academics	Vice Principal	Principal/Director (Administration)	Date of Release	Version	