KNOWLEDGE INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, Affiliated to Anna University, Chennai.
Accredited by NBA (CSE, ECE, EEE & MECH), Accredited by NAAC with 'A' Grade
KIOT Campus, Kakapalayam (PO), Salem – 637 504, Tamil Nadu, India.

Beyond Knowledge

B.E. / B.Tech. Regulations 2023

B.E. – Electrical and Electronics Engineering

Curriculum and Syllabi

(For the Students Admitted from the Academic Year 2023-24 Onwards)

Version: 1.0	Date: 09.09.2023

CHAIRPERSON
Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam.
Salem-637 504

TABLE OF CONTENTS

CHAIRPERSON
Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technol...
KIOT Campus, Kakapalay...
Salem-637 504

	KNOWLEDGE INSTITUTE OF TECHNOLOGY(AUTONOMOUS), SALEM -637504
	Approved by AICTE, Affiliated to Anna University, Accredited by NAAC and NBA (B.E.:Mech., ECE, EEE & CSE)
	Website: www.kiot.ac.in

B.E. / B.Tech. REGULATIONS 2023 (R 2023)

CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

VISION OF THE INSTITUTE
• To be a world class institution to impart value and need based professional education to the aspiring youth and carving them into disciplined world class professional who have the quest for excellence, achievement orientation and social responsibilities.

MISSION OF THE INSTITUTE	
A	To promote academic growth by offering state-of-art undergraduate, postgraduate and doctoral programs and to generate new knowledge by engaging in cutting – edge research
B	To nurture talent, Innovation, entrepreneurship, all-round personality and value system among thestudents and to foster competitiveness among students
C	To undertake collaborative projects which offer opportunities for long-term interaction withacademia and industry
D	To pursue global standards of excellence in all our endeavors namely teaching, research,consultancy, continuing education and support functions

VISION OF THE DEPARTMENT
To produce technically competent Electrical and Electronics Engineers having exemplary skills with ethical and social values.

MISSION OF THE DEPARTMENT	
M1	To provide state-of-the art facilities in Electrical and Electronics Engineering for improving the learning environment and research activities
M2	To continuously enrich the knowledge and skill of students towards the employment and creation of innovative products for society
M3	To develop ethical, social-valued and entrepreneurship skilled Electrical and Electronics Engineers

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	Succeed in the areas of Electrical and Electronics Engineering and other diverse fields by utilizing the fundamental knowledge of engineering, analytical and creative skills
PEO 2	Design, simulate and develop new innovative product and system in multi-disciplinary fields through life-long learning skill and modern tools handling ability
PEO 3	Demonstrate communication skill, leadership qualities, ethics, team work and social responsibilities

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KIOT Campus, Kakapalayam,
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PROGRAM OUTCOMES (POs)	
Engineering Graduates will be able to:	
PO 1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The Engineer and society:** Apply reasoning informed by the contextual knowledge to assess Societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)	
After the successful completion of B.E. Programme in Electrical and Electronics Engineering, the graduates will able to	
PSO 1	Apply current technologies in Embedded System Design for providing solution to real world problems through smart product development
PSO 2	Design, develop and implement software based automated system in the field of Electrical Power and Energy to meet out the demands of society and industry
PSO 3	Analyse and diagnose the faults and defects in electrical devices and systems for Energy Management

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Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam
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B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Courses of Study and Scheme of Assessment (Regulations 2023)

Sl. No.	Course Code	Course Title	Periods / Week						Maximum Marks		
			CAT	CP	L	T	P	C	IA	ESE	Total
SEMESTER III											
	THEORY										
1	BE23MA209	Transform Methods	BS	3	2	1	0	3	40	60	100
2	BE23EE402	Analog Electronics	PC	3	2	1	0	3	40	60	100
3	BE23EE403	Digital Electronics	PC	3	2	1	0	3	40	60	100
4	BE23EE404	Electrical Machines - I	PC	3	2	1	0	3	40	60	100
5	BE23EE405	Electromagnetic Theory	PC	3	2	1	0	3	40	60	100
	THEORY CUM PRACTICAL										
6	BE23CS310	Data Structures and SQL	ES	5	2	1	2	4	50	50	100
	PRACTICAL										
7	BE23EE406	Electrical Machines - I Laboratory	PC	4	0	0	4	2	60	40	100
8	BE23EE407	Analog and Digital Electronics Laboratory	PC	4	0	0	4	2	60	40	100
9	BE23EN103	Professional Communication Laboratory-I	HS	2	0	0	2	1	60	40	100
	EMPLOYABILITY ENHANCEMENT										
10	BE23PT805	Engineering Clinic-II	EEC	2	0	0	2	1	100	-	100
11	BE23PT807	Aptitude Skills-II	EEC	1	0	0	1	0.5	100	-	100
		Total		**33**	**12**	**6**	**15**	**25.5**	**630**	**470**	**1000**
SEMESTER IV											
	THEORY										
1	BE23MA206	Mathematics for Business Analytics	BS	3	2	1	0	3	40	60	100
2	BE23EE408	Measurements and Instrumentation	PC	3	2	1	0	3	40	60	100
3	BE23EE409	Electrical Machines - II	PC	3	2	1	0	3	60	40	100
4	BE23MC904	Environmental Science and Sustainability	MC	2	1.5	0.5	0	NC	-	-	-
	THEORY CUM PRACTICAL										
5	BE23EE410	Microcontroller and Interfacing	PC	5	2	1	2	4	50	50	100
6	BE23CS311	Object oriented programming using C++ and JAVA	ES	5	2	1	2	4	50	50	100
	PRCTICAL										
7	BE23EE411	Electrical Machines - II Laboratory	PC	4	0	0	4	2	60	40	100
8	BE23EN104	Professional Communication Laboratory-II	HS	2	0	0	2	1	60	40	100
	EMPLOYABILITY ENHANCEMENT										
9	BE23PT808	Aptitude Skills-III	EEC	1	0	0	1	0.5	100	-	100
		Total		**28**	**11.5**	**5.5**	**11**	**20.5**	**460**	**340**	**800**

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Knowledge Institute of Technology
KIOT Campus, Kakapalayam
Salem-637 504

BE23MA209	TRANSFORM METHODS	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1.	To study the concepts of Fourier series and types of Fourier series.
2.	To understand the various techniques in Fourier Transforms and Inverse Fourier Transforms.
3.	To infer the methodologies involved Discrete Fourier transform and Fast Fourier Transform.
4.	To learn the concepts of Z Transform and inverse transform.
5.	To familiarize the concepts of Transform methods and apply the Transforms in Engineering Problems.

INTRODUCTION (Not for Examination)	2

Importance:

Transform methods are mathematical operations that convert data from one domain to another. Solving electrical engineering problems in control systems, power electronics, and digital communications often involves transforming data from the time domain to the frequency domain.

Real-Life Example(s):

Digital Filters - Digital Communication -3G,4G,5G Technology - Mobile Communication -Medical Diagnosis (ECG Analysis) - FM-Radio

Linkages:

Pre-Requisite: Calculus for Engineers, Vector Calculus and Partial Differential Equations It contributes a prerequisite to Digital Signal Processing, Power Electronics

UNIT–I	FOURIER SERIES	5+3

Introduction to Fourier Series - Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series and cosine series – Root mean square value – Parseval's identity – Harmonic Analysis.

UNIT–II	FOURIER TRANSFORMS	5+3

Introduction to Fourier Transform - Statement of Fourier integral theorem – Fourier transform pair – Fourier sine and cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity. (Use MATLAB Fourier transforms function to solve simple problem)

UNIT– III	DISCRETE AND FAST FOURIER TRANSFORMATION	6+3

Introduction to DFT and FFT-Definition of DFT -General properties of DFT - Symmetry Properties of DFT of a real and Complex Sequence - Decimation in Time FFT (- Decimation in frequency FFT . (Use MATLAB function to solve simple problem)

UNIT – IV	Z – TRANSFORMS	6+3

Introduction to Z-transforms - Elementary properties– Initial and final value theorems – Inverse Z-transform Using partial Fraction and convolution theorem - Formation of difference equations .

UNIT–V	APPLICATIONS OF TRANSFORMS	6+3

Application of Fourier series to Electric circuits - Application of Fourier transform to ODE – Solution of difference equations using Z – transforms - Application of DFT in Discrete Signal Analysis

Total: 45 Periods

	OPEN-ENDED PROBLEMS / QUESTIONS	

Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

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Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam
Salem-637 504

Course Outcomes: Upon completion of this course the students will be able to:		Bloom's Taxonomy
CO1	Derive and compute Fourier series for periodic functions and calculate total energy and RMS values of signals	L3 – Apply
CO2	Apply the principles and applications of Fourier transforms in analyzing signals.	L3 – Apply
CO3	Apply the definitions and applications of Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT).	L3 – Apply
CO4	Formulate and solve difference equations using Z-transforms and Apply partial fraction decomposition and the convolution theorem to compute inverse Z-transforms.	L3 – Apply
CO5	Apply Fourier series to analyze and solve problems in electric circuits and Utilize the Discrete Fourier Transform (DFT) for analyzing discrete signals	L3 – Apply

TEXTBOOKS:

1.	Kreyzig E, "Advanced Engineering Mathematics", Tenth Edition, John Wiley and sons, 2017.
2.	Glyn James " Advanced Modern Engineering Mathematics", Third Edition ,Pearson Education ,2008

REFERENCE BOOKS:

1.	Grewal B.S., "Higher Engineering Mathematics", 44st Edition, Khanna Publishers, New Delhi,2020.
2.	T Veerarajan, "Fourier Series and Integral Transforms", First Edition, Yes Dee Publishing Pvt. Ltd, 2022.
3.	S.Sreenadh,"Fourier Series and Integral Transforms", First Edition, Yes Dee Publishing Pvt. Ltd,2014.

WEB REFERENCES:

	Publisher	Website link	Type of Content
1	Wikipedia	https://en.wikipedia.org/wiki/Fourier_series	Fourier Series
2	Wikipedia	https://en.wikipedia.org/wiki/Fourier_transform	Fourier Transform

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1	NPTEL	Prof.S. C Dutta Roy, , IIT Delhi	Lecture	https://www.youtube.com/watch?v=gkC7cXa8ewk
2	NPTEL	Prof. V. Balakrishnan, IIT Madras	Lecture	https://youtu.be/lkAvgVUvYvY?si=pG9psRgAt6Y1vqWE

Mapping of COs with POs and PSOs

COs	Pos												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
Avg.	**3**	**2**													

1–Low, 2 –Medium, 3–High.

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Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam
Salem-637 504

BE23EE402	ANALOG ELECTRONICS	Version: 1.0				
		CP	L	T	P	C
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	3	2	1	0	3

Course Objectives:

1. To understand the structure of basic electronic devices.
2. To familiarize the operation of transistors like BJT, FET and UJT.
3. To learn the required functionality of feedback amplifiers and oscillator circuits.
4. To learn the operation of the Op-amp-based circuits and their applications.
5. To impart the knowledge about the Special ICs.

INTRODUCTION (Not for Examination) — **2**

Importance:

Signal for information communications - Analog signal-Signal conditioning-amplifications(increasing the power level)- filtering (removing the noise) – conversion (one level to another level) - discrete active and passive components- integrated circuit (IC) -vacuum tubes - bipolar transistors- CMOS technology. Signal conditioning and processing circuits are one of the internal components of electrical and electronic systems that are designed using discrete components. Hence, electrical and electronic engineers should acquire the competency of designing signal conditioning and processing circuits and systems using integrated circuits.

Real-life example(s):

Stereos, headphones, speakers, televisions, Electrocardiograms (Amplify the electrical signals generated by the heart to produce clear readings for diagnosis)

Linkage:

Pre-requisite: Electrical Circuit Theory, Calculus for engineers.
Future courses: Power Electronics, Microcontroller and Interfacing, Measurement and Instrumentations and Project Work.

UNIT–I **SEMICONDUCTOR DIODES** — **6+3**

Introduction of basic semiconductor and PN junction theory: Semiconductor Conductivity, PN junction- Semiconductor Diode: PN junction diode, characteristics and parameters, ideal and practical diode, DC equivalent circuit, DC load line analysis, temperature effects, diode AC model, diode specifications(data sheet), diode testing - Zener diodes: junction breakdown, circuit symbol and package, characteristics and parameters, data sheet based device selection.
Diode Applications: Half wave and full wave rectifier power supply (operation, transformer selection, diode specification, filter capacitor selection) - clippers, clampers, voltage doubler and regulators.

UNIT–II **TRANSISTORS** — **6+3**

Transistors: Introduction BJT - structure, operation, Characteristics - CB, CE, CC amplifier configurations.
Application: Amplifier and Switches – Introduction to Power Amplifiers, Introduction and operation: Class A, B, AB and C - Heat Sink Calculation.

UNIT– III **FEEDBACK AMPLIFIERS AND OSCILLATORS** — **6+3**

Feedback Amplifiers: introduction – Gain with feedback – Effect of feedback on gain stability), Distortion, Bandwidth, Input and Output Impedances - Topologies of feedback amplifiers, case studies Application of negative feedback amplifiers.
Oscillators: Introduction, Positive feedback, Barkhausen criterion for oscillation– Application: Phase shift, Wien bridge and Crystal oscillators.

UNIT – IV **OPERATIONAL AMPLIFIERS AND APPLICATIONS** — **5+3**

OP-AMP: Ideal OP-AMP characteristics - DC characteristics- AC characteristics- Inverting and Non-Inverting Amplifier
Applications: Differential amplifier, Summer, Differentiator, Integrator-V/I & I/V Converters.

UNIT–V **SPECIAL IC's** — **5+3**

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Knowledge Institute of Technology
KIOT Campus, Kakapalayam
Salem-637 504

555 Timer: Introduction - monostable and astable modes of operation- Application of 555 timer **IC voltage Regulators**: Fixed Voltage regulator LM87XX,79XX Adjustable Voltage regulator – LM317, LM340, LM337 Series – Basic design considerations for designing regulated power supply– Selection of electronic devices using datasheet.

	OPEN-ENDED PROBLEMS / QUESTIONS	Total: 45 Periods

Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

Course Outcomes:

Upon completion of this course the students will be able to:

		BLOOM'S Taxonomy
CO1	Understand the structure and operation of semiconductor diode and outline the operation of voltage conversion devices	L2 - Understand
CO2	Understand the operation and characteristics of BJT and explain the operation of the amplifier and switching circuit.	L2 - Understand
CO3	Explain the operation of feedback amplifiers and oscillator circuits	L2 - Understand
CO4	Design the Op-Amp based electronic device	L3 - Apply
CO5	Design the voltage regulators using Special ICs	L3 - Apply

TEXTBOOKS:

1.	Jacob Millman, "Microelectronics", 2nd Edition, McGraw Hill, Reprinted 2017.
2.	Robert.L.Boylestad, "Electronic Devices and Circuit Theory", 11th Edition, Pearson, 2015.

REFERENCE BOOKS:

1.	Thomas L. Floyd, David M. Buchla, "Electronics Fundamentals", 7th Edition, Pearson Prentice Hall, 2010.
2.	David A. Bell, "Electronic devices and circuits", 5th edition, Oxford University higher education, 2008.
3.	Sedra Smith, "Microelectronic Circuits", 6th Edition, Oxford University Press, 2010.

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	METU Courseware	https://ocw.metu.edu.tr/course/view.php?id=105	Online Course
2.	MIT Courseware	https://ocw.mit.edu/courses/6-101-introductory-analog-electronics-laboratory-spring-2007/pages/study-materials/	online Course
3.	IIT-Kharagpur	http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAE/	Virtual Labs

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Prof.Shouribrata Chatterjee/ IIT Delhi	Lecture	https://www.youtube.com/playlist?list=PLp6ek2hDcoNDAw1BehPFazZ5ogPV8UlQa
2.	NPTEL	Prof. A.N. Chandorkar, ,IIT Bombay.	Lecture	https://www.youtube.com/playlist?list=PLbMVogVj5nJRdd1G38L_8GzxvcW11zMwN

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1												
CO2	1	3	3	1	1										
CO3	1	2	3	1									2		
CO4	1	2	3	1									2		2
CO5	1	2	3	1									1		
Avg.	**1.4**	**2**	**2.6**	**1**	**1**								**1.6**		**2**

1–Low, 2 –Medium, 3–High.

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Salem-637 504

BE23EE403	DIGITAL ELECTRONICS	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1.	To study various number systems and to simplify the mathematical expressions using Boolean functions word problems
2.	To introduce the fundamentals of combinational and sequential digital circuits.
3.	To study and construct the synchronous sequential circuits using flip-flops.
4.	To study the construct the asynchronous sequential circuits.
5.	To introduce Programmable Logic Devices (PLD's) and implement the digital functions.

INTRODUCTION (Not for Examination) — **2**

Importance:

Signal (analog-Digtial)- analog to digital conversion -Integrated circuit(IC)-two voltage bands ("ground":0/false), ("supply voltage":1/true)-programming logic devices. This course provides the fundamental knowledge to understand the advancements in interconnected systems and smart devices in smart grid communication, control, power systems, and embedded technologies.

Real-life Examples:

Smartwatches, Smartphones, Smart TVs, Washing machines and computer

Linkage:

Pre-requisites: Engineering Physics & Circuit Theory.
Future courses: Microcontrollers and Interfacing, Embedded Systems, and VLSI design

UNIT I	INTRODUCTION TO NUMBER SYSTEMS AND DIGITAL LOGIC FAMILIES	4 + 3

Introduction to Number systems – Number system conversions , One's & Two's compliments , Error detecting and correcting codes , Boolean algebra : Demorgans theorem , Digital logic families – RTL, DTL, TTL & ECL and MOS families , Characteristics of digital logic family .

UNIT II	COMBINATIONAL CIRCUITS	6 + 3

Introduction to Combinational logic circuits - representation of logic functions- SOP and POS forms, K-map representations - minimization using K maps (upto 4 variables) - simplification and implementation of combinational logic – multiplexers and de multiplexers - code converters, adders, subtractors, Magnitude comparators (1bit & 2 bit), Encoders and Decoders.

UNIT III	SYNCHRONOUS SEQUENTIAL CIRCUITS	6 + 3

Introduction to Sequential logic circuits - SR, JK, D and T flip flops - level triggering and edge triggering – counters - state diagram ; state reduction ; state assignment - Modulo counters - Shift registers- design of synchronous sequential circuits.

UNIT IV	ASYNCHRONOUS SEQUENTIAL CIRCUITS	6 + 3

Introduction to Asynchronous sequential logic circuits -Transition stability , flow stability -race conditions , hazards & errors in digital circuits ; analysis of asynchronous sequential logic circuits .

UNIT V	PROGRAMMABLE LOGIC DEVICES	6 + 3

Programmable Logic Devices: Introduction, PROM - EEPROM – PLA – PAL Architecture, Implementation of digital function in PLD's, CPLD-FPGA.

VHDL: Introduction , VHDL Operators & RTL Design

Not for Examination :

Simulation of sample circuits in Test bench (Adder / Subtractors / Flip-flops)

Total: 45 Periods

OPEN-ENDED PROBLEMS / QUESTIONS

Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

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Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam
Salem-637 504

Course Outcomes: Upon completion of this course the students will be able to:		BLOOM'S Taxonomy
CO1	Understand the number systems and characteristics of digital logic families and simplify the given Boolean expressions.	L2 - Understand
CO2	Apply K-maps and implementation of combinational circuit such as multiplexers and demultiplexers - code converters, adders, subtractors, Encoders and Decoders	L3 - Apply
CO3	Design the various synchronous circuits and counters using Flip Flops.	L3 - Apply
CO4	Design the asynchronous sequential circuits.	L3 - Apply
CO5	Implement the digital function using programmable logic devices.	L3 - Apply

TEXTBOOKS:

1.	Morris Mano.M, "Digital Logic and Computer Design", 6th edition, Prentice Hall of India, 2018.
2.	Soumithra kumar mandal, "Digital Electronics", MC Graw Hill Education, 2017

REFERENCE BOOKS:

1.	Ananda Natarajan, "Digital Electronics", PHI Learning, 2015
2.	A.P.Godse, Dr.D.A.Godse, "Digital Logic Circuits", Technical Publication, 2022

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Tutorialspoint	https://www.tutorialspoint.com/digital_circuits/digital_circuits_number_systems.htm	Articles with Examples
2.	allaboutcircuits	https://www.allaboutcircuits.com/textbook/digital/chpt-3/digital-signals-gates/	Articles with Examples
3.	electronicsforu	https://www.electronicsforu.com/technology-trends/learn-electronics/digital-circuit-design-types-applications-examples	Articles with Examples
4.	Indian Institute of Technology Delhi	https://de-iitr.vlabs.ac.in/exp/truth-table-gates/simulation.html	Virtual Labs
5.	Indian Institute of Technology Delhi	https://www.vlab.co.in/broad-area-electronics-and-communications	Virtual Labs

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	Introduction to Digital Circuits	Prof.S.Srinivasan, IIT Madras	NPTEL Video	https://www.youtube.com/watch?v=CeD2L6KbtVM&list=PL803563859BF7ED8C

Mapping of COs with POs and PSOs

	POs												PSOs		
COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	1												
CO2	1	3	3	1	1										
CO3	1	2	3	1									2		
CO4	1	2	3	1									2		2
CO5	1	2	3	1									1		
Avg.	**1.4**	**2**	**2.6**	**1**	**1**								**1.6**		**2**

1–Low, 2 –Medium, 3–High.

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Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-637 504

BE23EE404	ELECTRICAL MACHINES - I	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1	To understand the concept of Electromechanical Energy conversion.
2	To deliberate the construction and working principle of DC Generator.
3	To identify the appropriate machine for a given application based on its characteristics.
4	To impart fundamental knowledge of transformer construction, types, and operation.
5	To identify appropriate tests to determine the performance parameters of the transformer.

INTRODUCTION (Not for Examination) — **2**

Importance:

Energy Conversion: Generators(Mechanical to Electrical), Motors(Electrical to Mechanical), and Transformers(voltage level Conversion) these devices are the backbone of power systems and electrical infrastructure. These devices play crucial roles in generating, transmitting, and utilizing electrical energy.

Real-life Example(s):

Generators-Thermal Power plants, Motors-Water pump, washing machines and refrigerators, Transformers -Distribution transformers (11kV to 440/230V).

Linkage:

Pre-requisite: circuit theory
Future courses: Electric Drives, Transmission & Distribution, Power system Protection and special machines.

UNIT–I	PRINCIPLES OF ELECTROMECHANICAL ENERGY CONVERSION	4+3

Review of Magnetic Circuits – Magnetic Circuit Calculations and Magnetization Curves – Energy in Magnetic-field System: Energy and Co-energy – Field Energy and Mechanical Force – Singly excited and doubly excited system – Forces/Torques Calculation.

UNIT–II	DC GENERATORS	6+3

Constructional Details – Working Principle – Types of Armature Winding and Connections – EMF Equation – Methods of Excitation – Characteristics of Series and Shunt Generators – Armature Reaction and Commutation – Losses, Efficiency and Power Stages in DC Generator – Condition for Maximum Efficiency – Applications: Battery charging and Electroplating.

UNIT–III	DC MOTORS	6+3

Principle of Operation – Back EMF and Torque Equations – Types of DC Motors – Characteristics of Series, Shunt and Compound Motors – Applications: – Starters – Introduction to Speed Control Methods – Testing of DC Machines – Testing Standards – IEC, NEMA – Case studies.

UNIT–IV	TRANSFORMERS	6+3

Constructional Details – Types – Principle of Operation – EMF Equation – Transformation Ratio – Phasor Diagram – Transformer on No Load and Load – Equivalent Circuit – Regulation and Efficiency – Parallel Operation – Auto Transformer – Saving of Copper - Three Phase Transformers – Types of Connections. Application: Converter transformer, High frequency transformer.

UNIT–V	TESTING OF TRANSFORMER	6+3

Losses and Efficiency in Transformers – Condition for Maximum Efficiency – Testing of Transformers – OC and SC Test – Polarity Test, Load Test – Phasing out Test – Sumpner"s Test – IEC/IEEE Standard Practices of Testing transformers – Separation of Losses – All day Efficiency – Instrument Transformers.

Total : 45 Periods

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	OPEN-ENDED PROBLEMS / QUESTIONS	
Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.		

	Course Outcomes: **Upon completion of this course, the students will be able to:**	**BLOOM'S Taxonomy**
CO1	Explain the concepts of energy and co-energy in magnetic-field systems and their importance in energy conversion devices.	L2– Understand
CO2	Describe the constructional details and working principle of DC generators, including the role of armature winding and excitation methods.	L2- Understand
CO3	Analyze the operating characteristics of series, shunt, and compound DC motors and explain starting and speed control methods.	L3- Apply
CO4	Describe the constructional details of transformers and differentiate between various types based on their applications and configurations	L2- Understand
CO5	Identify and quantify the core and copper losses in transformers and calculate their efficiency under different operating conditions	L3- Apply
TEXT BOOKS:		
1.	Kothari D.P. and Nagrath I.J., "Electric Machines", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2018.	
2.	P. S. Bimbhra, "Electric Machinery", 2nd Edition, Khanna Publishers, 2021.	
REFERENCE BOOKS:		
1.	Theodore Wildi, "Electrical Machines, Drives and Power Systems", 6th Edition, Pearson Publications, 2014.	
2.	Fitzgerald, Kingsley and Umans, "Electric Machinery", 6th Edition, Tata McGraw Hill, New Delhi, 2015.	
3.	Sahdev S. K. "Electrical Machines", Cambridge University Press, 2018.	

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	NPTEL	Course "Electrical Machines": https://nptel.ac.in/courses/108102146	Study Materials
2.	NEMA - National Electrical Manufacturers Association	https://www.nema.org/	Electrical Standards, Electrical news and trends, etc
3.	Youtube	https://www.youtube.com/@LearningEngineering	Study materials with Animation videos, etc

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	Electrical Machines	Dr.G. Bhuvaneswari, IIT Delhi	YouTube videos	https://www.youtube.com/watch?v=LPcQYXjPdIQ&list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1			1					3	2	2
CO2	3	2	1	1	1			1					3	1	1
CO3	2	1	1	1	1			1					3	2	2
CO4	3	2	1	2	1			1					3	3	2
CO5	2	3	1	2	1			1					3	3	2
Avg.	**2.4**	**1.8**	**1**	**1.4**	**1**			**1**					**3**	**2.2**	**1.8**
1–Low,2–Medium,3–High															

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BE23EE405	ELECTROMAGNETIC THEORY	Version: 1.0				
Programme &Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1	To introduce the basic mathematical concepts and theorems related to electromagnetic vector fields
2	To impart knowledge on the concepts of Electrostatic fields and their applications.
3	To impart knowledge on the concepts of Magneto static fields and its applications.
4	To Learn Electromagnetic waves and characterizing parameters
5	To Learn electromagnetic Interference and Electromagnetic Compatibility

INTRODUCTION (Not for Examination) — **2**

Importance:

Electric charge - static (produce eclectic field), moving (produces current-magentic field), acceleration (produces electromagnetic field)- (Electromagnetic theory is to be learned to understand the behavior of electromagnetic materials for machine design and electromagnetic waves generation, transmission & Interferences.)

Real-Life Examples:

Motors, Generators, Transformers, Magnetic levitation systems, pacemaker

Linkages:

Pre-requisite: Electrical Circuit Theory and Engineering Physics.
Future courses: Transmission and Distribution, Electrical Machines, Power quality and Power System Analysis and Stability.

UNIT–I	INTRODUCTION	4+3

Sources and effects of electromagnetic fields – Vector fields – Different coordinate systems – Gradient, Divergence, Curl - Divergence theorem - Stoke's theorem - Coulomb's Law - Gauss's law – maxwell equations differential and integral forms.

UNIT–II	ELECTROSTATICS	6+3

Electric field intensity – Field due to point and continuous charges – Electrical potential – Electric field and equipotential plots - Electric field in free space, conductors, dielectric – Dielectric polarization - Dielectric strength - Electric field in multiple dielectrics – boundary conditions, Poisson's and Laplace's equations – Capacitance-energy density - Simulation of Electric field with FEM analysis.

UNIT–III	MAGNETOSTATICS	6+3

Lorentz Law of force, magnetic field intensity (H) – Biot savart's Law - Ampere's Law – H due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density (B) – B in free space, conductor, magnetic materials – Magnetization – Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density– Simulation of Magnetic field with FEM analysis.

UNIT–IV	ELECTROMAGNETIC WAVES	6+3

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors-skin depth, Poynting vector – Standing Waves

UNIT–V	ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY	6+3

Introduction to EMI & EMC - Non-ideal or high-frequency behavior of components - Crosstalk or near Field coupling - EM topology & grounding - EM Shielding Surge protection and Filters - Problem of Intentional electromagnetic interference, Lightning protection - EMC measurements and Standards

Total : 45 Periods

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	OPEN-ENDED PROBLEMS / QUESTIONS	
Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.		

Course Outcomes: Upon completion of this course, the students will be able to:		**BLOOM'S Taxonomy**
CO1	To understand various coordinate systems of electric fields with various laws	L2– Understand
CO2	To understand the concepts of Electrostatic fields and its boundary conditions	L2– Understand
CO3	To understand concepts of Magnetostatic fields and its boundary conditions	L2– Understand
CO4	To construct Electromagnetic wave generation equations by applying maxwell's equations	L3- Apply
CO5	To understand concepts of electromagnetic Interference and Electromagnetic Compatibility	L2– Understand
TEXTBOOKS:		
1.	Mathew N. O. Sadiku, "Principles of Electromagnetics", 6th Edition, Oxford University Press Inc. Asian edition, 2015.	
2.	K A Gangadhar, "Electromagnetic Field Theory", Eighth Reprint, Khanna Publishers, 2015	
REFERENCEBOOKS:		
1.	William H. Hayt and John A. Buck, "Engineering Electromagnetics", McGraw Hill Special Indian edition, 2014.	
2.	Kraus and Fleish, "Electromagnetics with Applications", Fifth Edition, McGraw Hill International, 2010.	
3.	V.V.Sarwate, "Electromagnetic fields and waves", First Edition, Newage Publishers, 1993.	

WEB REFERENCES:			
	Publisher	**Website link**	**Type of Content**
1.	NPTEL	https://archive.nptel.ac.in/courses/108/106/108106073/	Study Materials and Video
2.	NPTEL	https://archive.nptel.ac.in/courses/108/106/108106138/	Study Materials and Video

VIDEO REFERENCES:				
	Video Details	**Name of the Expert**	**Type of Content**	**Video link**
1.	Electromagnetic Theory	Prof. D.K. Ghosh, IIT Bombay	YouTube videos	https://www.youtube.com/playlist?list=PLbMVogVj5nJSKsAlDEbNwKZY6zD0EbGMF

Mapping of COs with POs and PSOs

COs	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	0											2
CO2	3	3	2	1											3
CO3	3	3	2	1											3
CO4	2	2	2	1											1
CO5	2	2	2	1											2
Avg.	**2.6**	**2.5**	**1.8**	**0.8**											**2.2**

1–Low,2–Medium,3–High

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BE23CS310	DATA STRUCTURES AND SQL	Version: 1.0				
Programme & Branch	COMMON TO ECE, EEE, MECH, CIVIL	CP	L	T	P	C
		5	2	1	2	4

Course Objectives:

1.	To understand the concepts of ADTs and to learn linear data structure - list ADT.
2.	To learn linear data structures - stacks, and queues.
3.	To understand nonlinear data structures - trees and graphs.
4.	To learn the fundamentals of data models, relational algebra.
5.	To understand the fundamental concepts of SQL database, SQL Comments, and Normalizations.

INTRODUCTION (Not for Examination)	2

Importance:

Efficiency in Data Management - Performance Optimization - Real World Applications - Competitive Programming and Contest and Problem Solving Skills.

Real-life Example(s):

Arrays - Online Shopping Carts - Linked Lists - Music Playlists - Stacks - Web Browser History - Queues - Customer Service Systems - Trees - File Systems - Graphs - Social Networks and Google Maps.

Linkages:

Pre-requisite: Problem Solving using C Programming, Computer Organization, Design Thinking.
Future courses: Design and Analysis of Algorithms, Coding Skills – I, Coding Skills – II.

UNIT–I	DATA STRUCTURES TYPES AND LIST ADT	5+3

Data Structure - Types, Abstract Data Types (ADTs) - **List ADT:** Array implementation of List ADT and Linked List implementation of List ADT - Singly linked lists - Circularly Singly linked lists - Doubly linked lists.

UNIT–II	LINEAR DATA STRUCTURES (STACK AND QUEUE)	5+3

Stack ADT: Operations Array and Linked List implementation - **Applications:** Expression Evaluation Infix to Postfix conversion - Evaluation of Postfix Expression - **Queue ADT:** Operations Array and Linked List implementation - Circular Queue.

UNIT– III	NON LINEAR DATA STRUCTURES (TREES AND GRAPHS)	6+3

Tree ADT: Tree Definition - Tree terminologies, General tree and Binary Tree - Tree traversal - Expression tree - Binary Search Tree. **Graph ADT**: Graph Definition - Graph terminologies, Representation of Graphs - Graph traversal - **Shortest Path algorithms:** Dijkstra's algorithms, **Minimum Spanning Tree:** Prim's and Kruskal's algorithms.

UNIT – IV	INTRODUCTION TO DATABASE SYSTEM	3+3

Database System: Definition and Purpose of Database System - Views of data - Data Models - Database System Architecture - **Introduction to relational databases:** Relational Model - Relational Algebra, **Entity Relationship model:** ER Diagrams.

UNIT–V	FUNDAMENTALS OF MySQL and SQL	9+3

MySQL: Introduction to MySQL - Environmental Setup **SQL:** What is SQL? Process of SQL Advantages and Disadvantages of SQL, SQL Syntax, SQL Data Types, SQL Operators – Keys, **SQL Commands:** DLL, DML, DCL, TCL, DQL - Normalizations - Joins Sub queries - Aggregate Functions.

Total(LT): 45 Periods

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LIST OF EXPERIMENTS/EXCERCISES:	
1.	Implement array and pointer based list.
2.	Implement array and pointer based stack.
3.	Implement array and pointer based queue.
4.	Implement binary tree traversals.
5.	Implement Shortest path and Minimum Spanning Tree algorithm.
6.	Implementation of DDL commands of SQL for the following operations. • Create table • Alter table • Drop Table
7.	Implementation of DML commands of SQL for the following operations. • Insert • Update • Delete
8.	Implementation of different types of operators in SQL. • Arithmetic Operators • Logical Operators • Comparison Operator • Special Operator • Set Operation
	Total (P): 30 Periods
	Total (LT+P): 75 Periods

	OPEN-ENDED PROBLEMS / QUESTIONS	
Course Specific Open-Ended Problems will be solved during class room teaching. Such problems can be given as assignments and evaluated as IA only and not for the End Semester Examinations.		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Define linear and nonlinear data structures.	L1 Remember
CO2	Implement linear and non–linear data structure operations.	L2 Understand
CO3	Use appropriate non–linear data structure operations for solving a given problem.	L3 Apply
CO4	Construct SQL Queries using relational algebra.	L2 Understand
CO5	Apply SQL queries to handle SQL database.	L3 Apply

TEXTBOOKS:

1.	Reema Thareja, "Data Structures Using C", Third Edition, Oxford University Press, 2023.
2.	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 9

REFERENCE BOOKS:

1.	Ritika Mehra, "Data Structures using C", 1st Edition, Pearson Education, 2021.
2.	Langsam, Augenstein and Tanenbaum, "Data Structures Using C and C++", 4th Edition, Pearson Education, 2022.
3.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022.
4.	Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft, "Data Structures and Algorithms", 4th edition, Pearson, 2020.
5.	Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 8th Edition, Pearson Education, 2020.

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Tutorialspoint	https://www.tutorialspoint.com/dsa_using_c/dsa_using_c_useful_resources.htm	Online Course
2.	Hackerrank	https://www.hackerrank.com/domains/data structures	Online Course
3.	Geeksforgeeks	https://www.geeksforgeeks.org/introductionofdbmsdatabasemanagementsystemset1/	Online Course

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VIDEO REFERENCES:				
	Video Details	**Name of the Expert**	**Type of Content**	**Video link**
1.	YouTube	K.Ravikumar	Lecture	https://www.youtube.com/@reachtutorravi3115
2.	YouTube	Jenny's Lectures	Lecture	https://www.mygreatlearning.com/academy/learnforfree/courses/datastructures inc
3.	NPTEL	Prof. Partha Pratim Das, Prof. Samiran Chattopadhyay	Lecture	https://onlinecourses.nptel.ac.in/noc22_cs91/preview

Mapping of COs with POs and PSOs															
COs	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	1	2	2							3	2	1	
CO2	1	2	1	2	2							2	2	2	
CO3	2	3	1	2	3							2	2	1	
CO4	2	2	3	2	1							1	2	1	
CO5	3	1	1	1	1							3	3	1	
Avg.	**2**	**2.2**	**1.4**	**1.8**	**1.8**							**2.2**	**2.2**	**1.2**	
1–Low, 2 –Medium, 3–High.															

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BE23EE406	ELECTRICAL MACHINES - I LABORATORY	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		4	0	0	4	2

Course Objectives:

1.	To expose the students to determine the characteristics of DC machines and transformers by performing experiments on these machines.
2.	To provide hands on experience to evaluate the performance parameters of DC machines and transformer by conducting suitable tests.

List of Experiments / Exercises

1.	Load characteristics of DC series motor
2.	Load characteristics of DC compound motor
3.	Speed control of DC shunt motor and Swinburne"s test
4.	Open circuit and load characteristics of DC shunt generator
5.	Load characteristics of DC compound generator with differential and cumulative connections.
6.	Hopkinson's test
7.	Load test on single phase and three phase transformer
8.	OC and SC test of transformers
9.	Sumpner's test
	Total: 60 Periods

Course Outcomes: Upon completion of this course the students will be able to:		**BLOOM'S Taxonomy**
1.	Construct the circuit with appropriate connections for the given DC machine/transformer.	L3 – Apply
2.	Experimentally determine the characteristics of different types of DC machines.	L3 – Apply
3.	Demonstrate the speed control techniques for a DC motor for industrial applications.	L3 – Apply
4.	Identify suitable methods for testing of transformer and DC machines.	L3 – Apply
5.	Predetermine the performance parameters of transformers and DC motor.	L3 – Apply

TEXTBOOKS:

1.	D.P.Kothari, B.S.Umre, "Laboratory Manual for Electrical Machines", 2nd edition, Dreamtech Press.

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1					1				3	1	1
CO2	3	3	1	1					1				3	3	2
CO3	3	3	1	1					1				3	3	2
CO4	3	3	1	1					1				2	3	2
CO5	3	3	1	1					1				2	3	2
Avg.	**3.0**	**3.0**	**1**	**1**					**1**				**2.6**	**2.6**	**1.8**

1–Low, 2 –Medium, 3–High.

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BE23EE407	ANALOG AND DIGITAL ELECTRONICS LABORATORY	Version: 3.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		4	0	0	4	2

Course Objectives:

1	To conduct the experiment to determine the characteristics of electronic components (Diodes and Transistors)
2	To design the Integrator, Differentiator, amplifiers, ADC & DAC, clippers & clampers for various applications.
3	To construct the code converters, Adder & Subtractors, MUX – DeMUX, Encoders & Decoders using suitable IC's.

List of Experiments / Exercise :

	ANALOG ELECTRONICS
1.	Characteristics of PN junction diode and Zener diode.
2.	Characteristics of NPN Transistor Configurations.
3.	Design of DC Power supply using voltage-regulated ICs
4.	Design of an Integrator and Differentiator circuit using Op-amp.
5.	Design of Differential Amplifier & Oscillators
6.	Design of ADCs and DACs
7.	Design of clipper and clamper using PN junction diode (Discrete components & Simulation software)
	DIGITAL ELECTRONICS
8.	Study of Basic Digital IC's.
9.	Implementation of Boolean functions.
10.	Design of code converters – BCD To GRAY / BCD to Excess – 3
11.	Design of Adder and Subrtactors using logic gates.
12.	Design of Counters.
13.	Design of Mux & Demux.
14.	Design of Encoder and Decoder
15.	Study of Flip-Flops.
	Total: 60 Periods

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
1.	Obtain the characteristics of given electronics components.	L3 – Apply
2.	Design the application circuit to achieve the Integrator, Differentiator & amplifiers.	L3 – Apply
3.	Construct the signal conversion for ADC & DAC, clippers & clampers.	L3 – Apply
4.	Study the Digital IC's and Flip-flops.	L2 – Understand
5.	Design the code converters and digital logic functions.	L3 – Apply

Virtual Labs:

1.	https://de-iitr.vlabs.ac.in/exp/truth-table-gates/simulation.html
2.	http://vlabs.iitkgp.ac.in/dec/#
3.	https://www.vlab.co.in/broad-area-electronics-and-communications

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Mapping of COs with POs and PSOs															
COs	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	3	1									1		
CO2	2	3	3										2	2	
CO3	2	3	3	1									2	2	
CO4	3	1	2												
CO5	3	3	3	1									3		
Avg.	**2.6**	**2.6**	**2.8**	**1**									**2**	**2**	
1–Low,2–Medium,3–High															

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BE23EN103	PROFESSIONAL COMMUNICATION LABORATORY - I	Version : 1.0				
Programme & Branch	COMMON TO ALL BRANCHES EXCEPT B.Tech CSBS	CP	L	T	P	C
		2	0	0	2	1

Course Objectives:

1	To use language for employment and social interaction.
2	To help learners frame sentences in correct context.
3	To develop students' confidence for presentation.
4	To strengthen students' business communication.
5	To participate confidently and appropriately in a team conversation.

INTRODUCTION (Not for examination)	1

Importance:

Provides a platform where students can enhance their language competence - Helps students to acquire career skills sought by the industry for campus recruitment - Improve communication skills in formal and informal situations.

Real-Life Example(s):

Writing letters, drafting e-mails, blog writing, writing abstracts - Public Speaking, presentation.

Linkages:

Communicative English – I, Communicative English – II

LIST OF EXPERIMENTS

1.	Listening & Reading Comprehension
2.	Root words & Sentence formation
3.	Expressing oneself in everyday situation
4.	Conversation and Just a minutes talk
5.	Oral presentation – Long turn
6.	Group Discussion
7.	Creative Writing
8.	Business Letter Writing
9.	Giving constructive feedback and offering suggestions
10.	E-mail writing

Total : 30 Periods

Course Outcomes: Upon completion of this course the students will be able to:		BLOOM'S Taxonomy
CO1	Use language effectively for employment.	L3 - Apply
CO2	Enhance writing skills for better communication.	L3 - Apply
CO3	Present ideas in public forum.	L3 - Apply
CO4	Write business letters in a comprehensive manner.	L3 - Apply
CO5	Express opinions assertively in group discussions.	L3 - Apply

TEXTBOOKS:

1	Richardson, Mathew. Advanced Communication Skills. Charlie CReative Lab, 2020
2	Rizvi, Ashrif. Effective Technical Communication, Tata Mc Grahill, 2011.

REFERENCE BOOKS:

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1.	Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English.Cambridge University Press, Cambridge: Reprint 2011
2.	Terk, Natasha. Reports, Proposals and Procedures: A write It well Guide. Gildan Media, 2015.
3.	Carnegie, Dale. The Art of Public Speaking. Prabhat Prakashan Pvt. Ltd. 1st Edition: New Delhi, 2016

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Leverageedu	https://leverageedu.com/blog/group-discussion-topics/	others
2.	Forbes	https://www.forbes.com/advisor/in/business/business-letter-format/	others

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Dr.T.Ravichandran IIT, Kanpur	Lecture	https://nptel.ac.in/courses/109104031
2.	NPTEL	Dr.Binod Mishra IIT, Roorkee	Lecture	https://onlinecourses.nptel.ac.in/noc21_hs76/preview

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		1			
CO2										3		1			
CO3										3		1			
CO4										3		1			
CO5										3		1			
Avg.										**3**		**1**			

1–Low, 2 –Medium, 3–High.

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BE23PT805	ENGINEERING CLINIC - II	Version: 01				
Programme & Branch	COMMON TO All BRANCHES	CP	L	T	P	C
		2	0	0	2	1

Course Objectives:

1	To provide a platform for hands-on learning experiences in order to build relevant engineering skills.
2	To enable students to learn and develop skills on designing of new product for real world application using 3D Printer and IOT.
3	To take entrepreneurship, product development, startup-related activities and problem-solving skills in higher semesters and final semester project work.

INTRODUCTION (Not for Examination) — **02**

Importance:

This course aims to enhance engineering knowledge and enabling students to become more creative and innovative. Students are actively involved in solving real-time problems as part of their curriculum and take part in extracurricular projects.

Real-life Examples:

Smart home automation, smart Healthcare, smart irrigation system, digital printing, Industrial Automation and vehicle tracking system.

Linkage:

Pre-requisites: Engineering Physics, Engineering Clinic – I.
The Engineering Clinic I & II course will provides the hands-on experience to develop the miniature model of doing by learning.

A. CONCEPT

Engineering Clinic laboratory provides hands-on training for students to develop certain simple real-world products or applications with the help of faculty. It is a team activity consisting of maximum 3 students per team. A list of products or applications will be given. Engineering Clinic - II focus on product development involving interdisciplinary Engineering courses. Each team can choose one or more products for a given application. The students have to design, fabricate and demonstrate the working of the product.

B. EXECUTION

Day	Session	Course content / Activity	No. of Periods
1	S 1	Introduction to Embedded Systems and IoT.	2
	S 2	Hands-on Training to write a code for IOT Circuit design using open-source software.	4
	S 3	Demonstration and explanation of real-time IoT application circuits in various sectors.	6
2	S 4	Introduction to 3D Printing Technology.	2
	S 5	Hands-on Training to design 3D Printing model using open-source software.	4
	S 6	Fabrication of 3D Printing Models.	6
3	S7	Demonstration of Sublimation and Vinyl cutter Machine.	3
	S 8	Demonstration of Wood router Machine.	3
		Total : 30 Periods	

A list of sample applications/products is attached.

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C. ASSESSMENT

i. Assessment is done by Internal mode only and there is no End Semester Examination.
ii. Sessions (S7 & S8) are intended for demonstration purposes only, not for assessment.
iii. Marks distribution for Infernal Assessment is,

Method	Review I	Review II	Review III	Review IV
Details	System description and Circuit design.	Testing, Validation and Demonstration.	Design of 3D Printing models.	Fabrication of 3D Printing models.
Marks	25	25	25	25

For Product/Application the student team can choose themselves.

Total : 30 Periods

Course Outcomes: Upon completion of this course the students will be able to:		BLOOM'S Taxonomy
CO1	Understand the Basics of IOT components.	L2- Understand
CO2	Design and Demonstrate the prototype of expedient product using 3D Printer.	L4 -Analyze
CO3	Practice the culture of Innovation and Product Development towards Start-ups in an Institution.	L4 - Analyze

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	2	2	-	2	2	2	2	2		
CO2	3	3	3	2	2	2	2	-	2	2	3	2	2		
CO3	3	3	3	2	2	2	2	-	2	3	3	2	2		
Avg.	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**-**	**2**	**2.3**	**2.6**	**2**	**2**		

1–Low, 2 –Medium, 3–High.

List of sample Applications / Products for Engineering Clinic II

1. Automated Irrigation System
2. Smart Home Automation
3. AI based Image Capturing Robot
4. Vehicle Tracking System
5. IoT based Smart Traffic Management
6. IoT based Smart Hybrid Energy Management System
7. IoT based Garbage Monitoring System
8. Miniature of Home / Buildings / Bridges
9. Miniature of Robot /Quad copter/Motor and Drives
10. Development of Wood Wall Art/logo pendant /Door design.

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BE23PT807	APTITUDE SKILLS - II	Version: 01				
Programme & Branch	COMMON TO All BRANCHES	CP	L	T	P	C
		1	0	0	1	0.5

Course Objectives:

1	To acquire skills required to solve quantitative aptitude problems.
2	To enhance the logical reasoning skills and help them improve problem solving abilities.

INTRODUCTION (Not for Examination)	01

Importance:

Logical thinking and Problem-solving skills are very important for solving engineering problems

Linkages:

Pre-Requisite: Aptitude Skills I

Future courses: Aptitude Skills III and Aptitude Skills IV

UNIT–I	QUANTITATIVE APTITUDE	08

Number Systems–Averages–Percentage–Profit & Loss–Problems on Ages– Ratios &Proportions.

UNIT–II	LOGICAL REASONING	06

Venn Diagrams– Cubes & Cuboids– Data-Interpretation and Data-Sufficiency.

Total : 15 Periods

Course Outcomes: Upon completion of this course, the students will be able to:		BLOOM'S Taxonomy
CO1	Exhibit sound knowledge to solve problems of quantitative aptitude.	L3 - Apply
CO2	Demonstrate ability to solve problems using logical reasoning.	L3 - Apply

REFERENCE BOOKS:

1.	Dr. R.S. Aggarwal, "Quantitative Aptitude for Competitive Examinations", S.Chand and Company Ltd., 2022
2.	Dr. R.S. Aggarwal, "A Modern Approach to Logical Reasoning", S.Chand and Company Ltd., 2022
3.	FACE, "Aptipedia: Aptitude Encyclopedia", 2nd edition, Wiley India Pvt. Ltd., 2017

REFERENCE BOOKS:

1.	Arun Sharma, "Quantitative Aptitude for the CAT" 10th edition, McGraw-Hill Publishing, 2022
2.	Praveen R. V., "Quantitative Aptitude and Reasoning", 3rd edition, PHI Learning Pvt. Ltd., 2016

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Indiabix	https://www.indiabix.com/online-test/aptitude-test/	Tests for Practice
2.	Placement preparation	https://www.placementpreparation.io/quantitative-aptitude/	Tests for Practice
3.	Geeks for geeks	https://www.geeksforgeeks.org/aptitude-for-placements/	Learning Resources and Tests for Practice

VIDEO REFERENCES:

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	Video Details	Name of the Expert	Type of Content	Video link
1.	YouTube	CareerRide	Video Lectures	https://www.youtube.com/playlist?list=PLpyc33gOcbVA4qXMoQ5vmhefTruk5t9lt
2.	YouTube	Freshersworld.com	Video Lectures	https://www.youtube.com/playlist?list=PLjLhUHPsqNYkcq6YOfiywbTfnvf_TN7i9

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2	3														
CO3															
CO4															
CO5															
Avg.	**3**														

1–Low, 2 –Medium, 3–High.

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BE23MA206	MATHEMATICS FOR BUSINESS ANALYTICS	Version: 1.0				
Programme & Branch	COMMON TO All BRANCHES	CP	L	T	P	C
		3	2	1	0	3

Use of Calculator - fx991ms are permitted and Statistical Tables

Course Objectives:

1.	To learn the Foundation of Data Science.
2.	To understand the Concepts of Probability Distributions.
3.	To apply Statistical Techniques for Decision Making.
4.	To apply Design of Experiments in Business Problem.
5.	To introduce basic concepts of Correlation and regression for business data Analysis.

INTRODUCTION (Not for Examination) — **2**

Importance:

Business analytics has become one of the most important skills that every student of management and engineering must acquire to become a successful in the career. The analytics across industries for decision making, problem solving and for driving innovations makes analytics and essential skill for every student from management and engineering disciplines.

Real-Life Example(s):

Amazon – festival offer, Flipkart – special offer (Data collection).

Linkages:

Pre-Requisite: Calculus for Engineers.

UNIT–I	FOUNDATION OF DATA SCIENCE	6+3

Introduction to Business Analytics – Foundation of Data Science - Axioms of probability – Conditional probability – Baye's theorem.

UNIT–II	DISTRIBUTIONS	6+3

Discrete and continuous random variables - Types of Distributions –Discrete Distributions: Binomial, Poisson, Geometric – Continuous Distribution: Uniform, Exponential and Normal distributions.

UNIT– III	TESTING OF HYPOTHESIS	5+3

Essential of Testing of Hypothesis -Sampling distribution - Tests for single mean, proportion and difference of means (Large and small samples) – Tests for single variance and equality of variances – Chi Square test for goodness of fit – Independence of attributes.

UNIT – IV	DESIGN OF EXPERIMENTS	5+3

Introduction of Design of Experiments - One-way and two-way classifications - Completely randomized design – Randomized block design – Latin square design - 2^2 factorial designs.

UNIT – V	CORRELATION AND REGRESSION	6+3

Correlations – Pearson correlation coefficient - Spearman Rank Correlation – Regression Simple Linear Regression – SLR Models.

Total: 45 Periods

OPEN-ENDED PROBLEMS / QUESTIONS

Course specific Open Ended Problems will be solved during the classroom teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

Course Outcomes: Upon completion of this course the students will be able to:		BLOOM'S Taxonomy
CO1	Apply the probability concepts in business problems.	L3 – Apply
CO2	Apply the Probability Distribution Function in Engineering Problems.	L3 – Apply

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CO3	Apply hypothesis-testing techniques to interpret results.	L3 – Apply
CO4	Choose the appropriate test by various methods of Parametric tests.	L3 – Apply
CO5	Apply the Correlation and regression in Engineering and business Problems.	L3 – Apply

TEXTBOOKS:

1.	Dr.U.Dineshkumar IIM-B," Business Analytics", Second Edition, Wiley India Edition, 2022.
2.	Douglasc.Montgomery, Georgec.Runger,"Applied Statistics and Probability for Engineers", Seventh Edition, Wiley India Edition, 2018. J.K. Sharma

REFERENCE BOOKS:

1.	J.K. Sharma," Business Statistics",5th Edition, S. Chand, 2020.
2.	Ken Black, Business Statistics for contemporary decision making, 5th Edition, Wiley India Edition,2010.
3.	T.Veerarajan,"Probability -Statistics and Random variables", Third Edition,Mc Graw Hill Education, 2017.

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Wikipedia	https://en.wikipedia.org/wiki/Probability	Probability
2.	Wikipedia	https://en.wikipedia.org/wiki/Statistics	Statistics

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Prof. Saji K Mathew - IIT Madras	Lecture	https://onlinecourses.nptel.ac.in/noc24_cs65/preview
2.	NPTEL	Prof. Rudra P Pradhan - IIT Kharagpur	Lecture	https://onlinecourses.nptel.ac.in/noc20_mg11/preview

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2													
CO2	3	2													
CO3	3	2													
CO4	3	2													
CO5	3	2													
Avg.	**3**	**2**													

1–Low, 2 –Medium, 3–High.

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BE23EE408	MEASUREMENT AND INSTRUMENTATION	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1	To understand the fundamental concepts and characteristics of measurement
2	To educate the functional aspects of measuring instruments
3	To infer the importance of various bridge circuits used with measuring instruments
4	To educate the fundamental working of sensors and transducers and their application
5	To provide basic understanding of data acquisition systems and virtual instrumentation

INTRODUCTION (Not for Examination) — **2**

Importance:

Measurement and Instrument is the fundamental for various Engineering disciplines, teaches the principle and methods to measure and control physical quantities with high precision, accuracy, design and development.

Real-Life Example(s):

Sensors, transducers, Industrial Automation, Medical Instrument, Environmental monitoring, Aerospace and for Smart Home.

Linkage:

Pre-requisite: Circuit theory, Analog Electronics Control Systems:
Future Courses: Embedded Sysem

UNIT–I	CONCEPT OF MEASUREMENT	7

Instrument Classification and application. Elements of a generalized measurement system-static and dynamic characteristics-Error in measurements-Statistical evaluation of measurement data.

UNIT–II	MEASUREMENT OF ELECTRICAL PARAMETER	6+3

PMMC, moving iron, dynamometer type, rectifier type and thermal instruments- wattmeter-single and three phase power measurements-Digital Energy meter-Ballistic test-maximum demand meter-P.F.meter – Instrument Transformer (C.T & P.T)

UNIT–III	AC/DC BRIDGE & AMPLIFIER	6+3

Wheatstone bridge, Kelvin double bridge – Maxwell, Hay, Wein and Schering bridges – Errors and compensation in A.C. bridges- Instrumentation amplifiers- Potentiometers.

UNIT–IV	SENSORS AND TRANSDUCERS	6+3

Classification of sensors and transducers- Measurement of pressure, temperature, displacement, flow, angular velocity- digital transducer – smart sensor

UNIT–V	DIGITAL INSTRUMENTATION	6+3

A/D converters: Types, resolution, dynamic range, accuracy, sampling concepts and techniques, A/D boards - D/A converters: Types, D/A boards - Digital I/O boards - Counter/Timer I/O boards. Virtual Instrumentation: Components of LabView - Front panel - LOOP Behaviors and inter loop communication - Block diagram - SubVI- DAQ cards and accessories-Data Acquisition with LabVIEW.

Total :45 Periods

OPEN-ENDED PROBLEMS / QUESTIONS

Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

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Course Outcomes: Upon completion of this course, the students will be able to:		BLOOM'S Taxonomy
CO1	Ability to understand the fundamental of instruments and measurement	L2 - Understand
CO2	Identify the correct meters for measuring the parameters	L1 - Remember
CO3	Design an AC and DC bridge to measure resistance, capacitance and inductance	L3 - Applying
CO4	Ability to understand various sensors and transducers	L2 - Understand
CO5	Design different type of ADC-DAC circuits and analyze and interpret data	L3 - Applying
TEXTBOOKS:		
1.	David A. Bell, "Electronic Instrumentation and Measurements", 3rd Edition, Oxford university press, New Delhi, 2013.	
2.	H.S. Kalsi, "Electronic Instrumentation", 3rd Edition, Mc-Graw Hill education, 2015.	
REFERENCEBOOKS:		
1.	Cooper W.D and Helfrick A.D, "Modern Electronic Instrumentation and Measurement Techniques", 4th Edition, Pearson India Education, 2015	
2.	A.K. Sawhney, "A Course In Electrical And Electronic Measurements And Instrumentation", Dhanpat Rai Publications, 2012.	
3.	Jovitha Jerome, "Virtual Instrumentation using LABVIEW", Prentice Hall India, 2013.	

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	SciTechnol	https://www.scitechnol.com/scholarly/measurement-and-instrumentation-journals-articles-ppts-list.php	Journal
2.	Wikipedia	https://en.wikipedia.org/wiki/Instrumentation	webpage

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Dr.Dipankar N.Basu, IIT Guwahati	Video	https://www.youtube.com/watch?v=tN7iAzVEqa0
2.	NPTEL	Prof.Siddhartha mukhopadhyay IIT Kharagpur	Video	https://www.youtube.com/watch?v=vrqV-O_gaqg

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2													
CO2	2	1	2												
CO3	2	2	1	2											
CO4	2		1	2											
CO5	3		2	1									2	3	
Avg.	**2.4**	**1.6**	**1.5**	**1.6**									**2**	**3**	

1–Low,2–Medium,3–High

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BE23EE409	ELECTRICAL MACHINES - II	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		3	2	1	0	3

Course Objectives:

1	Explain the construction, working, and behavior of the alternator
2	Explain the construction, working performance of synchronous motor
3	Analyze the operation and performance characteristics of induction machines
4	Apply starting and speed control methods to AC motors.
5	Demonstrate the operation of single-phase induction machines and special Electrical machines.

INTRODUCTION (Not for Examination) — **2**

Importance:

Electrical AC Generators and Motors are fundamental components in a wide range of applications and play a crucial role in modern society. Their importance can be categorized into several key areas: Energy Conversion and Power Generation, Transportation, Home and office appliances, Renewable Energy Integration, Medical equipment. infrastructure and utilities and Economic and Environmental impact.

Real-life Example(s):

Air Conditioners, CNC Machines, Electric Vehicles, Electric Locomotives, Hoist industrial conveyors, Lift, Printers and Copiers, Refrigerator, Robotics, and Washing Machines.

Linkage:

Pre-requisite: Electrical Machines-I and circuit theory
Future Courses: Electric Drives and special machines.

UNIT–I	SYNCHRONOUS GENERATOR	4+3

Introduction to Rotating MMF – Construction and Operation Details – Types of Rotors – Concentrated and Distributed Windings – EMF Equation – Synchronous Reactance – Armature Reaction – Voltage Regulation: EMF, MMF and ZPF Methods – Synchronizing and Parallel Operation – Applications– Case Study: Integrated Starter Generator for Hybrid Electric Vehicle.

UNIT–II	SYNCHRONOUS MOTOR	6+3

Principle of Operation – Torque Equation – Starting Methods – V and Inverted V Curves – Input and Output Power Equations – Power/Power Angle Relations – Hunting – Causes & Prevention – Applications: Synchronous Condenser – Power factor correction.

UNIT–III	THREE-PHASE INDUCTION MOTOR	6+3

Construction and Operation Details – Types of Rotors – Squirrel Cage and Slip Ring– Slip –Torque Equations – Slip Torque Characteristics – Losses and Efficiency– Load Test – No Load and Blocked Rotor Tests – Equivalent Circuit – Circle Diagram – Separation of No-Load Losses – Crawling and Cogging– Applications

UNIT–IV	STARTING AND SPEED CONTROL OF THREE-PHASE INDUCTION MOTOR	6+3

Need for Starters – Types of Starters – Rotor Resistance, Autotransformer, Star-Delta and DOL Starters – Speed Control by Varying Voltage , Frequency , V/F Control , Poles and Rotor Resistance– Slip Power Recovery Scheme. Case Study– Design & Speed control of 3ph induction motor using MATLAB software.

UNIT–V	SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES	6+3

Construction and Operation Details – Double Revolving Field Theory – Equivalent Circuit– Types - Split Phase, Capacitor Start, and Capacitor Run Induction Motor – Applications– Special Machines – Servo Motor, Stepper Motor and BLDC motor. Case Study on special machines– Design using computer software.

Total: 45 Periods

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	OPEN-ENDED PROBLEMS / QUESTIONS	
Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.		

	Course Outcomes: **Upon completion of this course, the students will be able to:**	**BLOOM'S Taxonomy**
CO1	Explain the construction, working, and behavior of the alternator	L3 – Apply
CO2	Explain the constructional, working performance of synchronous motor	L3 – Apply
CO3	Analyze the operation and performance characteristics of induction machines	L3 – Apply
CO4	Apply starting and speed control methods to AC motors.	L3 – Apply
CO5	Demonstrate the operation of a single-phase induction machine and Special Electrical machines.	L3 – Apply
TEXTBOOKS:		
1.	Kothari D.P. and Nagrath I.J, "Electric Machines", 5th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2018	
2.	B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015.	
REFERENCE BOOKS:		
1.	Rajput R.K.,"Electrical Machines", 6th Edition, Laxmi Publications, New Delhi, 2018.	
2.	Gupta J.B., "Electrical Machines", 4th Edition, S.K. Kataria& Sons, New Delhi, Reprint 2014.	
3.	Murugesh Kumar, 'Electric Machines', Vikas Publishing House Pvt. Ltd, First edition 2010.	
4.	Alexander S. Langsdorf, 'Theory of Alternating-Current Machinery', McGraw Hill Publications, 2001.	

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	NPTEL	https://archive.nptel.ac.in/courses/108/105/108105155/	Video lecture
2.	NPTEL	https://nptel.ac.in/courses/108102146	Video lecture

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Prof. Debaprasad Kastha, IIT Kharagpur	Video lecture	https://www.youtube.com/playlist?list=PL59861DBF8EC85491
2.	NPTEL	Prof. Bhuvaneswari, IIT Delhi	Video lecture	https://www.youtube.com/playlist?list=PLp6ek2hDcoNCANsWM2mw3qi0387BhfLyV

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1										
CO2	3	3	1	1	1										
CO3	3	3	1	1	1										
CO4	3	3	1	1	1										
CO5	3	3	1	1	1										
Avg.	**3**	**3**	**1**	**1**	**1**										
1–Low,2–Medium,3–High															

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BE23MC904	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	Version:1.0				
Programme & Branch	COMMON TO ALL BRANCHES	CP	L	T	P	C
		2	1.5	0.5	0	0

Course Objectives:

1.	To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
2.	To impart knowledge on the causes, effects and control or prevention measures of environmental pollution.
3.	To facilitate the understanding of global and Indian scenario of energy resources, causes of their degradation and measures to preserve them.
4.	To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
5.	To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyzes the role of sustainable urbanization.

INTRODUCTION (Not for Examination)	1

Importance:
Engineering students studying environmental science explore the significance of ecosystems, human-nature dynamics, and global environmental challenges like climate change and biodiversity loss. They also grasp concepts of sustainable management and socio-economic goals such as carbon emission reduction and equitable resource access.

Real-Life Example(s):

Sewage water treatment plant – Solar panel – Wildlife sanctuary

Linkages:
To all processes that generate pollution.

UNIT–I	ENVIRONMENT AND BIODIVERSITY	5+2

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.
Case study on Ecosystem at local level.

UNIT–II	ENVIRONMENTAL POLLUTION	5+2

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, and Hazardous pollution management. Case studies on Occupational Health and Safety Management system (OHASMS). Environmental protection, Environmental protection acts.
Case study – Sources and remedy of water pollution, air pollution at industry level.

UNIT–III	ENERGY SCENARIO OF WORLD AND INDIA	4+1

Presents sources and distributions, related energy issues, future growth aspects and anticipated energy consequences – Need to form on environment friendly and renewable sources their potential and impact – Hardness in execution. Case study on available new energy resources in India.

UNIT–IV	SUSTAINABILITY AND MANAGEMENT	4+1

Development, GDP, Sustainability- concept, needs and challenges -economic, social and aspects of sustainability-from unsustainability to sustainability - millennium development goals, and protocols - Sustainable Development Goals-targets, indicators and intervention areas Climate change - Global, Regional and local environmental issues and possible solutions- Concept of Carbon Credit, Carbon Footprint. Case study – Environmental issues and possible solutions for climate change.

UNIT–V	SUSTAINABILITY PRACTICES	4+1

Zero waste and R concept, Circular economy, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Green Engineering - Sustainable urbanization Case study - Socio economical and technological change.

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	Total: 30 Periods

	OPEN-ENDED PROBLEMS / QUESTIONS	
Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Understand the functions of environment, ecosystems and biodiversity and their conservation.	L2 – Understand
CO2	Measure causes of water, air, noise and soil pollutions and provide preventive solutions.	L3 – Apply
CO3	Understand the global and Indian scenario of energy resources and causes of their degradation.	L2 – Understand
CO4	Select suitable strategies for sustainable environment management.	L3 – Apply
CO5	Understand sustainability practices and green materials.	L2 – Remember

TEXT BOOKS:

1.	Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers, 2018.
2.	Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.

REFERENCE BOOKS:

1.	R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38.
2.	Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007
3.	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
4.	Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	National Bureau of Animal Genetic Resources, Haryana	https://nbagr.icar.gov.in/en/home/	Database and policies
2.	International Federation of the National Standardizing Associations	https://www.iso.org/standard/	Policies
3.	Ministry of Environment, Forest and Climate Change, Govt. of India	https://cpcb.nic.in/	Standards and Polices

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	NPTEL	Dr. Samik Chowdhur, Dr. Sudha Goel, IIT Kharagpur	Lecture	https://nptel.ac.in/courses/109105203
2.	NPTEL	Dr. Deepu Philip, Dr. Amandeep Singh, IIT Kanpur	Lecture	https://nptel.ac.in/courses/112104225
3.	YouTube	Prof. Prasenjit Mondal, IIT Roorkee	Discussion	https://www.youtube.com/watch?v=NRoFvz8Ugeo&list=PLLy_2iUCG87Cr__rs9sS1zSaR62imd0uB&index=1

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Mapping of COs with POs and PSOs															
COs	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1				2	3					2			
CO2	3	2				3	3					2			
CO3	3		1			2	2					2			
CO4	3	2	1	1		2	2					2			
CO5	3	2	1			2	2					1			
Avg.	**2.8**	**1.75**	**1**	**1**		**2.2**	**2.4**					**1.8**			
1–Low,2–Medium,3–High.															

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BE23EE410	MICROCONTROLLER AND INTERFACING	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		5	2	1	2	4

Course Objectives:

1	Understand the basics of microprocessors and microcontrollers.
2	Gain insights into the architecture and programming of 8051 microcontrollers.
3	Execute PIC microcontroller programming in assembly and C languages, employing its architecture, memory organization, addressing modes, and instruction set effectively.
4	Understand serial communication protocols and their implementation.
5	Gain insights into the practical challenges and solutions in developing real-world embedded systems applications.

INTRODUCTION (Not for Examination)	2

Importance:

This course provides the fundamental knowledge to understand the internal architecture of microprocessor and microcontrollers, programming skills in Assembly and C languages, Interfacing microcontrollers with various external devices and components, such as sensors, actuators, and communication modules,Designing and implementing embedded systems using microcontrollers. Hence, electrical and electronic engineers should explore real-world applications and gain insights into Energy Management, Industrial Automation, and IoT.

Real-life examples:

Washing Machines, Microwave Ovens, Smartphones, Smart TVs, Wearable Fitness Trackers, and Automated Irrigation Systems.

Linkage:

Pre-requisite: Circuit Theory, Analog and Digital Electronics, Computer Programming
Future Courses: Embedded Systems, Industrial Automation, IoT Systems and Applications.

UNIT–I	INTRODUCTION TO MICROPROCESSOR AND MICROCONTROLLER	7

Introduction to microprocessors and microcontrollers, Basic block diagram of 8085 & 8051 , Comparison between microcontrollers and microprocessors,8085 Addressing modes and Instruction Set, 8085 programming in assembly language.

UNIT–II	8051 MICROCONTROLLER AND ITS PROGRAMMING	6+3

Architecture, Memory organization, Addressing modes, Instruction Set, Introduction to IDE, Simple programs using Assembly & C language.

UNIT–III	PIC MICROCONTROLLER AND ITS PROGRAMMING	6+3

Architecture – Memory organization – Addressing modes – Instruction Set – PIC programming in Assembly & C language.

UNIT–IV	COMMUNICATION INTERFACES	6+3

Input / Output interfacing, Analog-to-Digital Conversion (ADC) and Digital-to-Analog Conversion (DAC), Serial communication (UART, SPI, I2C), Interrupts and timers/Counters, Controlling actuators(Stepper motor/Servo Motor, relays) with microcontrollers, Simple Interfacing Programs.

UNIT–V	REAL-TIME APPLICATIONS AND CASE STUDY	6+3

Energy Management Systems, Industrial Automation, Instrumentation and Control Systems, IoT-based Control and Monitoring of Electric Vehicles-Case studies of embedded systems.

Total (LT): =45 Periods

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OPEN-ENDED PROBLEMS / QUESTIONS

Course specific Open Ended Problems will be solved during the class room teaching. Such problems can be given as Assignments and evaluated as Internal Assessment only and not for the End semester Examinations.

LIST OF EXPERIMENTS

1. Arithmetic and Logical Operations in 8085.
2. Arithmetic and Logical Operations in 8051.
3. Interfacing of ADC and DAC using 8051.
4. Interfacing of ADC and DAC using PIC.
5. Interfacing of Display devices(LED,LCD) using 8051.
6. Interfacing of Display devices(LED,LCD) using PIC.
7. Interfacing of Stepper Motor/Servo Motor using 8051.
8. Interfacing of Stepper Motor/Servo Motor using PIC.
9. Study of STM32 Microcontroller.
10. Design a home energy monitoring system using STM32 Microcontroller(Mini Project).

Total (P) : 30 Periods

Total (LT+P) : 70 Periods

	Course Outcomes: **Upon completion of this course, the students will be able to:**	**Bloom's Taxonomy**
CO1	Understanding of microcontroller architecture and programming.	L2– Understand
CO2	Develop and debug assembly language and C programs for 8051 microcontrollers.	L2– Understand
CO3	Develop and debug assembly language and C programs for PIC microcontrollers.	L2– Understand
CO4	Demonstrate and implement microcontroller-based systems with various peripheral interfaces	L3– Apply
CO5	Apply knowledge to real-world projects and develop microcontroller-based project	L3– Apply

TEXTBOOKS:

1.	Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Microcontroller and Embedded Systems', Pearson Education, Second Edition 2011.
2.	Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The PIC Microcontroller and Embedded Systems', Second Edition 2011.

REFERENCEBOOKS:

1.	Douglas V. Hall, "Microprocessors & Interfacing", Tata McGraw Hill, 3rd Edition, 2017.
2.	Krishna Kant, "Microprocessors & Microcontrollers", Prentice Hall of India, 2007.
3.	Mike Predko, "8051 Microcontrollers", McGraw Hill, First Edition, 2009.
4.	Michael Bar "Programming Embedded Systems in C and C++" 2nd Edition, 2006.

WEB REFERENCES:

	Publisher	**Website link**	**Type of Content**
1.	NPTEL	https://onlinecourses.nptel.ac.in/noc22_ee98/preview	Video lecture
2.	NPTEL	https://onlinecourses.nptel.ac.in/noc24_cs24/preview	Video lecture
3.	coursera	https://www.coursera.org/courses?query=microcontroller	Video lecture

VIDEO REFERENCES:

	Video Details	**Name of the Expert**	**Type of Content**	**Video link**
1.	NPTEL	Prof.Santanu chattopadhyay, IIT Kharagpur.	Video lecture	https://www.youtube.com/watch?v=o6W0opScrKY
2.	NPTEL	Prof. Ajit Pal, IIT Kharagpur	Video lecture	https://www.youtube.com/watch?v=liRPtvj7bFU

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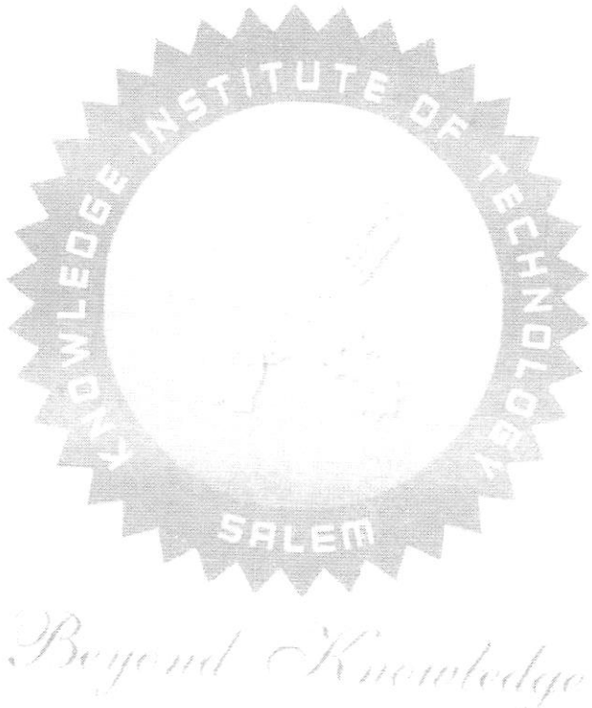
COs	Mapping of COs with POs and PSOs														
	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	2	3				1	2		1		3		1
CO2	2	1	2	3				1	2		1		3		1
CO3	2	1	2	3				1	2		1		3		1
CO4	2	1	2	3				1	2		1		3		1
CO5	2	1	2	3				1	2		1		3		1
Avg.	**2**	**1**	**2**	**3**				**1**	**2**		**1**		**3**		**1**

1–Low,2–Medium,3–High



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BE23CS311	OBJECT ORIENTED PROGRAMMING USING C++ AND JAVA	Version:1.0				
Programme & Branch	COMMON TO MECH, ECE, EEE AND CIVIL	CP	L	T	P	C
		5	2	1	2	4

Course Objectives:

1.	To understand OOPs concepts and basics of C++ programming language
2.	To know the principles of class, objects and encapsulation
3.	To explore the inheritance, polymorphism and abstract classes using C++
4.	To understand the basics of Java programming language
5.	To know the principles of inheritance, packages and interfaces using Java

INTRODUCTION (Not for Examination)	2

Importance:

Object-Oriented and Procedural Programming, Hybrid Approach, Rich Collection of Libraries, Widely Used in Systems Programming, Large Community and Legacy Code

Real-Life Example(s):

Video Game Development, Operating Systems, Web Browsers, Enterprise Applications, Android Development, Web Applications, E-commerce Platforms

Linkages:

Pre-requisite: Data Structures and SQL
Future courses: Advanced C++, Core Java Programming, Java FullStack Development.

UNIT–I	BASICS OF C++ PROGRAMMING	6+2

Limitation of Structure Oriented Programming- Need of Object-Oriented Programming- C++ Introduction - Structure of C++ Programming - Compiling - Executing and Debugging - Character Set - Tokens: (Keywords – Identifiers – Constants – Strings – Operators - Special Symbols) - Data Types. Expression - Precedence and Associativity - Evaluating Expression - Type Conversion - Input and Output - Control Flow Statements - Arrays - Functions - Inline Functions - Default Arguments.

UNIT–II	CLASS, OBJECTS AND ENCAPSULATION	6+2

Class Definition - Access Specifies- Object Creation - Array of Objects–Constructor - Destructor - this Pointer - Static variables and Member Functions - Encapsulation: Introduction - types - friend function and friend class.

UNIT–III	INHERITANCE AND POLYMORPHISM	6+3

Inheritance: Needs - types of inheritance - Constructors and Destructors in Inheritance - Constraints of Multiple Inheritance - Abstract Base Class - Pure Virtual function. Polymorphism: Introduction - Compile Time polymorphism: Function Overloading- Operator Overloading-Run Time Polymorphism - Function Overriding- Virtual Function.

UNIT–IV	INTRODUCTION TO JAVA	6+3

Introduction to Java - Compiling and executing using command line – Datatypes, Variables, Operators, Expression, and Type Conversion - Control flow statements- Array, Compiling and executing using Eclipse IDE-Functions- Describing Objects and Classes- Constructors-Methods-Access specifiers-Static members - Nested and Inner Classes.

UNIT–V	INHERITANCE, PACKAGES AND INTERFACES	6+3

Inheritance: Basics–Types of Inheritance-Super keyword-Method Overriding–Dynamic Method Dispatch–Abstract Classes–Interfaces-Packages–Packages and Member Access–Types-Importing Packages.

Total (LT) : 45 Periods

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LIST OF EXPERIMENTS/EXCERCISES	
1.	Write a C++ program to sort an array of elements using functions.
2.	Write a C++ program to demonstrate call by value and call by reference.
3.	Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
4.	Write a Program to illustrate default constructor, parameterized constructor and copy constructors.
5.	Write a Java program to develop stack and queue data structures using classes and objects.
6.	Develop a Java application that includes an Employee class to generate pay slips.
7.	Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea( ) that prints the area of the given shape.
8.	Solve the above problem using an interface.
9.	Write a Java program to develop stack and queue data structures using classes and objects.
	Total (P) : 30 Periods
	Total (LT+P) : 75 Periods

	OPEN-ENDED PROBLEMS/QUESTIONS	
Course Specific Open-Ended Problems will be solved during class room teaching. Such problems can be given as assignments and evaluated as IA only and not for the End Semester Examinations.		
Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Use the concepts of object oriented programming with C++.	L2 - Understand
CO2	Describe the class, objects and encapsulation to solve the real-world problems.	L3 - Apply
CO3	Develop programs using inheritance and polymorphism using C++	L3 - Apply
CO4	Build Java applications with object oriented programming Concept	L3 - Apply
CO5	Develop programs using inheritance, packages and interfaces	L3 - Apply
TEXTBOOKS:		
1.	Bjarne Stroustrup, "The C++ Programming Language"4th Edition, Addison-Wesley,2013	
2.	Herbert Schildt, "Java: The Complete Reference", 11 th Edition, McGraw Hill Education, New Delhi,2019.	
REFERENCE BOOKS:		
1.	Balagurusamy,E, "Object Oriented Programming with C++", McGraw Hill; Eighth edition,2020.	
2.	Herbert Schildt, "C++: The Complete Reference", 5th Edition, McGraw Hill Education, 2012.	
3.	Balagurusamy,E, "Object Oriented Programming with C++", 8th Edition, Tata McGraw-Hill, New Delhi, 2019.	
4.	Cay S. Horstmann, "Core Java Fundamentals", Volume 1, 11 th Edition, Prentice Hall,2018.	
5.	Herbert Schildt, "Introducing JavaFX 8 Programming", 1 st Edition, McGraw Hill Education, New Delhi, 2015.	

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WEB REFERENCES:			
	Publisher	**Website link**	**Type of Content**
1.	Web reference	https://www.tutorialspoint.com/	Reading Material
2.	w3schools	https://www.w3schools.com/	Reading Material
3.	javatpoint	https://www.javatpoint.com/	Reading Material

VIDEO REFERENCES:				
	Video Details	**Name of the Expert**	**Type of Content**	**Video Link**
1.	NPTEL	Prof. Partha Pratim Das IIT Kharagpur	Lecture	http://www.digimat.in/nptel/courses/video/106105151/106105151.html
2.	NPTEL	Prof. Debasis Samanta IIT Kharagpur	Lecture	https://archive.nptel.ac.in/courses/106/105/106105191/
3.	NPTEL	Prof. Debasis Samanta IIT Kharagpur	Lecture	https://www.youtube.com/playlist?list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

Mapping of COs with POs and PSOs															
COs	**POs**												**PSOs**		
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	2	2					1			2	2	2	
CO2	3	2	2	2					1			2	2	2	
CO3	3	2	2	2					1			2	2	2	
CO4	3	2	2	2					1			2	2	2	
CO5	3	2	2	2					1			2	2	2	
Avg.	**3.0**	**2.0**	**2.0**	**2.0**					**1.0**			**2.0**	**2.0**	**2.0**	
1–Low,2–Medium,3–High.															

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BE23EE411	ELECTRICAL MACHINES – II LABORATORY	Version: 1.0				
Programme & Branch	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	CP	L	T	P	C
		4	0	0	4	2

Course Objectives:

1	To expose the students to the operation of synchronous machines and induction motors and give them experimental and analysis skills.

LIST OF EXPERIMENTS

1.	Regulation of three-phase alternator by EMF and MMF methods.
2.	Predetermination of voltage regulation of three-phase salient pole alternator by Blondel's Method.
3.	Plotting V and inverted V curve of three-phase synchronous motor.
4.	Load test on three-phase Slip ring induction motor.
5.	No Load and Blocked Rotor test on three-phase squirrel cage induction motor.
6.	Separation of No-load losses of three-phase induction motor.
7.	Speed control of three-phase slip ring induction motor.
8.	Load test on single-phase induction motor.

Total:60 Periods

Course Outcomes: Upon completion of this course, the students will be able to:		BLOOM'S Taxonomy
CO1	Apply Voltage Regulation Techniques on Alternators	L3– Apply
CO2	Identify appropriate motor types for specific applications.	L3– Apply
CO3	Implement various Speed Control Techniques on Induction Motor and Analysis Performance.	L3– Apply

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1					1			3	1		
CO2	3	3	1	1					1			3	1		
CO3	3	3	1	1					1			3	1		
Avg.	**3**	**3**	**1**	**1**					**1**			**3**	**1**		

1–Low,2–Medium,3–High

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BE23EN104	PROFESSIONAL COMMUNICATION LABORATORY - II	Version : 1.0				
Programme & Branch	COMMON TO ALL BRANCHES EXCEPT B.Tech CSBS	CP	L	T	P	C
		2	0	0	2	1

Course Objectives:

1	To train the students to gain proficiency in communication.
2	To orient the students towards grooming as a professional
3	To develop analytical thinking skills for problem-solving in communicative contexts.
4	To make students employable graduates.
5	To make presentation on a given topic in a formal context.

INTRODUCTION (Not for examination)	**1**

Importance:

Enhances students' language competence - trains students to acquire career skills sought by the industry for campus recruitment - Improves communication skills in formal and informal situations.

Real-life Example(s):

Job Application & Resume - writing minutes - role play - presentation - writing case study

Linkages:

1. Pre-requisite: Communicative English - I, Communicative English - II

LIST OF EXPERIMENTS

1.	Oral and visual presentation
2.	Interview skills
3.	Drafting Job application & Resume
4.	Mock Interview
5.	Writing minutes
6.	Speaking about specifications of a product (E.g., Home appliances)
7.	Persuasive Talk – Role play activity
8.	Verbal analogies
9.	Spotting errors
10.	Writing case study for given problem

Total : 30 Periods

Course Outcomes: **Upon completion of this course the students will be able to:**		**BLOOM'S Taxonomy**
CO1	Use language effectively for presentation.	L3 - Apply
CO2	Utilize writing skills for better communication.	L3 - Apply
CO3	Construct ideas in both formal and informal conversation.	L3 - Apply
CO4	Develop writing skills for report writing.	L3 - Apply
CO5	Express opinions assertively in group discussions.	L3 - Apply

TEXTBOOKS:

1.	Richardson, Mathew. Advanced Communication Skills. Charlie Creative Lab, 2020

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2.	Rizvi, Ashrif. Effective Technical Communication, Tata Mc Grahill, 2011.

REFERENCE BOOKS:

1.	Comfort, Jeremy, et al. Speaking Effectively: Developing Speaking Skills for Business English. Cambridge University Press, Cambridge: Reprint 2011
2.	Terk, Natasha. Reports, Proposals and Procedures: A write It well Guide. Gildan Media, 2015.
3.	Carnegie, Dale. The Art of Public Speaking. Prabhat Prakashan Pvt. Ltd. 1st Edition: New Delhi, 2016

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Mindtools	https://www.mindtools.com/a99xl9o/interview-skills	others
2.	Ecampusontario	https://ecampusontario.pressbooks.pub/writingcorrections/chapter/sample-chapter/	others

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video link
1.	Swayam	Dr. Vibhuti Gaur Indira Gandhi National Open University (IGNOU)	English at the Workplace	https://onlinecourses.swayam2.ac.in/nou24_lg67/preview
2.	Coursera	Brian McManus Language Specialist University of Pennsylvania	Writing Covering Letter, Resume	https://www.coursera.org/learn/careerdevelopment

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		1			
CO2										3		1			
CO3										3		1			
CO4										3		1			
CO5										3		1			
Avg.										**3**		**1**			

1–Low, 2 –Medium, 3–High.

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BE23PT808	APTITUDE SKILLS - III	Version: 01				
Programme & Branch	COMMON TO ALL BRANCHES	CP	L	T	P	C
		1	0	0	1	0.5

Course Objectives:

1	To acquire skills required to solve quantitative aptitude problems.
2	To enhance the logical reasoning skills and help them improve problem solving abilities.

INTRODUCTION (Not for Examination)	01

Importance:

Logical thinking and Problem-solving skills are very important for solving engineering problems

Linkages:

Pre-Requisite : Aptitude Skills I and Aptitude Skills II
Future course : Aptitude Skills IV

UNIT–I	QUANTITATIVE APTITUDE	08

Time & Work–Chain Rule–Permutations & Combinations–Probability–Boats & Streams–Pipes & Cisterns.

UNIT–II	LOGICAL REASONING	06

Non-verbal reasoning–Syllogisms–Critical Thinking– Statement & Conclusion.

Total : 15 Periods

Course Outcomes: Upon completion of this course, the students will be able to:		BLOOM'S Taxonomy
CO1	Exhibit sound knowledge to solve problems of quantitative aptitude.	L3 - Apply
CO2	Demonstrate ability to solve problems using logical reasoning.	L3 - Apply

TEXTBOOKS:

1.	Dr. R.S. Aggarwal., "Quantitative Aptitude for Competitive Examinations", S.Chand and Company Ltd., 2022
2.	Dr. R.S. Aggarwal, "A Modern Approach to Logical Reasoning", S.Chand and Company Ltd., 2022
3.	FACE, "Aptipedia: Aptitude Encyclopedia", 2nd edition, Wiley India Pvt. Ltd., 2017

REFERENCE BOOKS:

1.	Arun Sharma, "Quantitative Aptitude for the CAT" 10th edition, McGraw-Hill Publishing, 2022
2.	Praveen R. V., "Quantitative Aptitude and Reasoning", 3rd edition, PHI Learning Pvt. Ltd., 2016

WEB REFERENCES:

	Publisher	Website link	Type of Content
1.	Indiabix	https://www.indiabix.com/online-test/aptitude-test/	Tests for Practice
2	Placement preparation	https://www.placementpreparation.io/quantitative-aptitude/	Tests for Practice
3	Geeks for geeks	https://www.geeksforgeeks.org/aptitude-for-placements/	Content for Learning and Tests for Practice

VIDEO REFERENCES:

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	Video Details	Name of the Expert	Type of Content	Video link
1.	YouTube	CareerRide	Video Lectures	https://www.youtube.com/playlist?list=PLpyc33gOcbVA4qXMoQ5vmhefTruk5t9lt
2	YouTube	Freshersworld.com	Video Lectures	https://www.youtube.com/playlist?list=PLjLhUHPsqNYkcq6YOfiywbTfnvf_TN7i9

Mapping of COs with POs and PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3														
CO2	3														
CO3															
CO4															
CO5															
Avg.	**3**														

1–Low, 2 –Medium, 3–High.

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Note:

Syllabus for courses offered from 5th to 8th Semester will be added after the approval of Board of Studies (BoS) and Academic Council (AC) in due course.

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