

EXCEL ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai Accredited by NBA and NAAC with "A+"and Recognized by UGC (2f &12B) KOMARAPALAYAM -637303

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING REGULATION - 2020 CHOICE BASED CREDIT SYSTEM

I TO VIII SEMESTERS CURRICULUM AND SYLLABI

	I SEMESTER									
Code No.	Course	Category	Perio	ds / V	Veek		Maximum Marks			
			L	Т	Ρ	С	CA	FE	Total	
Theory Co	urse(s)									
20MA104	Mathematics - I for Electrical Sciences	BS	3	2	0	4	40	60	100	
2000101	Fundamentals of Electrical								(
2022101	Engineering	ES	3	0	0	3	40	60	100	
Theory wit	h Practical Course(s)	L								
20ENEXX	Language Elective - I*	HSS	2	0	2	3	50	50	100	
20PH102	Physics for Electrical Sciences	BS	3	0	2	4	50	50	100	
20CS102	Problem Solving Using Python	ES	3	0	2	4	50	50	100	
Practical C	Course									
20EE102	Electrical Engineering Practices Laboratory	ES	0	0	2	1	50	50	100	
Mandatory	Course		-							
20MC101	Induction Programme	MC	2	0	0	0	100	0	100	
	TOTAL		16	2	8	19	380	320	700	

Language Electives – I										
Code No	Course	Category	Perio	ods / \	Week	C	Maximum Marks			
Code No.			L	Т	Ρ		CA	FE	Total	
20ENE01	Communicative English	HSS	2	0	2	3	50	50	100	
20ENE02	Advanced Communicative English	HSS	2	0	2	3	50	50	100	

Passed in Board of Studies Meeting (24.02.2022)

	II SEMESTER										
Code No	Course	Category	Perio	ods/\	Neek	C	Мах	imun	n Marks		
oode No.	Oburse	oategory	L	Т	Ρ)	CA	FE	Total		
Theory Co	urse(s)										
20MA204	Mathematics - II for Electrical Sciences	BS	3	2	0	4	40	60	100		
20EE201	Circuit Theory	ES	3	0	0	3	40	60	100		
Theory wit	h Practical Course(s)										
20ENEXX	Language Elective - II	HSS	2	0	2	3	50	50	100		
20CH202	Chemistry for Electrical Sciences	BS	3	0	2	4	50	50	100		
20ME203	Engineering Graphics	ES	1	0	4	3	50	50	100		
Practical C	Course										
20EE202	Electric Circuits Laboratory	ES	0	0	4	2	50	50	100		
Mandatory	/ Course										
20MC202	Interpersonal Skills	MC	2	0	2	0	100	0	100		
	Total		14	2	14	19	380	320	700		

Language	Language Electives – II											
Code No	Course	Category	Perio	ods / \	Week	C	Maximum Marks					
	Course	HSS 2 0 2)	CA	FE	Total						
20ENE02	Advanced Communicative English	HSS	2	0	2	3	50	50	100			
20ENE03	Hindi	HSS	2	0	2	3	50	50	100			
20ENE04	French	HSS	2	0	2	3	50	50	100			
20ENE05	German	HSS	2	0	2	3	50	50	100			

	III SEMESTER										
Codo No	Course	Category	Perio	ods / '	Week	C	Max	imum	n Marks		
Code No.	Course	Category	L	Т	Ρ		СА	FE	Total		
Theory Co	ourse(s)										
20MA301	Transforms and Boundary Value Problems	BS	3	1	0	4	40	60	100		
20EE302	Electromagnetic Theory	PC	3	0	0	3	40	60	100		
20EE303	Power Generation Systems	ES	3	0	0	3	40	60	100		
20CS302	Object Oriented Programming Systems	ES	3	0	0	3	40	60	100		
20EE305	Electrical Machines I	ES	3	0	0	3	40	60	100		
Theory wit	h Practical Course(s)										
20EE301	Electronic Devices and Circuits	PC	3	1	2	4	50	50	100		
Practical 0	Course(s)										
20EE306	DC Machines & Transformers Laboratory	PC	0	0	2	1	50	50	100		
20CS305	Object Oriented Programming Laboratory	ES	0	0	2	1	50	50	100		
Mandatory	/ Course										
20MC301	Environmental Science	MC	2	0	2	0	100	0	100		
	Total		20	2	8	22	450	450	900		

	IV- SEMESTER											
Code No	Course	Category	Perio	ods / \	Week	C	Мах	imum	Marks			
Code No.	Course	Category	L	Т	Р	U	CA	FE	Total			
Theory Co	ourse(s)											
20MA405	Numerical Methods	BS	3	1	0	4	40	60	100			
20EE401	Digital Logic Circuits	BS	3	0	0	3	40	60	100			
20EE402	Transmission and Distribution	PC	3	0	0	3	40	60	100			
20EE403	Measurement and Instrumentation	PC	3	0	0	3	40	60	100			
20EE404	Electrical Machines II	PC	3	1	0	4	40	60	100			
Theory w	ith Practical Course(s)											
20EE405	Integrated Circuits and Applications	PC	3	0	2	4	50	50	100			
Practical	Course											
20EE406	Synchronous and Induction Machines Laboratory	PC	0	0	2	1	50	50	100			
20EE407	Instrumentation Engineering Laboratory	PC	0	0	2	1	50	50	100			

Mandatory	Course								
20MC401	Soft Skills	MC	2	Weel	٨S	0	100	0	100
	Total		18	2	6	23	450	450	900

V- SEMESTER									
Codo No	Course	Catagory	Perio	ods / \	Neek	C	Max	imum	Marks
Code No.	Course	Calegory	L	Т	Ρ	C	CA	FE	Total
Theory Co	urse(s)								
20EE501	Power System Analysis and Stability	PC	3	0	0	3	40	60	100
20EE502	Electric Machine Design	PC	3	0	0	3	40	60	100
20EE503	Power Electronics	PC	3	0	0	3	40	60	100
20EEEXX	Professional Elective I	PE	3	0	0	3	40	60	100
20EEOXX	Open Elective I	OE	3	0	0	3	40	60	100
Theory wit	h Practical Course(s)								
20EE504	Control Systems Engineering	PC	3	0	2	4	50	50	100
Practical C	ourse								
20EE505	Basic Software Laboratory	PC	0	0	2	1	50	50	100
20EE506	Power Electronics Laboratory	PC	0	0	2	1	50	50	100
	Total		18	1	6	21	350	450	800

	VI- S	EMESTER	2						
Codo No	Course	Cotogony	Peric	ods / \	Neek	0	Max	imum	Marks
Code No.	Course	Category	L	Т	Ρ	C	CA	FE	Total
Theory Cou	irse(s)								
20EE601	Professional Ethics in Engineering	PC	3	0	0	3	40	60	100
20EE602	Solid State Drives	PC	3	0	0	3	40	60	100
20EE603	Digital Signal Processing for Electrical Engineering	PC	3	0	0	3	40	60	100
20EEEXX	Professional Elective II	PE	3	0	0	3	40	60	100
20EEOXX	Open Elective -II	OE	3	0	0	3	40	60	100
Theory with	Practical Course		•						
20EE604	Microprocessor and Microcontroller	PC	3	0	2	4	50	50	100
Practical Co	ourse								
20EE605	Renewable System Laboratory	PC	0	0	2	1	50	50	100

Passed in Board of Studies Meeting (24.02.2022)

Employabil	ity Enhancement Course(s)								
20EEC606	Mini Project	EEC	4	0	2	2	50	50	100
20EEC607	Internship/Implant Training	EEC	2	Weel	٢S	1	100	0	100
	Total		22	0	6	23	450	450	900

	VII- SEMESTER										
Codo No	Course	Catagory	Perio	ods / \	Week	C	Max	imum	Marks		
Code No.	Course	Calegory	L	Т	Ρ	U	CA	FE	Total		
Theory Cou	irse(s)	·									
20EE701	Protection and Switch Gear	PC	3	0	0	3	40	60	100		
20EE702	Special Electrical Machines	PC	3	0	0	3	40	60	100		
20EEEXX	Professional Elective -III	PE	3	0	0	3	40	60	100		
20EEEXX	Professional Elective -IV	PE	3	0	0	3	40	60	100		
20EEOXX	Open Elective -III	OE	3	0	0	3	40	60	100		
Theory with	n Practical Course										
20EE703	Power System Operation and Control	PC	3	0	2	4	50	50	100		
Employabil	ity Enhancement Course										
20EEC705	Design Project	EEC	0	0	6	3	50	50	100		
	Total		18	0	8	22	300	400	700		

	VIII- SEMESTER											
Code No	Course	Category	Perio	ods/\	Neek	C	Мах	imum	Marks			
	Course	Category	L	Т	Ρ	0	CA	FE	Total			
Theory Co	ourse(s)											
20EEEXX	Professional Elective -V	PE	3	0	0	3	40	60	100			
20EEEXX	Professional Elective -VI	PE	3	0	0	3	40	60	100			
Practical C	Course											
20EE801	Project	EEC	0	0	20	10	50	50	100			
	Total		6	0	20	16	130	170	300			

Passed in Board of Studies Meeting (24.02.2022)

PROFESSIONAL ELECTIVES (PE)											
Code No.	Course	Category	Perio	ods / \	Neek		Мах	imum	Marks		
			L	Т	Ρ	С	CA	FE	Total		
STREAM	- I EMBEDDED AND CONTROL I	DRIVES	-				-				
20EEE01	Communication Engineering	PE	3	0	0	3	40	60	100		
20EEE02	Visual Languages and Applications	PE	3	0	0	3	40	60	100		
20EEE03	Analysis and Synthesis of Electrical Networks	PE	3	0	0	3	40	60	100		
20EEE04	Embedded Systems and IoT	PE	3	0	0	3	40	60	100		
20EEE05	Modern Power Converters	PE	3	0	0	3	40	60	100		
20EEE06	Principles of Robotics	PE	3	0	0	3	40	60	100		
20EEE07	Power Quality	PE	3	0	0	3	40	60	100		
20EEE08	Extra High Voltage Alternating Current Transmission	PE	3	0	0	3	40	60	100		
20EEE09	Advanced Control System	PE	3	0	0	3	40	60	100		
20EEE10	Control of Electrical Drives	PE	3	0	0	3	40	60	100		
STREAM – II DESIGN AND ELECTRICAL MANAGEMENT											
20EEE21	Intellectual Property Rights	PE	3	0	0	3	40	60	100		
20EEE22	Disaster Management	PE	3	0	0	3	40	60	100		
20EEE23	Human Rights	PE	3	0	0	3	40	60	100		
20EEE24	Operations Research	PE	3	0	0	3	40	60	100		
20EEE25	Principles of Management	PE	3	0	0	3	40	60	100		
20EEE26	Fiber Optics and Laser Instrumentation	PE	3	0	0	3	40	60	100		
20EEE27	Foundation Skills in Integrated Product Development	PE	3	0	0	3	40	60	100		
20EEE28	System Identification and Adaptive Control	PE	3	0	0	3	40	60	100		
20EEE29	Transients in Power System	PE	3	0	0	3	40	60	100		
20EEE30	Total Quality Management	PE	3	0	0	3	40	60	100		
20EEE31	Electronic Product Design	PE	3	0	0	3	40	60	100		
20EEE32	Networking in Smart Grids	PE	3	0	0	3	40	60	100		
STREAM -	- III POWER AND ENERGY SOUF	RCES	1	6			T				
20EEE41	Flexible AC Transmission Systems	PE	3	0	0	3	40	60	100		
20EEE42	Soft Computing Techniques	PE	3	0	0	3	40	60	100		
20EEE43	Power Systems Dynamics	PE	3	0	0	3	40	60	100		

B.E. Electrical and Electronics Engineering (R-2020)

20EEE44	SMPS and UPS	PE	3	0	0	3	40	60	100
20EEE45	Electric Energy Generation, Utilization and Conservation	PE	3	0	0	3	40	60	100
20EEE46	Energy Management and auditing	PE	3	0	0	3	40	60	100
20EEE47	High Voltage Direct current Transmission	PE	3	0	0	3	40	60	100
20EEE48	Smart Grid	PE	3	0	0	3	40	60	100
20EEE49	Power Electronics for Renewable Energy Systems	PE	3	0	0	3	40	60	100

OPEN ELECTIVE COURSES (For Other Branches)

Code No.	Course	Category	Perio	ods / V	Week	С	Maximum Marks				
			L	Т	Ρ		CA	FE	Total		
20EEO01	Energy Conservation and Management	OE	3	0	0	3	40	60	100		
20EEO02	Electrical Safety and Quality Assurance	OE	3	0	0	3	40	60	100		
20EEO03	Analytical Methods and Instrumentation	OE	3	0	0	3	40	60	100		
20EEO04	Introduction to Signals and Systems	OE	3	0	0	3	40	60	100		
20EEO05	High Voltage Engineering	OE	3	0	0	3	40	60	100		
20EEO06	Medical Instrumentation	OE	3	0	0	3	40	60	100		
20EEO07	VLSI Design	OE	3	0	0	3	40	60	100		
20EEO08	Computer Aided Design of Electrical Apparatus	OE	3	0	0	3	40	60	100		
20EEO09	Electric Drives and Control	OE	3	0	0	3	40	60	100		
20EEO10	Microcontrollers Based System Design	OE	3	0	0	3	40	60	100		
20EEO11	Fundamentals of Nano-Science	OE	3	0	0	3	40	60	100		
20EEO12	Renewable Energy Systems	OE	3	0	0	3	40	60	100		

ONE CREDIT COURSES

ONE CREDIT COURSES										
Codo No	0	Catanan	Perio	ds/V	Veek	0	Maximum Marks			
Code No.	Course	Calegory	L	Т	Ρ	C	CA	FE	Total	
Theory Cou	ırse(s)									
20EEA01	PLC Automation	EEC	1	0	0	1	100	0	100	
20EEA02	MATLAB Design	EEC	1	0	0	1	100	0	100	
20EEA03	Industrial Automation	EEC	1	0	0	1	100	0	100	
20EEA04	Quality Management System	EEC	1	0	0	1	100	0	100	
20EEA05	Applications of Synchronous Generator in Industries	EEC	1	0	0	1	100	0	100	
20EEA06	Hybrid Solar PV System	EEC	1	0	0	1	100	0	100	
20EEA07	Embedded Control of Electric Drives	EEC	1	0	0	1	100	0	100	

SUMMARY

S.No	CATEGORY		С	REDI	TS PE	R SE	MESTI	ER			CREDITS
•		I	II	III	IV	v	VI	VII	VIII	(AICTE)	in %
1.	HSS	3	3							6 (10-14)	3.63%
2.	BS	8	8	4	7					27 (22-28)	16.36 %
3.	ES	8	8	10						26 (24)	16.25 %
4.	PC			8	16	15	14	10		60 (48)	36.36 %
5.	PE					3	3	6	6	21 (18)	12.72 %
6.	OE					3	3	3		9	5.45%
7.	EEC						3	3	10	16 (12-16)	9.69%
	Total	19	19	22	23	21	23	22	16	165	100.00 %

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

& Me Chairman - Board of Studies

- HSS Humanities and Social Sciences
- **BS** Basic Sciences
- **ES Engineering Sciences**
- PC Professional Core
- PE Professional Electives
- **OE** Open Electives
- EEC Employability Enhancement Courses
- MC Mandatory Courses (Non-Credit Courses)
- CA Continuous Assessment
- FE Final Examination

Passed in Board of Studies Meeting (24.02.2022) Meeting (09.03.2022) Approved in Academic Council

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Chairman - Board of Studies

SEMESTER I

20MA104	MA	THEMATICS - I FOR ELECTRICAL SCIENCES	L	Т	Ρ	С
			3	2	0	4
Nature of C	ourse	Basic Sciences				
Pre requisit	es	Fundamentals of basic Mathematics				

Course Objectives

The course is intended to

- 1. Study the methodologies involved in solving problems related to fundamental principles of matrices and calculus.
- 2. Acquaint the student with mathematical tools needed in evaluating limits, derivatives and differentiation of one variable.
- 3. Learn the basic tools of calculus for the purpose of modeling the engineering problems mathematically and obtaining solutions.
- 4. Provide the concepts of evaluating multiple integrals and their usage.
- 5. Study the basics of vector calculus comprising of gradient, divergence, curl, line, surface, volume integrals and the classical theorems

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	No. Course Outcome							
CO1	Apply the concept of orthogonal reduction to diagonals the given matrix	Apply						
CO2	Understand the limit definition and rules of differentiation to differentiate functions	Understand						
CO3	Determine the circle of curvature, evaluate and envelope of the curves	Apply						
CO4	Compute double and triple integrals	Understand						
CO5	Apply the concepts of differentiation and integration to vectors	Apply						

Course Contents

Unit – I Matrices

Characteristic equation - Eigen values and Eigen vectors of a real matrix - Properties(statement only) - Cayley-Hamilton theorem and its applications - Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

Unit – II Limits, Continuity and Differentiability

Representation of functions - Limit of a function - Continuity - Derivatives - Differentiation rules - Rolle 's Theorem - Mean value theorem - Maxima and Minima of one variable.

Unit – III Differential Calculus

Curvature - radius of curvature (Cartesian and Polar co-ordinates) - Centre of curvature - Circle of curvature - Involute and evolute - envelope.

Unit – IV Multiple Integrals

Double integration- Cartesian and Polar co-ordinates - Change of order of integration - Area between two curves - Area of double integral - Triple integration

Unit – V Vector Calculus

Gradient, Divergence and Curl - Directional derivative - Irrotational and Solenoidal vector fields -Vector integration - Green's, Gauss divergence and Stokes ' theorem - Statement, Verification and Simple applications.

Total: 60 Periods

Approved in Academic Council Meeting (11.10.21)

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Text Books:

1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition 2016. 2.Veerarajan T," Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd

Edition 2014.

Reference Books:

1.N.P.Bali, Manish Goyal, "A text book of Engineering Mathematics Semester II", Laxmi 2.Publications, 6th Edition 2015.

Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 3rd Edition 2012.

Web References

1. nptel.ac.in/courses/111/105/111105121

2. nptel.ac.in/courses/111/105/111105122

Mapping	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)															
POs PS PS														PSOs		
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	1 2 3		
CO1	3	3	2										3			
CO2	3	3	2										2			
CO3	2	3	3										3			
CO4	1	3	2										1			
CO5	3	3	2										3			
	3		Η	igh		2		N	/lediu	Im		1	Low			

Formative assessment									
Bloom's Level	Assessment Component	Marks	Total marks						
Remember	Online Quiz	5							
Understand	Tutorial Class / Assignment	5	15						
	Attendance	5							

Summative Assessment											
Bloom's Category	Internal A	ssessment Ex	Final Examination								
	IAE 1 (7.5)	IAE 2 (7.5)	IAE 3 (10)	(60)							
Remember	10	10	10	20							
Understand	10	10	10	20							
Apply	30	30	30	60							
Analyze											
Evaluate											
Create											

20EE101	FUI	NDAMENTALS OF ELECTRICAL ENGINEERING	L	Т	Ρ	С
	_		3	0	0	3
Nature of C	ourse	Basic Sciences				
Pre requisit	es	Fundamental of Physics				

The course is intended to

- To study the generation of electrical power and energy efficient equipments
 To understand the principle, design of illumination systems and energy efficiency lamps.
- 3. To gain the knowledge in transformer.
- 4. To understand the construction and principles of Electrical machines.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Understand the main aspects of generation of electrical power	Understand
CO2	Design of illumination systems and energy efficiency lamps	Apply
CO3	Construct an electric connection for any domestic appliance like refrigerator and battery charging circuit for a specific household application	Apply
CO4	Estimate the performance of transformers with the constraints	Evaluate
CO5	Interpret the construction and working of different types of Electrical Machines	Understand

Course Contents:

Unit I **Renewable Energy Sources**

Introduction - Solar Energy - Wind Energy - Bio - Energy - Other Renewable Energy Sources

Unit II Illumination

Importance of lighting - properties of good lighting scheme - laws of illumination - photometry types of lamps - lighting calculations - basic design of illumination schemes for residential, commercial, street lighting, factory lighting and flood lighting

Unit III **Domestic Utilization of Electrical Energy**

Domestic utilization of electrical energy - House wiring. Induction based appliances, Online and OFF line UPS, Batteries - nonlinear and domestic loads - Earthing - Domestic, Industrial and Substation.

Unit IV Transformer

Construction, transformer rating, EMF equation of transformer, ideal transformer, Losses, types and applications.

Approved in Academic Council Meeting (11.10.21)

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Unit V Electrical Machines

Construction and principle of operation of DC motor and AC motor (Induction Motor), types and applications

Total: 45 Periods

Text books:

- 1. D.P Kothari and I.J Nagrath, "Basic Electrical Engineering", McGraw Hill Education (India) Private Limited, Fourth Edition, 2020.
- 2. Wadhwa, C.L. "Generation, Distribution and Utilization of Electrical Energy", New Age International Pvt. Ltd, 2003.
- 3. Energy Efficiency in Electric Utilities, BEE Guide Book, 2010.

Reference books:

- 1. Rajput R.K., "Basic Electrical and Electronics Engineering", Laxmi Publications, Second Edition, 2012.
- 2. Partab.H, "Art and Science of Utilization of Electrical Energy", Dhanpat Rai and Co, New Delhi, 2004.
- 3. Rajendra Prasad "Fundamentals of Electrical engineering", Prentice Hall of India, Third Edition, 2014.

Mapping o	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)														
	Pos												PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3				2					3	2	3	2	3
CO2	3	3				2						2	3	2	3
CO3	3	2				2	1						3	2	3
CO4	3	2				2	2						3	2	3
CO5	3	2				2	2						3	2	3
	3		Н	ligh		2	Medium					1	Low		

Formative assessment											
Bloom's Level	Bloom's Level Assessment Component										
Remember	Classroom or Online Quiz	5									
Understand	Assignment	5	15								
	Attendance	5									

Summative Assessment												
	Continue	ous Assessme	nt Tests	Terminal Examination								
Bloom's Category	IAE 1 (7.5)	IAE 2 (7.5)	IAE 3 (10)	(60)								
Remember	10	10	10	20								
Understand	10	10	10	20								
Apply	30	30	30	60								
Analyse	0	0	0	0								
Evaluate	0	0	0	0								
Create	0	0	0	0								

20ENE01		COMMUNICATIVE ENGLISH								
Nature of 0	Course	Humanities and Social Science								
Pre requisites		Nil								

The course is intended to

- 1. Improve lexical, grammatical and semantic competence.
- 2. Enhance communicative skills in real life situations.
- **3.** Augment thinking in all forms of communication.
- 4. Equip with oral and written communication skills.
- 5. Gain employability skills.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Use effectively the lexical, grammatical and semantic knowledge	Remember
CO2	Communicate with clarity using intentional vocabulary in English	Apply
CO3	Articulate perfectly and express their opinions confidently using communicative strategies	Remember
CO4	Accomplish listening and reading skills for lifelong learning	Understand
CO5	Comprehend, interpret and present data	Understand

Course Contents

Unit – I Basic Structure and Usage

Parts of Speech -- Articles -Tenses - Subject-Verb Agreement - Different Grammatical forms of the same word - Listening to Speeches and Conversations from Globareana software - Listening to Announcements - Listening and Gap Filling.

Unit - II Vocabulary And Language Development

Intentional vocabulary used in and around Airport, Hospital, Hotel, Court - Abbreviations and acronyms - One Word Substitution - Compound words - Homophones and Homonyms - Types of sentences - Ordering Jumbled Sentences Letter writing - informal.

Unit – III Oral Communication Skills

Improving fluency - Articulation with pronunciation - Voice modulation in Speaking - One minute talk -Self Introduction and introducing ones friend - Telephonic conversations - Group Discussion - Modal Auxiliaries - discourse markers.

Unit – IV Comprehensive Listening and Reading

Effective listening Strategies – Listening to Interviews from Globareana software - Phrasal verbs - Reading Comprehension - "An Astrologer's Day" by R.K.Narayan and "Building a New State" by Dr. A.P.J. Abdul Kalam.

Unit – V Effective Writing

Interpretation and presentation of data - developing Hints - general essays and paragraph writing - Report Writing - survey report and accident report - Instructions and Recommendations.

Total: 30 Periods

Passed in Board of Studies Meeting (09.10.21)

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Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Role-play - One minute talk	3	Understand
2	Role-play - Telephonic conversations	3	Understand
3	Listening to speeches and lectures and gap filling	4	Understand
4	Group Discussion.	4	Understand
5	Articulation with pronunciation practice	3	Apply
6	Listening to Announcements - Listening and Gap Filling	4	Understand
7	Listening to Interviews & Native speakers' Conversations	4	Understand
8	Reading practice with articles in magazine and news	4	Understand
0	papers.	7	Understand
9	Model - Job Interviews	4	Understand
10	Introspective report - Personal analysis	5	Understand
11	Telephone etiquette	3	Remember
12	Reading - Shorter texts and News Articles	4	Understand
13	Role Play - Getting and Giving Permission	3	Remember
14	Self Introduction(Formal)	3	Understand
15	Recommendations/Suggestions	3	Apply

Text Books

- 1. Rizvi, Ashraf M., "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
- 2. Board of Editers, "Using English A Course book for Undergraduate Engineers and Technologists", Orient BlackSwan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

- 1. Meenakshi Raman and Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 10th Edition, 2007.
- 2. John Cunnison Catford, "A Practical Introduction to Phonetics", Clarendon Press, Jamaica, 2nd Edition, 2001.
- 3. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 3rd Edition, 2000.
- S P Dhanavel "English and Soft Skills", Orient Black Swan Private Limited, Hyderabad, 1st Edition, 2010.

Web reference:

 https://www.googleadservices.com/pagead/aclk?sa=L&ai=DChcSEwij4dCTucfsAhXE1pY KHch4ABMYABABGgJ0bA&ohost=www.google.com&cid=CAASEuRo76HVx9BpazOOBf XeJSKVQ&sig=AOD64_3OHNEnUO4A5sc31MsUfaTBGGdQ&q&adurl&ved=2ahUKEwjC 3ceTucfsAhXBeisKHatlBewQ0Qx6BAgfEAE

Mapping of	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)															
	POs													PSOs		
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1							1			3	2	2				
CO2							1			3	2	2				
CO3							1			3	2	2				
CO4							1			3	2	2				
CO5							1			3	2	2				
	3	3 High			2 Medium				1	L	w					

	Summative assessment													
		Continuous Assessment												
Bloom's		Th	eory Marks	Practical	Examination (Theory)									
Level														
	IAE-I	IAE-II	IAE -III	Attendance	Rubric based CIA	[50 marks]								
	[7.5]	[7.5]	[10]	[5]	[20 Marks]									
Remember	20	20	20		40	40								
Understand	20	20	20		40	40								
Apply	10	10	10		20	20								
Analyse														
Evaluate														
Create														

Approved in Academic Council Meeting (11.10.21)

20ENE02		ADVANCED COMMUNICATIVE ENGLISH	L	Т	Ρ	С
			2	0	2	3
Nature of (Course	Humanities and Social Sciences				
Pre requis	ites	Basics of Communicative English				

The course is intended to

- 1. Demonstrate satisfactory control over complex structures and mechanics in English.
- 2. Develop fluency and accuracy in oral communication.
- 3. Communicate effectively and actively in social interactions.
- 4. Read English at inspectional level.
- 5. Face interviews with confidence.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Apply knowledge of English grammar for effective communication	Remember
CO2	Make use of common English phrases and vocabulary strength.	Understand
CO3	Build self confidence and enhance professionalism	Apply
CO4	Implement listening, reading and writing skills in real - life situations	Apply
CO5	Speak fluently in English with proper pronunciation, intonation, tone and accent.	Understand

Course Contents

Unit – I Grammar and Usage

Active voice and passive voice - Prefixes and suffixes - Compound words - Clauses - If conditionals - Idioms & Phrases - Right forms of verbs - Modal Auxiliaries - Spotting errors.

Unit – II Lexical Competence

Technical Vocabulary - Expressions - Frequency - Cause and effect - Words often Miss-spelled -Syntax and structure - Homophones and Homonyms- Verbal analogy - idioms and phrases.

Unit - III **Conversational Etiquette**

Processes description - Tone and accent in speech - Role-play (Job-Interview) - Presentation skills - Mechanics of presentation - Telephone etiquette - Group Discussion strategy - Formal & Informal subjective and objective introduction - Body Language - Mock Interview.

Unit – IV Listening Reading and Writing

Listen to Scientific / Technical talks and gap filling - Listening to TED/INK Talks - Reading -"Water: The Elixir of Life" by C.V.Raman. "Progress" by St. John Ervine - Instructions and Recommendations - Letter writing formal - Job application- Report writing - Introspective report -Creative writing - Essays and Paragraphs.

Unit – V **Phonetics**

Production and classification of speech sound - International Phonetic Alphabet and transcriptions -Phonological rules - way and Place of articulation - Vowels, consonants and diphthongs. Specific characteristics feature of vowel sounds.

Total: 30 Periods

6

6

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S.No	List of Exercises	CO Mapping	RBT
1	Role-play - Processes Description	2	Remember
2	Listening to TED/INK Talks and gap filling	4	Understand
3	Group Discussion	3	Understand
4	Articulation with pronunciation practice	3	Apply
5	Reading - Longer texts and Technical Articles (Skimming & Scanning).	4	Apply
6	Presentation skills - Mechanics of presentation	5	Understand
7	Individual presentation on given topics	5	Remember
8	Telephone etiquette	5	Understand
9	Instructions and Recommendations	5	Remember
10	Writing - General Essays.	4	Apply
11	Report writing technique- write up	4	Remember
12	Introspective report - Personal analysis	4	Understand
13	Model Job Interviews	3	Understand
14	Job Interviews(Role play)	3	Apply
15	Body Language	3	Understand

Laboratory Components

Text Books

Total:30 Periods

- 1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
- 2. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 3rdEdition, 2000.
- 3. Board of Editers, "Using English A Coursebook for Undergraduate Engineers and Technologists", Orient BlackSwan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

- 1. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 10th Edition, 2007.
- 2. John Cunnison Catford, "A Practical Introduction to Phonetics", Clarendon Press, Jamaica, 2nd Edition, 2001.
- Norman Whitby, Business Benchmark "Pre-Intermediate to Intermediate, Students Book", Cambridge University Press, 1st Edition, 2006.
- 4. Dhanavel S. P., "English and Soft Skills", Orient Black Sggwan Private Limited, Hyderabad, 1st Edition, 2010.

Web References:

- 1. https://www.coursera.org/lecture/tesol-speaking/video-2-listening-strategies-for-learners-3AeBL?utm_source=mobile&utm_medium=page_share&utm_content=vlp&utm_campaign= top_button
- 2. blob:https://www.youtube.com/73f7256d-d302-4563-bed5-9e84c94a26ac

Ma	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)																
<u> </u>		POs													PSOs		
003	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1										3	1	2					
CO2										3	1	2					
CO3										3	1	2					
CO4										3	1	2					
CO5										3	1	2					
	3		Hi	igh		2		Medium 1					Low				

Summative assessment										
Bloom's Level		Final								
		Th	eory Marks	Practical	Examination (Theory)					
	IAE-I	IAE-II	IAE -III	Attendance	Rubric based CIA	[50 marks]				
	[7.5]	[7.5]	[10]	[5]	[20 Marks]					
Remember	20	20	20		40	40				
Understand	20	20	20		40	40				
Apply	10	10	10		20	20				
Analyse										
Evaluate										
Create										

20PH102		PHYSICS FOR ELECTRICAL SCIENCES	L	Т	Ρ	С
			3	0	2	4
Nature of Course		Basic Science				
Pre Requisites		Nil				

The course is intended to

- 1. Impart knowledge of optics, especially laser and their applications in fiber optics.
- 2. Gain knowledge to learn thermal properties of materials and their applications.
- 3. Provide knowledge of properties of matter like elasticity and its applications.
- 4. Learn the electronic properties of materials like semiconductors and its applications.
- 5. Develop a clear understanding of optical devices like solar cell, LED etc.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Compare the working of lasers and propagation of light through optical fibers and its applications	Understand
CO2	Demonstrate the thermal conductivity of the good and bad conductors	Understand
CO3	Explain the knowledge about elastic modulus	Understand
CO4	Interpret the knowledge about semiconductor materials	Understand
CO5	Illustrate the working of optoelectronic devices	Understand

Course Contents:

Unit I Laser and Fiber Optics

Lasers: population of energy levels. Einstein's A and B coefficients derivation - resonant cavity. optical amplification (qualitative) - Semiconductor lasers: homo junction and hetero junction - Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibers (material, refractive index, mode) - optical fiber communication system - fiber optic endoscope

Unit II **Thermal Physics**

Transfer of heat energy – thermal expansion of solids and liquids – expansion joints - bimetallic strips - thermal conductivity - Forbe's and Lee's disc method: theory and experiment - conduction through compound media (series and parallel) - thermal insulation - applications : heat exchangers in refrigerators, ovens and solar water heaters.

Unit III **Properties of Matter**

Elasticity - Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength - tensional stress and deformations - twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment - cantilever - uniform and non-uniform bending - I-shaped girders - stress due to bending in beams.

Semiconductor Physics Unit IV

Intrinsic Semiconductors - Energy band diagram - direct and indirect band gap semiconductors -Carrier concentration in intrinsic semiconductors - extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors - Variation of carrier concentration with temperature - variation of Fermi level with temperature and impurity concentration -Hall effect and its applications.

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Unit V Optical Properties of Materials

Classification of optical materials - carrier generation and recombination processes - photo current in a P- N diode : principle and working - solar cell and photo detectors : working principle - LED : principle and working - Organic LED : principle and working, advantages over LED -Laser diodes : principle, working and applications.

Total: 45 Periods

9

Laboratory Components

S.No	List of Exercises	CO Mapping	RBT
1	Determination of rigidity modulus - Torsion pendulum	CO3	Apply
2	Determination of Young's modulus by non-uniform bending method.	CO3	Apply
3	Determination of wavelength, and particle size using Laser	CO1	Apply
4	Determination of acceptance angle in an optical fiber	CO1	Apply
5	Determination of thermal conductivity of a bad conductor by Lee's Disc method	CO2	Apply
6	Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer	CO3	Apply
7	Determination of Coefficient of viscosity of liquid	CO3	Apply

Text Books:

- Bhattacharya D.K. and Poonam T., "Engineering Physics", Oxford University Press, 2nd Edition, 2015.
- 2. Avadhanulu M.N. and Kshirsagar P.G., "A Text book of Engineering Physics", S.Chand and company., New Delhi, 10th Edition, 2014
- Raghavan V., "Materials Science and Engineering, A First course", PHI Learning, 5th Edition, 2015

Reference Books:

- David Halliday. Robert Resnick. and Jearl Walker., "Principles of Physics", Wiley, 10th Edition, 2014
- 2. Raymond A Serway. and John W Jewett., "Physics for Scientists and Engineers", Cengage Learning, 9th Edition, 2019
- 3. Raghavan V., "Materials Science and Engineering, A First course", PHI Learning, 5th Edition, 2015.

Web References:

- 1. https://nptel.ac.in/courses/115/107/115107095/
- 2. https://www.coursera.org/lecture/fe-exam/stresses-in-beams-strains-in-pure-andnonuniform-bending-6aMRx
- 3. https://nptel.ac.in/courses/115/105/115105099/#
- 4. https://www.youtube.com/watch?v=uv0LxMoalEQ

Марј	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)																
COs	POs													PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	2	1														
CO2	3	1	1														
CO3	3	2	1														
CO4	3	1	1														
CO5	3		1														
	3		Hi	gh		2		Med	ium		1			Low			

			Summ	native assessm	nent			
			Internal	Assessment		Final Examination (Theory)		
Bloom's		Tł	eory Mark	S	Practical			
Level	IAE-I IAE-II		IAE-III	Attendance	Rubric	[50 marks]		
	[7.5]	[7.5]	[10]	[5]	base			
					CIA			
					[20 Marks]			
Remember	10	10	10			30		
Understand	35	35	35		40	62		
Apply	5	5	5		60	8		
Analyse								
Evaluate								
Create								

2005102		PROBLEM SOLVING LISING PYTHON	L	Т	Ρ	С
2000102			3	0	2	4
Nature of Course		Engineering Sciences				
Pre requisites		Mathematical and Logical Knowledge				

The course is intended to

- 1. To think logically and write algorithm and draw flow charts for problems.
- 2. To read and write simple Python programs.
- 3. To develop Python programs with conditionals and loops.
- 4. To define Python functions and call them.
- 5. To use Python data structures -- lists, tuples, dictionaries and files.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Develop algorithmic solutions to simple computational problems and read, write, execute by simple python programs.	Apply
CO2	Structure simple python programs for solving problems.	Understand
CO3	Administer the role of control statements and functions involving the idea of modularity.	Apply
CO4	Represent compound data using python strings and lists.	Apply
CO5	Read and write data from/to files in python Programs.	Understand

Course Contents

Unit – I Basics of Computers & Problem Solving

Computer Basics – Components-Computer organization - Computer Software- Types of software - Software Development steps -Need for logical analysis and thinking- Algorithms – Flowchart - Number system..

Unit – II Introduction of Python Programming

Introduction-Python Interpreter-Interactive and script mode -Values and types, variables, operators, expressions, statements, precedence of operators, Multiple assignments, comments, Input and Output Statements.

Unit – III Control Statements and Functions

Conditional (if), alternative (if-else), chained conditional (if-elif-else)-Iteration-while, for, break, continue, pass – Functions - Introduction, inbuilt functions, user defined functions, passing parameters, return values, recursion, Lambda functions.

Unit – IV Strings and Lists

Strings-String slices, immutability, string methods and operations -Lists-creating lists, list operations, list methods, mutability, aliasing, cloning lists, list and strings, list and functions-list processing-list comprehension, searching and sorting.

Unit – V Tuples, Dictionaries and Files

Tuples- Tuple assignment, lists and tuples, Tuple as return value- Dictionaries-operations and methods, Files and Exception-Text files, reading and writing files, format Operator, Exception handling.

TOTAL: 45 Periods

Chairman - Board of Studies

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S.No	List of Experiments	CO Mapping	RBT
1	Write a algorithm & draw flowchart for simple computational problems	CO1	Understand
2	Write a program to perform different arithmetic operations on numbers in python.	CO2	Understand
3	Write a python program to implement the various control structures	CO3	Apply
4	Write a python program for computational problems using recursive function.	CO3	Apply
5	Demonstrate use of list for data validation.	CO4	Apply
6	Develop a python program to explore string functions	CO4	Analyze
7	Implement linear search and binary search.	CO4	Apply
8	Develop a python program to implement sorting methods	CO4	Analyze
9	Develop python programs to perform operations on dictionaries.	CO5	Analyze
10	Write a python program to read and write into a file	CO5	Apply

Laboratory Components

TOTAL: 30 Periods

- 1. Reema Thareja, "Problem Solving and Programming with Python", Oxford University Press, 2018
- 2. Dr. R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2017.

Reference Books:

Text Books

- 1. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012
- 2. Ashok Namdev Kamthane, Amit Ashok Kamthane, "Programming and Problem Solving with Python", Mc-Graw Hill Education, 2018.
- 3. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem Solving Focus", Wiley India Edition, 2013
- 4. Timothy A. Budd," Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015

Mappin	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)																
<u> </u>		POs												PSOs			
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	2	1										3	1			
CO2	3	2	1										3	1			
CO3	3	2	2										3	1			
CO4	3	2	2										3	1			
CO5	3	2	2										3	1			
	3		Н	igh		2		Ν	1ediu	Im		1	Low				

	Summative assessment												
			Continuous A	Assessment		End							
Bloom's		Th	eory Marks		Practical	Semester Examinatio n (Theory) [50 marks]							
Level	IAE-I [7.5]	IAE-II [7.5]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]								
Remember	10	10	10			20							
Understand	20	20	20		30	50							
Apply	20	20	20		50	30							
Analyse	-	-	-		20	-							
Evaluate	-	-	-		-	-							
Create	-	-	-		-	-							

20EE102		ELECTRICAL ENGINEERING PRACTICES LAB	L	Т	Ρ	С
						1
Nature of Course		Engineering Science				
Pre requisites		NA				

The course is intended to

- 1. Provide hands on experience on various house hold Appliances
- 2. Understand the correct function of electrical parameters and calibration of voltage, current
- 3. Provide a comprehensive understanding of basic electronic components and equipments
- 4. Study the basic circuits using Active and Passive Components
- 5. Understand the fundamental principles of logic gates

Course Outcomes

On successful completion of the course, students will be able to

- 1. Construct the basic house hold electrical wirings
 - 2. Measure the electrical quantities using Meters
- 3. Demonstrate sine, square and triangular waveforms with required

frequency and amplitude using function generator

- 4. Identify the RLC Components and Logic gates
- 5. Design the simple electronic circuits using PCB Design

CYCLE-1

S.No.	Course Content	СО	Bloom's Level
1	Residential house wiring using switches, fuse, indicator, lamp and energy meter.	CO 1	Understanding
2	Fluorescent lamp wiring	CO 1	Applying
3	Stair case wiring	CO 1	Applying
4	Measurement of electrical quantities - voltage, current, power & power factor in RLC circuit	CO 2	Understanding
5	Measurement of energy using single phase energy meter	CO 2	Understanding

CYCLE-2

S.No.	Course Content	СО	Bloom's Level
1	Study of Electronic components and equipments - Resistor - Color coding. Measurement of AC signal parameter (peak-peak Voltage, RMS Voltage, frequency) using CRO	CO 4	Understanding
2	Study of logic gates AND, OR, EX-OR and NOT	CO 4	Understanding
3	Generation of Clock Signal	CO 3	Remembering
4	Soldering practice - Components Devices and Circuits - Using general purpose PCB	CO 5	Applying
5	Measurement of ripple factor of HWR & FWR	CO 3	Analyzing

Mappin	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSO)														
	Pos PSOs											S			
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1		1	1							3	1	1
2	3	1	1		1	1							3	1	1
3	3	1	1		1	1							3	1	1
4	3	1	1		1	1							3	1	1
5	3	1	1		1	1							3	1	1
	3		Н	ligh		2		Ν	/lediu	Jm		1	Lc	W	

Summative assessment based on Continuous and Final Examination									
Rubric based Continuous Final									
Bloom's Level	Assessment	Examination							
	[50 marks]	[50 marks]							
Remember	10	10							
Understand	50	50							
Apply	30	30							
Analyze	10	10							
Evaluate	-	-							
Create	-	-							

Approved in Academic Council Meeting (11.10.21)

20MC101	INDUCTION PROGRAMME	L	Τ	Ρ	С
		2	0	0	0
Nature of Course	Mandatory, Non Credit				
Pre requisites	Completion of Schooling at Higher Secondary Level				

The course is intended to

- 1. To nurture the character and behavior as a student.
- 2. To have broad understanding of society and relationships.
- 3. To impart interpersonal and soft skills.
- 4. To inspire the students in the field of engineering.
- 5. To provide exposure to industries.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Perform curricular and co-curricular activities excellently.	Knowledge
CO 2	Do the skill based training with excellence.	Understand
CO 3	Work as team for the given task	Apply
CO 4	Gain character and behavior	Knowledge
CO 5	Demonstrate the acquired skills effectively	Apply

Course Contents

PHYSICAL ACTIVITY

Yoga, Sports

CREATIVE ARTS (students can select any one of their choice)

Painting, sculpture, pottery, music, craft making and so on

UNIVERSAL HUMAN VALUES

Enhancing soft skills

LITERARY AND PROFICIENCY MODULES

Reading, Writing, Speaking- Debate, Role play etc.,

Communication and computer skills

LECTURES BY EMINENT PEOPLE

Guest lecture by subject experts

VISIT TO LOCAL CITIES

Meditation centers / Industry

FAMILARIZATION TO DEPARTMENT / BRANCH INNOVATION

Lectures by Departments Head and senior faculty members

Total Hours: 45

Approved in Academic Council Meeting (11.10.21)

Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs) POs **PSOs** COs CO1 CO2 CO3 CO4 CO5 Medium High Low

Mapping of COs with POs and PSOs

		Continuous	Assessment ((Non-Credit, Man	datory)
Bloom's Level	Test -I [20]	Test -II [20]	Test - III [20]	Assignment/ Activity [20]	Attendance [20]
Remember	10	10	10		
Understand	20	20	20	10	
Apply	20	20	20	10	
Analyse					
Evaluate					
Create					

20MA204	Μ	ATHEMATICS II FOR ELECTRICAL SCIENCES	L	т	Ρ	С		
Nature of Co	ourse	Basic Sciences						
Pre requisites		Fundamentals of Basic Mathematics						

The course is intended to

- 1. Learn rigorous and analytic approach to analyze the conformal mapping.
- 2. Study the knowledge of evaluating contour integrals using residue theorem.
- 3. Explain the concept of Laplace transforms and its applications to various problems related to Engineering.
- 4. Acquaint the student with Fourier transform techniques used in wide variety of situations
- 5. Study the knowledge of specific mathematical tools and techniques such as Z-transforms and solutions of difference equations

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Compute an analytic function ,when its real or imaginary part is known	Understand
CO2	Identify the Singularities and its corresponding Residues for the given function	Apply
CO3	Compare Laplace transform, Inverse Laplace transform and solve the linear differential equations by Laplace transform techniques.	Apply
CO4	Solve Engineering problems using Fourier transform techniques	Apply
CO5	Solve difference equations using Z-transforms that arise in discrete time systems	Apply

Course Content

Unit - I **Complex Differentiation and Conformal Mapping**

Functions of a complex variable - Analytic functions - Statement of Cauchy - Riemann equation -Harmonic functions - Harmonic conjugate - Construction of analytic functions - Conformal mapping : w=z + c, cz, 1/z and Bilinear transformation.

Unit - II **Complex Integration and Calculus of Residues**

Cauchy's Integral theorem (statement only) - Cauchy's integral formula - Liouville's theorem -Maximum Modulus Principle - Taylor's series and Laurent's series - Classification of singularities -Cauchy's residue theorem - Contour integration.

Unit - III Laplace Transforms

Laplace transforms - Transform of elementary functions - Properties - Transform of periodic functions. Definition of Inverse Laplace transforms - Statement and applications of Convolution theorem - Initial and Final theorems - Solution of linear ODE of second order with constant coefficient by Laplace transforms.

Unit - IV **Fourier Transforms**

Statement of Fourier integral theorem - Fourier transform pair - Fourier sine and cosine transforms -Properties - Transforms of simple functions - Convolution theorem - Parseval's identity - Application to boundary value problems.

12

12

12

Unit - V Z - Transforms

Z-Transform, Elementary Properties, Inverse Z-Transform, Convolution Method- Partial fraction method, Solution of Difference Equations using Z-Transform.

Total: 60 Periods

12

Text Books:

- 1. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 44th Edition 2016.
- 2. Veerarajan T, "Engineering Mathematics for Semester I and II", Tata McGraw Hill, 3rd Edition, 2014.

Reference Books:

- 1. Bali N.P and Dr. Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications(P)Ltd, 8th Edition, 2015.
- **2.** Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons(Asia) Limited, 10th Edition, 2018.

Web References:

- 1. nptel.ac.in/courses/111/105/111105134
- 2. nptel.ac.in/courses/111/102/111102129

Маррі	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)														
				POs	5									PSOs	
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	2										2		
CO2	3	2	1										2		
CO3	2	3	3										3		
CO4	3	3	3										2		
CO5	3	2	3										2		
	3		H	ligh		2 Medium 1				Low					

Formative assessment							
Bloom's Level	Assessment Component	Marks	Total marks				
Remember	Online Quiz	5					
Understand	Tutorial Class / Assignment	5	15				
	Attendance	5]				

Summative Assessment								
Bloom's Category	Continue	ous Assessmen	t Tests	Final Examination				
Bioonin's Category	IAE-1	IAE-2	IAE-3					
	(7.5)	(7.5)	(10)	(60)				
Remember	10	10	10	20				
Understand	10	10	10	20				
Apply	30	30	30	60				
Analyse								
Evaluate								
Create								

Approved in Academic Council Meeting (11.10.21)

20FF201	CIRCUIT THEORY					С
		3	0	0	3	
Nature of Course		Engineering Sciences				
Pre requisites		Fundamentals of Basic Mathematics and Electricals				

The course is intended to

- 1. To introduce electric circuits and its analysis.
- 2. To impart knowledge on solving circuit equations using network theorems
- 3. To introduce the phenomenon of resonance in coupled circuits.
- 4. To educate on obtaining the transient response of circuits.
- 5. To introduce phasor diagrams and analysis of three phase circuits.

Course Outcomes

On successful completion of the course, students will be able to

CO.No.	Course Outcome	Bloom's Level
C01.	Analyse the electric circuits and its analysis.	Analyse
CO2.	Apply the concepts of AC circuits, phasor representation of Sinusoidal Voltage-Current, Impedance and Admittance of AC circuits.	Apply
CO3.	Analyse on solving circuit equations using network theorems.	Analyse
CO4.	Evaluate the phenomenon of resonance in coupled circuits	Evaluate
CO5.	Educate on obtaining the transient response of circuits	Understand

Course Contents

UNIT – I DC CIRCUITS ANALYSIS

Charge, Current, Voltage, Power and Energy-Ohm's law- Kirchhoff's laws-Voltage and current Division in Series and Parallel Circuits-Network Reduction-Mesh Current and Nodal Voltage

UNIT – II AC CIRCUITS ANALYSIS

Sinusoidal Voltage and Current- RMS Value-Form Factor – Phasor representation of Sinusoidal Voltage- Current, Voltage-Current relationship in R,L and C Circuits - Impedance and Admittance-Power Factor concepts in RC, RL and RLC circuits -Real Power-Reactive Power, Complex Power, Apparent Power- concepts of three phase circuits.

UNIT – III NETWORK THEOREMS FOR DC AND AC CIRCUITS

Network reduction: voltage and current division, source transformation - star delta conversion. Thevenin's and Norton Theorems - Superposition Theorem - Maximum power transfer theorem Reciprocity Theorem - Millman's theorem.

UNIT – IV RESONANCE AND COUPLED CIRCUITS

Series and parallel resonance - their frequency response - Quality factor and Bandwidth - Self and mutual inductance - Coefficient of coupling - Tuned circuits - Single tuned circuits.

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UNIT – V TRANSIENT ANALYSIS OF ELECTRIC CIRCUITS

Source of the L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

Total :45 Periods

9

TEXT BOOKS

- 1. Charles .K.Alexander, Mathew.N.O.Sadiku , 'Fundamentals of Electric Circuits' ,Tata McGraw-Hill Publishing company limited , 3 rd edition, New Delhi, 2008
- 2. Joseph A.Edminister, Mahmood Nahri, 'Electric Circuits', Schaum's Series, Tata McGraw- Hill, 4th edition, New Delhi, 2007
- 3. William H.Hayt , Jack E.Kemmerly and Steven M.Durbin, 'Engineering Circuit Analysis', Tata McGraw-Hill Publishers, 6th edition, New Delhi, 2002

REFERENCE BOOKS

- 1. Paranjothi S R,' Electric Circuit Analysis', New Age International Ltd., New Delhi, 1996.
- 2. Chakrabati A, 'Circuit Theory (Analysis and Synthesis)', Dhanpath Rai & Sons, New Delhi, 1999.
- 3. Sudhakar A and Shyam Mohan S P, 'Circuits and Network Analysis and Synthesis', Tata McGraw- Hill, 2007.

Web References:

- 1. www.circuitstoday.com
- 2. https://nptel.ac.in/courses/113/106/113106062/

Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)															
00-	POs												PSOs		
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	3	2							1	3	2	2
CO2	3	3	2	3	2							1	3	2	2
CO3	2	3	2	2	2							1	3	2	2
CO4	3	2	2	3	2							1	3	2	2
CO5	3	3	2	3	3							2	3	2	2
	3	Hig	jh		•	2	2 Medium 1					Low	•		

Formative assessment							
Bloom's Level	Assessment Component	Marks	Total marks				
Remember	Classroom / Online Quiz	5					
Understand	Assignment	5	15				
	Attendance	5					

Passed in Board of Studies Meeting (09.10.21)

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Summative Assessment								
	Interna	al Assessment	Terminal Examination					
Bloom's Category	1 (7.5)	2 (7.5)	3 (10)	(60)				
Remember	10	10	10	20				
Understand	10	10	10	20				
Apply	30	30	30	60				
Analyse	0	0	0	0				
Evaluate	0	0	0	0				
Create	0	0	0	0				

20ENE02		ADVANCED COMMUNICATIVE ENGLISH				
ZULINLUZ			2	0	2	3
Nature of	Course	Humanities and Social Sciences				
Pre requisites		Basics of Communicative English				

The course is intended to

- 1. Demonstrate satisfactory control over complex structures and mechanics in English.
- 2. Develop fluency and accuracy in oral communication.
- 3. Communicate effectively and actively in social interactions.
- 4. Read English at inspectional level.
- 5. Face interviews with confidence.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Apply knowledge of English grammar for effective communication	Remember
CO2	Make use of common English phrases and vocabulary strength.	Understand
CO3	Build self confidence and enhance professionalism	Apply
CO4	Implement listening, reading and writing skills in real - life situations	Apply
CO5	Speak fluently in English with proper pronunciation, intonation, tone and	Understand
	accent.	

Course Contents

Unit – I Grammar and usage

Active voice and passive voice - Prefixes and suffixes - Compound words - Clauses - If conditionals -Idioms & Phrases - Right forms of verbs - Modal Auxiliaries - Spotting errors.

Unit - II Lexical competence

Technical Vocabulary - Expressions - Frequency - Cause and effect - Words often Miss-spelled - Syntax and structure - Homophones and Homonyms- Verbal analogy - idioms and phrases.

Unit - III Conversational etiquette

Processes description - Tone and accent in speech - Role-play (Job-Interview) - Presentation skills - Mechanics of presentation - Telephone etiquette - Group Discussion strategy - Formal & Informal subjective and objective introduction - Body Language - Mock Interview.

Unit – IV Listening reading and writing

Listen to Scientific / Technical talks and gap filling – Listening to TED/INK Talks – Reading – "Water: The Elixir of Life" by C.V.Raman. "Progress" by St. John Ervine - Instructions and Recommendations – Letter writing formal – Job application- Report writing – Introspective report – Creative writing – Essays and Paragraphs.

Unit – V Phonetics

Production and classification of speech sound - International Phonetic Alphabet and transcriptions - Phonological rules - way and Place of articulation - Vowels, consonants and diphthongs. Specific characteristics feature of vowel sounds.

Total: 30 Periods

Passed in Board of Studies Meeting (09.10.21)



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S.No	List of Exercises	CO Mapping	RBT
1	Role-play - Processes Description	2	Remember
2	Listening to TED/INK Talks and gap filling	4	Understand
3	Group Discussion	3	Understand
4	Articulation with pronunciation practice	3	Apply
5	Reading - Longer texts and Technical Articles (Skimming & Scanning).	4	Apply
6	Presentation skills - Mechanics of presentation	5	Understand
7	Individual presentation on given topics	5	Remember
8	Telephone etiquette	5	Understand
9	Instructions and Recommendations	5	Remember
10	Writing - General Essays.	4	Apply
11	Report writing technique- write up	4	Remember
12	Introspective report - Personal analysis	4	Understand
13	Model Job Interviews	3	Understand
14	Job Interviews(Role play)	3	Apply
15	Body Language	3	Understand

Laboratory Components

Total: 30 Periods

Text Books

- 1. Rizvi, Ashraf.M, "Effective Technical Communication", Tata McGraw Hill Publishing Company Limited, New Delhi, 5th Edition, 2007.
- 2. Hewings. M, "Advanced English Grammar", Cambridge University Press, Chennai, 3rd Edition, 2000.
- 3. Board of Editers, "Using English A Coursebook for Undergraduate Engineers and Technologists", Orient Black Swan Private Limited, Hyderabad, 2nd Edition, 2017.

Reference Books:

- 1. Raman M & Sangeetha Sharma, "Technical Communication", Oxford University Press, USA, 10th Edition, 2007.
- 2. John Cunnison Catford, "A Practical Introduction to Phonetics", Clarendon Press, Jamaica, 2nd Edition, 2001.
- 3. Norman Whitby, Business Benchmark "Pre-Intermediate to Intermediate, Students Book", Cambridge University Press, 1st Edition, 2006.
- 4. Dhanavel S. P., "English and Soft Skills", Orient Black Swan Private Limited, Hyderabad, 1st Edition, 2010.

Web Reference:

- 1. https://www.coursera.org/lecture/tesol-speaking/video-2-listening-strategies-for-learners-3AeBL?utm_source=mobile&utm_medium=page_share&utm_content=vlp&utm_campaign=top __button
- 2. blob:https://www.youtube.com/73f7256d-d302-4563-bed5-9e84c94a26ac
| N | Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific
Outcomes (PSOs) | | | | | | | | | | | | | | |
|-----|--|----------------------------|--|--|--|--|--|--|--|---|---|----|------|--|--|
| 000 | Pos | | | | | | | | | | | | PSOs | | |
| COS | 1 | 1 2 3 4 5 6 7 8 9 10 11 12 | | | | | | | | 1 | 2 | 3 | | | |
| CO1 | | | | | | | | | | 3 | 1 | 2 | | | |
| CO2 | | | | | | | | | | 3 | 1 | 2 | | | |
| CO3 | | | | | | | | | | 3 | 1 | 2 | | | |
| CO4 | | | | | | | | | | 3 | 1 | 2 | | | |
| CO5 | | | | | | | | | | 3 | 1 | 2 | | | |
| | 3 | 3 High 2 Medium 1 | | | | | | | | | | Lo | w | | |

	Summative assessment											
.		Final										
Bloom's Level		Tł	neory Marks	Practical	Examination (Theory)							
	IAE-I [7.5]	IAE-II [7.5]	IAE -III [10]	Attendance [5]	Rubric based CIA [20 Marks]	[50 marks]						
Remember	20	20	20		40	40						
Understand	20	20	20		40	40						
Apply	10	10	10		20	20						
Analyse												
Evaluate												
Create												

Approved in Academic Council Meeting (11.10.21)

20CH202	CHEMISTRY FOR ELECTRICAL SCIENCES	L 3	Т 0	P 2	<u>С</u> 4
Nature of Course	Basic Sciences				
Prerequisites	Nil				

The course is intended to

- 1. Impart knowledge and understanding about the constituents present in water and the need for purification of water.
- 2. Understand the fundamentals of batteries.
- 3. Provide knowledge about materials like metals, refractories and cement.
- 4. Develop the understanding and applications of basic concepts of electrochemistry.
- 5. Understand the causes and control measures of corrosion.

On successful completion of the course, students will be able to

CO.No	Course Outcome	Bloom's Level
CO1	Develop innovative and eco-friendly method for water purification to meet the growing industrial demand	Apply
CO2	Understand the basic principles and mechanism of working of batteries and fuel cells	Understand
CO3	Discuss about various types of alloys and engineering materials	Understand
CO4	Use the principles of electro chemical cells, EMF, electroplating and electrolysis	Apply
CO5	Demonstrate the importance of protection of metals from corrosion	Apply

Course Contents

Unit-I Water Analysis and Water Treatment

Water analysis: Sources of water, Hard water and soft water, Hardness of water, acidity, alkalinity, pH value, amount of free CO2, fluoride content and chloride content. Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD). Water treatment: Definition, Zeolite process, Conditioning methods: internal conditioning (Phosphate, Calgon) and external conditioning (Demineralization), Desalination, Reverse osmosis (RO).

Unit-II **Energy Storage Devices**

Batteries: Definition, characteristics and classification, Primary battery: Alkaline battery, Secondary battery: lead acid battery, nickel cadmium battery, lithium battery and lithium ion battery, Fuel cells: construction and working of phosphoric acid fuel cell.

Alloys and Engineering Materials Unit-III

Alloys: classification and types, Ferrous alloys (Nichrome and stainless steel only), Non- ferrous alloys (brass and bronze), Heat treatment of steel, Refractories: characteristics, classification manufacture, Cement: manufacture and setting.

Unit-IV Electrochemistry

Electrode potential, Nernst equation and problems, Reference electrodes, Standard hydrogen electrode, Calomel electrode, Ion selective electrode (glass electrode), Determination of pH by glass electrode, Electro chemical series, Electrochemical cell, Galvanic cell: measurement of EMF, Electrolytic cell.



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Unit-V Corrosion and its Control

Corrosion: Classification, Types: Chemical corrosion and electrochemical corrosion, mechanism. Corrosion control: Corrosion inhibitors, cathodic protection (sacrificial anodic protection, impressed current cathodic protection), Protective coating and Paint. Electroplating (Au).

Total: 45 Periods

Total: 30 Periods

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Laboratory Component

S.No	Name of the Experiment	CO Mapping	RBT
1	Determination of hardness of water	CO1	Apply
2	Determination of chloride content in water sample	CO1	Apply
3	Conduct metric titration of strong acid versus strong base	CO2	Understand
4	Determination of strength of HCI by pH metry	CO2	Understand
5	Estimation of copper in brass by EDTA method	CO3	Apply
6	Determination of CaO in cement	CO3	Apply
7	Estimation of strength of iron by potentiometric titration	CO4	Apply
8	D Determination alkalinity of water sample and making a comparative study of corrosion rate	CO5	Apply

- 1. O.G.Palanna, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, 1st Edition, New Delhi, 2017.
- 2. P.C.Jain and Monicka Jain, "Engineering Chemistry", Dhanapat Rai Publishing Company Pvt.Ltd, 2nd Edition, 2017.

Reference Books

Text Books

- 1. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, 2nd Edition, New Delhi 2009.
- 2. R. Sivakumar and N. Sivakumar, "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New ^{3.} Delhi, 1st Edition, 2009.
- 4. Dr.Sivanesan and Nandagopal, "Engineering Chemistry-I" V.K.Pub.Pvt.Ltd, 2nd Edition, 2011. **Web reference:**
 - 1. https://nptel.ac.in/downloads/122101001
 - 2. https://nptel.ac.in/courses/103103033/module9/lecture1.pdf
 - 3. https://nptel.ac.in/courses/102103044/3
 - 4. https://www.sciencedirect.com/topics/chemistry/phosphoric-acid-fuel-cells

Ма	Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)														
COs		POs PSOs													
	1 2 3 4 5 6 7 8 9 10 11 12											12	1	2	3
CO1	3	2									1				
CO2	3	2									1				
CO3	3	2									1				
CO4	3	2									1				
CO5	3	1									1				
	3 High 2 Medium 1										Low				

		Summ	native Assess	ment							
	Continuous Assessment										
	Theory										
	IAE-I [7.5]	IAE-II [7.5]	IAE-III[10]	Attendance [5]	Rubric based CIA [20]						
Remember	30	20	10		20						
Understand	10	20	30		20						
Apply	10	10	10		10						
Analyze											
Evaluate											
Create											

Approved in Academic Council Meeting (11.10.21)

Chairman - Board of Studies

20ME203			L	Т	Ρ	С		
20111203								
Nature of	Course	Engineering Sciences						
Pre requ	uisites	Nil						

The course is intended to

- 1. Understand technical drawings in various fields of engineering
- 2. Imagine and visualize the geometric details of engineering objects.
- 3. Translate the geometric information of engineering objects into engineering drawings.
- 4. Develop the graphical skills for communication of concepts, ideas and design of engineering products through technical drawings.
- 5. Visualize and draw isometric and perspective views

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO 1	Develop the conic sections, special curves, and draw orthographic views from pictorial views.	Apply
CO 2	Apply the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant.	Apply
CO 3	Construct the projections of simple solids like prisms, pyramids, cylinder and cone.	Apply
CO 4	Build the sectional views of solids like cube, prisms, pyramids, cylinders & cones and development of its lateral surfaces.	Apply
CO 5	Organize and draw isometric and perspective sections of simple solids.	Apply

Course Contents:

Concepts and Conventions (Not for Examination)

Importance of graphics in engineering applications - Use of drafting instruments -BISconventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning.

UNIT -I Plane Curves and Free Hand Sketching

Basic Geometrical constructions, Curves used in engineering practices: Conics - Construction of ellipse, parabola and hyperbola by eccentricity method - Construction of cycloid - construction of involutes of square and circle - Drawing of tangents and normal to the above curves.

Visualization concepts and Free Hand sketching: Visualization principles -Representation of Three-Dimensional objects - Layout of views- Free hand sketching of multiple views from pictorial views of objects

Projection of Points, Lines and Plane Surfaces UNIT –II

Orthographic projection- principles-Principal Planes-First angle projection-projection of points Projection of straight lines (only First angle projections) inclined to both the principal planes -Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNIT –III **Projection of Solids**

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

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(3+12)

(3+12)

(3+12)

UNIT- IV Projection of Sectioned Solids and Development of Surface

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section, Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Developmentof lateral surfaces of solids with cut-outs and holes

UNIT -V Isometric and Perspective Projections

Principles of isometric projection – isometric scale -Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: (15+60) Periods

Text Books:

- 1. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2011
- 2. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012.

Reference Books:

- 1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.
- 2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
- 3. Parthasarathy N S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

Web References:

- 1. http://nptel.ac.in/courses/112103019/Engineering drawing
- 2. http://pioneer.netserv.chula.ac.th/~kjirapon/self-practice.html

Publication of Bureau of Indian Standards:

- 1. IS 10711 2001: Technical products Documentation Size and lay out of drawing sheets.
- 2. IS 9609 (Parts 0 & 1) 2001: Technical products Documentation Lettering.
- 3. IS 10714 (Part 20) 2001 & SP 46 2003: Lines for technical drawings.
- 4. IS 11669 1986 & SP 46 2003: Dimensioning of Technical Drawings.
- 5. IS 15021 (Parts 1 to 4) 2001: Technical drawings Projection Methods.

Special points applicable only to Final Examinations of Engineering Graphics:

- 1. There will be five questions, each of either-or type covering all units of the syllabus.
- 2. All questions will carry equal marks of 20 each making a total of 100.
- 3. The answer paper shall consist of drawing sheets of A3 size only. The students will be permitted to use appropriate scale to fit solution within A3 size.
- 4. The examination will be conducted in appropriate sessions on the same day

I	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)																
<u> </u>	POs													PSOs			
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	3	2										1	2				
CO2	3	2										1	2				
CO3	3	2										1	2				
CO4	3	3										1	2				
CO5	3	2									1	2					
	3		Hi	igh		2		Med	dium		1		Low				

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(3+12)

Summative assessment

		Cont	inuous Asse	ssment		Final
			Theory		Practical	Examinati
Bloom's Level	IAE-I [7.5]	IAE-II [7.5]	IAE-III [10]	Attendance [5]	Rubric based CIA [20 Marks]	on (Theory) [50 marks]
Remember	10	10	10		20	20
Understand	20	20	20		40	40
Apply	20	20	20		40	40
Analyze						
Evaluate						
Create						

20EE202		Electric Circuits Laboratory	L	Т	Ρ	С
		,	0	0	4	2
Nature of Course		Engineering Science				
Pre requisites		NA				

The course is intended to

- 1. To impart hands on experience in verification of circuit laws and theorems.
- 2. To impart measurement of circuit parameters, study circuit characteristics and transient response.
- 3. Understand the correct function of electrical parameters and calibration of voltage, current.

Course Outcomes

On successful completion of the course, students will be able to

- 1. Verify laws, network theorems, mesh and nodal analysis and interpret the results. Measure the electrical quantities using Meters
- 2. Determine self-inductance and mutual inductance of the coils and obtain frequency response of series and parallel RLC circuits.
- 3. Determine the transient response of series and parallel RL, RC and RLC circuits and interpret the results.

S.No.	Course Content	СО	Bloom's Level
1	Measurement of Electric Circuit load current and load voltage using Kirchhoff's voltage and current laws (simulation and experimental study)	CO 1	Analyze
2	Determination of Thevenin equivalent circuit with single voltage source and resistance using Thevenin's Theorem.	CO 1	Apply
3	Determination of Norton equivalent circuit with single Current source and resistance using Norton's Theorem.	CO 1	Apply
4	Analysis of Homogeneity and Additivity of the electric circuit using Superposition Theorem	CO 2	Apply
5	Analysis of Impedance matching of the electric circuit using Maximum Power Transfer Theorem	CO 2	Apply

CYCLE-1

CYCLE-2

S.No.	Course Content	СО	Bloom's Level
1	Measurement of Self and Mutual Inductances of a coil	CO 4	Apply
2	Frequency response of Single Tuned coupled Circuit	CO 4	Apply
3	Determination of Maximum current for series resonant circuits.	CO 3	Analyze
4	Determination of Maximum Voltage for parallel resonant circuits.	CO 5	Analyze
5	Study of Analog and digital oscilloscopes and measurement of sinusoidal voltage, frequency and power factor.	CO 3	Understand

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Mappin	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSO)																	
						PSOs												
COs	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
1	3	1	1		1	1							3	1	1			
2	3	1	1		1	1							3	1	1			
3	3	1	1		1	1							3	1	1			
4	3	1	1		1	1							3	1	1			
5	3	1	1		1	1							3	1	1			
	3		H	ligh		2	Medium 1						1 Low					

Summative assessment based on Continuous and Final Examination												
Bloom's Level	Rubric based Continuous Assessment [50 marks]	Final Examination [50 marks]										
Remember	10	10										
Understand	50	50										
Apply	30	30										
Analyze	10	10										
Evaluate	-	-										
Create	-	-										

Approved in Academic Council Meeting (11.10.21)

20ENE03	НІЛОІ	L	Т	Ρ	С
ZUENEUU		2	0	2	3
Nature of Cours	Humanities and Social Sciences				
Pre requisites	Basic Perceptive of Language				

The course is intended for learners.

- 1. To help students acquire the basics of Hindi
- 2. To teach them how to converse in Hindi on simple day-to-day situations
- 3. To help students acquire the ability to understand a simple technical text in Hindi

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO.1	Construct simple sentences and use vocabulary required for day-to-day conversation	Remember
CO.2	Distinguish and understand the basic sounds of Hindi language.	Remember
CO.3	Appear for Hindi examinations conducted by Dakshin Bharat Hindi Prachar Sabha.	Remember

Course Contents:

UNIT I Introduction

Hindi Alphabet: Introduction - Vowels - Consonants - Plosives - Fricatives - Nasal sounds - owel Signs-Chandra Bindu & Visarg - Table of Alphabet - Vocabulary.

UNIT II Reading

Nouns: Genders (Masculine & Feminine Nouns long vowels and short vowels - -Masculine & Feminine - Reading Exercises

UNIT III Grammar

Pronouns and Tenses: Categories of Pronouns - Personal Pronouns - Second person you & honorific) - Definite & Indefinite pronouns - Relative pronouns - Present tense - Past tense - Future tense -Assertive & Negative Sentences - Interrogative Sentences.

UNIT IV Vocabulary

Classified Vocabulary: Parts of body - Relatives - Spices - Eatables - Fruit & Vegetables - Clothes -**Directions - Seasons - Professions**

UNIT V Speaking

Speaking: Model Sentences and Rhymes - Speaking practice for various occasions.

Reference:

- 1. Hindi Prachar Vahini-1 by Dakshin Bharat Hindi Prachar Sabha Chennai
- 2. B.R.Kishore, Self Hindi Teacher for Non-Hindi Speaking People, Vee Kumar Publications (P)Ltd., New Delhi,2009
- 3. Videos, Stories, Rhymes and Songs.

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Total:30 Periods

B.E Electrical and Electronics Engineering (R 2020)

20ENE04			L	Т	Ρ	С
20LNL04		TRENCH	2	0	2	3
Nature of Cour	se	Humanities and Social Sciences				
Pre requisites		Basic Perceptive of Language				

Course Objectives

The course is intended for learners.

- 1. To prepare the students for DELF A1Examination
- 2. To teach them to converse fluently in French in day-to-day scenarios

Course Outcomes

On successful completion of the course, students will be able to

CO.No.	Course Outcome	Bloom's Level		
CO1	To help students acquire familiarity in the French alphabet &basic vocabulary	y Remember		
CO2	listen and identify individual sounds of French	Remember		
CO3	Use basic sounds and words whiles peaking	Remember		
CO4	Read and understand short passages on familiar topics	Understand		
CO5	Understand and use basic grammar and appropriate vocabulary in completing language tasks	Understand		

Course Contents:

UNIT I : EntrerEn Contact

langue francaise. alphabets. numeros. mois. l a les les iours. les s"appeler.etre. Grammaire Les verbes definis. indefinis avoir. les articles Communication Saluer. s"informer sur quelquun, demander de se presenter Lexique - Les alphabets, les nationalites, age, les pays, les couleurs, les jours de la semaine, les mois de l"annee, les professions

UNIT II : Partager Son Lieu De Vie

Lesfrancaisetleur habitat, des habitation s in solitesGrammaire - Verbes - Conjugaison : Present (Avoir / etre / ER, IR, RE : RegulieretIrregulier) -AdjectifsIdelieuCommunication - Chercher un logement, d'ecrire son voisin, s''informer sur un logementLexique - L''habitat, les pieces, l"equipement, la descriptionphysiqu

UNIT III: Vivre Au Quotidien

Grammaire - Articles contractes, verbesvouloir, pouvoir, devoir, adjective interrogative, future proche Communication- Exprimersesgouts, parler de sesloisirs, justifier un choix, exprimeruneenvieLexique -le temps libre et les loisirs, les saisons, les activitesquotidiennes, le temps (lematin, le soir, la nuit)

UNIT IV: Comprendre Son EnvironnementOuvrir La Culture

Grammaire - Verbes- Finir, Sortir, les adjectifsdemonstratifs, le passe compose, l''imparfait Communication - Propose $a\tilde{A}f$? \tilde{A} , \hat{A} quelqu''''un de faire quelque chose, raconteur une sortie au passeparlerunfilmLexique - Les sorties, la famille, art, les vetementsetlesaccessoires

UNIT V: Gouter A La Campagne

Grammaire La forme negative, les verbesacheter, manger, payer, articles partitifs, le pronomen de quantite Communication Accepter et refuse rune invitation, donner des instructions, commander au restaurant Lexique Les services et les commerces, les aliments, les ustensiles, argent.

Total: 30 Periods

Passed in Board of Studies Meeting (09.10.21)

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Mapping of (PSOs)	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)														
COs			PSOs												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										2					
CO2										2					
CO3										3					
CO4										3					
CO5										2					
	3	B High				2	Medium 1								

Passed in Board of Studies Meeting (09.10.21)

Approved in Academic Council Meeting (11.10.21)

20ENE05	GERMAN	L	Τ	Ρ	С
ZULINLUJ	GERMAN	2	0	2	З
Nature of Course	Humanities and Social Sciences				
Pre requisites	Basic Perceptive of Language				

The course is intended for learners.

- 1. To help students appear for the A1 level Examination
- 2. To teach them how to converse fluently in German in day-to-day scenarios

Course Outcome

On successful completion of the course, students will be able to

CO.No.	Course Outcome	Bloom's Level
CO1	listen and identify individual sounds of German	Remember
CO2	use basic sounds and words while speaking	Remember
CO3	read and understand short passages on familiar topics	Remember
CO4	use basic sentence structures while writing	Understand
CO5	understand and use basic grammar and appropriate vocabulary in completing language tasks	Understand

Course Contents:

UNIT I Introduction

Introduction to German language: Alphabet - Numbers - Greetings - Days and Seasons-Working with Dictionary

UNIT II Pronunciation

Nouns - articles - Speaking about one self - Listening to CD supplied with the books, paying special attention to pronunciation

UNIT III Basic Syntax

Regular & Irregular verbs - Personal pronouns - family - Introduction to types of sentences

UNIT IV Vocabulary

Question words-Types of Questions - Nominative case- Verb Conjugation - country nationalities

UNIT V Action Words

Verbs - to be & to have - conjugation - Hobbys - Framing basic Questions and answers

Total: 30 Periods

Passed in Board of Studies Meeting (09.10.21)

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Reference(s)

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- 1. Kursbuch and Arbeitsbuch, Netzwerk A1 Deutsch Als Fremdsprache, Goyal Publishers & Distributers Pvt. Ltd., New Delhi,2015
- 2. Langenscheidt Euro dictionary German English / English German, Goyal Publishers & Distributers Pvt. Ltd., New Delhi,2009
- 3. Grundkurs, DEUTSCH Lehrbuch Hueber Munichen, 2007

Mapping of (PSOs)	Mapping of Course Outcomes (COs) with Program Outcomes (POs) Program Specific Outcomes (PSOs)														
COs			PSOs												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										2					
CO2										2					
CO3										3					
CO4										3					
CO5										2					
	3	High				2	Medium					1	Low		

20EE203		BASICS OF ELECTRICAL ENGINEERING FOR	L	Τ	Ρ	С
2022203		TEXTILE TECHNOLOGY	3	0	0	3
Nature of 0	Course	Basic Sciences				
Pre requis	ites	NIL				

The course is intended to

- 1. Understand the various laws and theorems applied to solve electric circuits and networks
- 2. Understand the basic concepts in AC circuits.
- 3. To gain the knowledge in transformer.
- 4. To understand the construction and principles of DC machines.
- 5. To acquire the knowledge about the construction and principles of AC machines.

Course Outcomes

On successful completion of the course, students will be able to

CO.No.	Course Outcome	Bloom's Level
CO1.	Apply basic laws to calculate the voltage, current and power for dc electric circuit.	Apply
CO2.	Analyze the AC power circuits	Analyze
CO3.	Estimate the performance of transformers with the constraints.	Analyze
CO4.	Interpret the construction and working of different types of dc machines	Apply
CO5.	Interpret the construction and working of different types of ac machines	Apply

Course Contents:

UNIT-I DC CIRUCITS

Introduction- Current and Voltage sources, Resistance, Inductance and Capacitance, Ohm's law and Kirchhoff's law& it's application, Mesh and Nodal analysis, Star and Delta Connection, Voltage and Current division, Super position theorem, Maximum power transfer theorem.

UNIT-II AC CIRCUITS

Generation of sinusoidal voltage, AC values, Single Phase RL, RC, RLC Series circuits, Power in AC circuits, Power Factor, Three Phase Systems, Three Phase Power Measurement, Simple layout of generation, transmission & distribution of power.

UNIT III TRANSFORMER

Construction, transformer rating, EMF equation of transformer, ideal transformer, Losses, equivalent circuit of a transformer, regulation, efficiency, open circuit and short circuit test of transformer, Auto transformer.

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UNIT IV DC MACHINES

Construction and principle of operation of DC motor and generator, types of DC motors, EMF and torque equation, Methods of excitation and magnetization characteristics, Starting methods and speed control, Universal Motor.

UNIT V AC MACHINES

Three Phase Induction Motor- Construction and principle of operation, equivalent circuit, Slip and torque, speed characteristics. Single Phase Induction Motor- Construction and principle of operation, Types- capacitor start induction motor, and Capacitor start capacitor run induction motor, Stepper motor.

Text books:

- 1. D.P Kothari and I.J Nagrath, "Basic Electrical Engineering", McGraw Hill Education (India) Private Limited, Fourth Edition, 2020.
- 2. B.L.Theraja "Fundamentals of electrical Engineering & Electronics", s. Chand &Co.Ltd. 2015.
- 3. Rohit Mehta and V.K.Mehta, "Principles of Electrical Engineering and Electronics", S.Chand&Co.Ltd., Second Edition, 2015.

Reference books:

- 1. Charles K Alexander, Mathew N O Sadiku, 'Fundamentals of Electric Circuits', Tata McGraw Hill, Seventh Edition, 2020.
- 2. Rajendra Prasad "Fundamentals of Electrical engineering", Prentice Hall of India, Third Edition, 2014.
- 3. Rajput R.K., "Basic Electrical and Electronics Engineering", Laxmi Publications, Second Edition, 2012

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)

COs	POs										PSOs				
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3				2					3	2	3	2	3
CO2	3	3				2						2	3	2	3
CO3	3	2				2	1						3	2	3
CO4	3	2				2	2						3	2	3
CO5	3	2				2	2						3	2	3
	3	Hig	h			2	Medium 1				Low	•			

Formative assessment								
Bloom's Level	Marks	Total marks						
Remember	Classroom or Online Quiz	5						
Understand	Assignment	5	15					
	Attendance	5						

Passed in Board of Studies Meeting (09.10.21)

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Total: 45 Periods

Summative Assessment									
Bloom's Catagory	Internal	Assessment	Final Examination						
Biooni s Categoly	1	2	3						
	(7.5)	(7.5)	(10)	(60)					
Remember	10	10	10	20					
Understand	10	10	10	20					
Apply	30	30	30	60					
Analyse									
Evaluate									
Create									

20MA301		Transforms and Boundary Value Problems	L	Т	Ρ	С
	(Co	mmon to Aero, Mech, S&F,Civil, FT and Agri, EEE)	3	2	0	4
Nature of Course		Basic Sciences				
Pre requisite	es	Mathematics-I & II for Mechanical, Building and Bio Science	es			

The course is intended to

- 1. Familiarize linear and non-linear partial differential equations with different methods.
- 2. Acquire the knowledge of Fourier series.
- 3. Acquaint with the Fourier series techniques in solving one dimensional wave and heat equations.
- 4. Learn the concept of Fourier transforms and it's inverse.
- 5. Introduce the concept of Z-transforms and difference equations.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Classify the linear and non-linear partial differential equations.	Understand
CO 2	Determine the Fourier series expansion.	Apply
CO 3	Interpret the solution of boundary value problems.	Understand
CO 4	Apply transform techniques to solve engineering problems.	Apply
CO 5	Illustrate the Z-transforms and difference equations.	Understand

Course Contents

UNIT I	Partial Differential Equations	12					
Solution of Clairaut's second ar $sin(ax + b)$	Solution of standard types of first order non-linear partial differential equations: (i) $f(p,q)=0$, (ii) Clairaut's type - Lagrange's linear equation - Homogeneous linear partial differential equations of second and higher order with constant coefficients (R.H.S =Constant, e^{ax+by} , $cos(ax + by)$, $sin(ax + by)$).						
UNIT II	Fourier Analysis	12					
Condition coefficient square va	for Fourier expansion -Fourier series for periodic functions- Determination of F ts - Expansion of periodic functions with Period (0, 2L) and period (0, 2π) -Root lue on Fourier coefficients - Parseval's identity	⁻ ourier mean					
UNIT III	Boundary Value Problems	12					
Classification of Partial differential equations-Method of separation of variables - Solutions of one dimensional wave equation - Solutions of one dimensional heat equation.							

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UNIT IV	Fourier Transforms	12				
Statement of Fourier integral theorem - Fourier transforms pair: Fourier transforms and Inverse Fourier transforms - Fourier sine transforms -Fourier cosine transforms - Transforms of simple functions – Parseval's identity.						
UNIT V	Z - Transforms and Difference Equations	12				
Z-transfor Formation	Z-transforms - Properties – Inverse Z-transform: partial fraction and Convolution theorem - Formation of difference equations -Solution of difference equations using Z - transform					
	Total : 60 Pe	eriods				

Text Books

- 1. Veerarajan. T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., 3rd edition, 2017.
- 2. Grewal B.S, "Higher Engineering Mathematics", Khanna Publishers, 43rd Edition, 2016.

Reference Books

- 1. Bali N.P and Manish Goyal, "A Text book of Engineering Mathematics", Lakshmi Publications Pvt Ltd, 9th Edition, 2016.
- 2. Ramana.B.V,"Higher Engineering Mathematics", Tata Mc-Graw Hill Publishing Company Limited, 4th Edition, 2016.
- 3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Publications, 10th Edition,2015.

Additional References

- 1. <u>https://pvpsitrealm.blogspot.com/2016/09/higher-engineering-mathematics-by-bs.html</u>
- 2. https://reference.wolfram.com/language/tutorial/DSolvePartialDifferentialEquations.html

Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
COc	POs										PS	Os		
COS	1 2 3 4 5 6 7 8 9 10 11 12									1	2			
CO 1	3	3	2									1	2	
CO 2	3	2	2									1	2	
CO 3	3	2	1									1	2	
CO 4	3	2	2									1	1	
CO 5	3 3 2 1									2				
3-High 2-Medium 1-Low														

Formative Assessment									
Blooms Taxonomy	Marks	Total marks							
Remember	Quiz	5							
Understand	Understand Tutorial class / Assignment								
	Attendance	5							

Summative Assessment										
Bloom's Catogory	Internal As	sessment Exar	Final Examinations (FE)							
Bioon s Category	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60						
Remember	10	10	10	20						
Understand	30	30	30	60						
Apply	10	10	10	20						
Analyse										
Evaluate										
Create										

Approved in Academic Council Meeting (09.03.2022)

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20FF302		Electromagnetic Theory	L	Т	Ρ	С
2022302		Electromagnetic meory	3	0	0	3
Nature of Course		Professional Core				
Pre requisi	tes	Physics for Electrical Sciences				

The course is intended to

- 1. Classify the different co-ordinate systems to describe the spatial variations of the physical quantities dealt in electromagnetic field theory as they are functions of space and time.
- 2. Predict the electric field in material space and to solve boundary value problems.
- 3. Solve the various concepts and properties of magneto-static field.
- 4. Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.
- 5. Identify, formulate and solve fields and electromagnetic waves propagation problems.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Understand the basic mathematical concepts related to electromagnetic vector fields	Understand
CO 2	Examine the principles of electrostatics to get solutions for the problems related to electric field, electric potential, boundary conditions and electric energy density	Apply
CO 3	Apply the principles of magneto statics to get solutions for the problems related to magnetic field, magnetic potential, boundary conditions and magnetic energy density	Apply
CO 4	Describe the concepts related to Faraday's law, induced emf and Maxwell's equations	Understand
CO 5	Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation	Apply

Course Contents

UNIT I FUNDAMENTALS OF ELECTROMAGNETICS

Sources and effects of electromagnetic fields - Coordinate Systems - Vector fields -Gradient, Divergence, Curl - theorems and applications - Coulomb's Law - Electric field intensity - Field due to discrete and continuous charges - Gauss's law and applications.

UNIT II ELECTROSTATICS

Electric potential – Electric field and equipotential plots - Dielectric polarization – Dielectric strength - Boundary conditions - Poisson's and Laplace's equations - Capacitance- determination of capacitance for concentric sphere, cylindrical and parallel plate configurations- Energy density

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UNIT III MAGNETOSTATIC FIELDS

Lorentz force, magnetic field intensity (H) – Biot-Savart's Law - Ampere's Circuit 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, Applications.

UNIT IV ELECTRODYNAMIC FIELDS

Magnetic Circuits - Faraday's law - Transformer and motional EMF - Displacement current - Maxwell's equations (differential and integral form) - Relation between field theory and circuit theory – Applications.

UNIT V ELECTROMAGNETIC WAVES

Electromagnetic wave generation and equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors- skin depth - Poynting theorem - Plane wave reflection and refraction.

Total: 45 Periods

Text Books

- 1. John D. Kraus and Daniel A. Fleisch, "Electromagnetic with Applications", 5th Edition, Tata McGraw Hill, New Delhi, 2010.
- 2. W. H. Hayt and John A. Buck, "Engineering Electromagnetics", 7th Edition, Tata McGraw Hill, New Delhi, 2020.
- 3. Gangadhar K.A. and Ramanathan P.M., "Electromagnetic Field Theory", 5th Edition, Khanna Publishers, New Delhi, 2015.

Reference Books

- 1. S C Mahapatra, Sudipta Mahapatra, "Principles of Electromagnetics", Mc Graw Hill Education (India) Private Limited, New Delhi,2nd Edition 2015.
- 2. Joseph A. Edminister, "Theory and Problems of Electromagnetic Schaum's Outline Series", 5th Edition, Tata McGraw Hill Inc., New Delhi, 2017
- 3. AshutoshPramanik, "Electromagnetism Theory and Applications", 2nd Edition, Prentice Hall of India, New Delhi, 2010.

Additional References

- 1. Gate <u>https://www.youtube.com/watch?v=t-v42Q8tmv8</u>
- 2. **NPTEL** <u>https://nptel.ac.in/courses/108/104/108104087</u>
- 3. **Coursera** <u>https://www.coursera.org/lecture/electrodynamics-introduction/1-1-introduction-</u> to-electromagnetism-qilQb

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Мар	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs		POs														
003	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
CO 1	3	3		2								1				
CO 2	3	3		2								1				
CO 3	3	3		2								1				
CO 4	3	3		1								2				
CO 5	3	3		2								2				
	3-High				2-Medium				1-Low							

Formative Assessment												
Blooms Taxonomy	Assessment Component	Marks	Total marks									
Remember	Quiz	5										
Understand	Tutorial class / Assignment	5	15									
Apply		5										
	Attendance	5										

Summative Assessment												
Bloom's Category	Internal As	sessment Exar	Final Examinations (FE)									
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60								
Remember												
Understand	30	20	20	50								
Apply	20	30	30	50								
Analyse												
Evaluate												
Create												

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

Chairman - Board of Studies

X

20EE303		Power Generation Systems	L	Т	Ρ	С
2022303		r ower Generation Systems	3	0	0	3
Nature of Course		Engineering Science				
Pre requisites		Fundamentals of Electrical Engineering				

The course is intended to

- 1. Recall the overall process flow in Thermal power plant.
- 2. Infer the knowledge regarding Equipment, Plant layout, principle of working of various diesel and gas turbine plants.
- 3. Analyze the working principles of various nuclear reactors.
- 4. Express the working principle, construction of power generation from non-conventional sources of energy.
- 5. Deduce the economics of power plants and list factors affecting the power plants.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Describe the power generation scenario, the layout components of thermal power plant ,improved Rankine cycle and Cogeneration cycle	Remember
CO 2	Illustrate the elements and its functions of Diesel and gas turbine power plants.	Understand
CO 3	Compare the various types of the nuclear power plant and its safety principles.	Analyze
CO 4	Discuss the layout, construction and working of the components inside Renewable energy power plants.	Understand
CO 5	Correlate the power plants based on economics, environmental hazards and cost estimation.	Analyze

Course Contents

UNIT I COAL BASED THERMAL POWER PLANTS

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants - Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems.

UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS

Otto, Diesel, Dual & Brayton Cycle – Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.

Passed in Board of Studies Meeting (24.02.2022)

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UNIT III NUCLEAR POWER PLANTS

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANada Deuterium- Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants.

UNIT IV POWER FROM RENEWABLE ENERGY

Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV), Geo Thermal, Biogas and Fuel Cell power systems.

UNIT V ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER 8 PLANTS

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

Total : 45 Periods

Text Books

- 1. Nag. P.K., "Power Plant Engineering", Fifth Edition, Tata McGraw Hill Publishing Company Ltd., 2021.
- 2. Farshid zabihian " Power Plant Engineering ", CRC Press., 2021
- 3. Power Plant Engineering by R.K.Hedge,Pearson Education., 2015.

Reference Books

- 1. El-Wakil. M.M., "Power Plant Technology", Tata McGraw Hill Publishing Company Ltd., 2017.
- 2. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2015.
- 3. Bedalov, Zark "Practical power plant engineering, a guide for early career engineers, 2020

Additional References

- 1. Gate <u>https://www.youtube.com/watch?v=iWWyI8CZhUw</u>
- 2. **NPTEL** <u>https://nptel.ac.in/courses/112/107/112107291</u>
- 3. Coursera https://www.coursera.org/lecture/electricity/power-plants-gAZ4H

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Ма	appin	g of C	ourse	e Outco	mes ((Spe	COs) w cific O	vith Pro outcom	ogram es (PS	me Ou SOs)	itcome	s (PO:	s) Pro	gramm	e
<u> </u>						Р	Os						PSOs	
CUS	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	3		2								1		
CO 2	3	3		2								1		
CO 3	3	1		2								2		
CO 4	3	1		1								1		
CO 5	3	3		2								2		
	3-High 2-Medium 1-Lo									.ow				
					Fo	ormati	ive As	sessn	nent					
Bloor	ns Ta	axono	omy		As	sessm	Ма	arks	Tota	marks				
R	lemei	nber		Quiz								5		
U	nders	stand		Tutori			signmy	ont				5		15
	Арр	oly				5/75	signine	5111				J	15	
				Attend	lance						5			

Summative Assessment													
Bloom's Category	Internal As	sessment Exar	Final Examinations (FE)										
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60									
Remember	30			20									
Understand	20	30	20	40									
Apply													
Analyse		20	30	40									
Evaluate													
Create													

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

2005302		Object Oriented Programming	L	Т	Ρ	С
2003302		(Common to CSE, IT and AI & DS)	3	0	0	3
Nature of Course		Professional Core				
Pre requisites		Programming in C and Data Structures				

The course is intended to

- 1. Learn the features of Java
- 2. Gain Knowledge in Classes, Objects and Methods
- 3. Explore the concepts of inheritance and interfaces
- 4. Get detailed knowledge about multithreading and generic programming
- 5. Discover the event driven programming concepts.

Course Outcomes

On successful completion of the course, students will be able to

CO. No.	Course Outcome	Bloom's Level
CO1	Infer the basic concepts of java programming.	Understand
CO2	Solve simple applications by utilizing the java classes and interfaces.	Apply
CO3	Categorize the principles of exception handling and I/O streams	Analyze
CO4	Appraise java programs using generic programming and multithreading.	Analyze
CO5	Perform real time applications using event handling concepts.	Apply

Course Contents

UNIT I INTRODUCTION TO JAVA FUNDAMENTALS

Features of java - Type Conversion and Casting - Java Collections - Data types and Operators - Operator Precedence and Associativity – Expression - Conditional Statements and Control Structures -Arrays-Handling Strings - Java Classes, Objects, Methods - Constructors - Static and Final Keyword -Java Application Programming.

INHERITANCE AND INTERFACES UNIT II

Inheritance basics – Using Super, Method overriding -Abstract Classes – Polymorphism - Interfaces- Multiple Inheritance - this keyword - Garbage Collection- finalize() method -Packages - Access Protection-Importing Packages-Nested and Inner Class-Wrapper **Classes-** Command Line Arguments

UNIT III APPLETS, EXCEPTION HANDLING AND I/O

Applets-Life Cycle - Invoking an Applet - Getting Applet Parameters -Try, catch , finally and throws clause - Catching Multiple Exceptions - User Defined Exceptions- Byte streams - Character streams - Reading and Writing files

MULTITHREADING AND GENERIC PROGRAMMING UNIT IV

The Java Thread Model-Thread Life Cycle-Thread Class and Runnable Interface-Multiple Threads and Synchronization-Inter Thread Communication-Generic Classes and Methods-Bounded Type Parameters, Parallelism.

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

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UNIT V EVENT DRIVEN PROGRAMMING

Graphics Programming- AWT event hierarchy-Container Class-Layouts-Components-Basics of event handling - event handlers and listener interfaces - adapter classes -Mouse, Keyboard actions and events - Difference between AWT and Java Swing

Total : 45 Periods

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Text Books:

- 1. Herbert Schildt, "Java the Complete Reference", Tata McGraw-Hill Education, 10th Edition 2017.
- Cay S. Horstmann and Gary cornell, "Core Java Volume-I Fundamentals", Prentice HallPearson education, 10th Edition 2007.

Reference Books:

- 1. Paul Deitel and Harvey Deitel," Java How to Program (Early Objects)", Pearson PrenticeHall, 10th Edition 2018.
- 2. Timothy Budd," An Introduction to Object-Oriented Programming", Pearson Education, 10th Edition 2018.
- 3. Balaguruswamy.E, "Programming with Java", Tata McGraw-Hill Publishers, 3rd Edition2016.

Additional References:

- 1. https://onlinecourses.nptel.ac.in/noc19_cs84/preview
- 2. https://onlinecourses.nptel.ac.in/noc21_cs03/preview
- 3. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs38/

Mapping o Specific O	f Cou utcoi	urse mes	Outo (PSC	:ome)s)	es (C	Os) \	with	Prog	gram	nme	Outc	omes	(POs)	Program	me
COs						PSOs									
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2	1										3	1	
CO2	3	2	1										3	1	
CO3	3	2	2	1								1	3	1	
CO4	3	2	2	2								1	3	1	
CO5	3	2	2	2								1	3	1	
	3	3 High 2 Medium 1 L									L	ow			

Formative assessment								
Bloom's Level	Assessment Component	Marks	Total marks					
Remember	Online Quiz	5						
Understand	Tutorial Class / Assignment	5	15					
	Attendance	5						

Summative Assessment											
Bloom's Category	Interna	Final									
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	Examination (60)							
Remember	10	10	10	20							
Understand	20	20	10	50							
Apply	20	20	20	20							
Analyze			10	10							
Evaluate											
Create											

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

Chairman - Board of Studies

20EE305		Electrical Machines-I	L	Т	Ρ	С
2022303			3	1	0	4
Nature of Co	ourse	Professional Core				
Pre requisit	es	Electromagnetic Theory				

The course is intended to

- 1. Identify the principles of electromechanical energy conversion and basic concepts in rotating machines.
- 2. Infer the construction, principle of operation and performance of DC generators.
- 3. Predict the principle of operation, performance, starting methods and speed control of DC motors.
- 4. Express the construction, principle of operation and performance of transformers.
- 5. Complete the Losses and efficiency, testing of DC machines and transformers.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Recall the principles of electro mechanical energy conversion and	Remember
	basic concepts on rotating machines	
CO 2	Illustrate the constructional details, operation, types, characteristics	Understand
002	and parallel operation of DC generators;	Onderstand
CO 3	Articulate the operation, performance, starting, and speed control of	Applying
005	DC motors.	Аррушу
	Summarize the construction, types, operation, performance,	
CO 4	equivalent circuit of single phase two winding and auto	Understand
	transformers; Also show three phase transformer connections;	
CO 5	Make use of different testing methods in DC Machines and	Applying
005	transformers to determine the losses and efficiency	трыйнд

Course Contents

UNIT I BASIC CONCEPTS OF ROTATING MACHINES

Principles of electromechanical energy conversion - Single and multiple excited systems - Field energy and co-energy – Force and Torque - MMF of distributed A.C. windings – Rotating magnetic field - Generated voltage - Torque in round rotor machine.

UNIT II DC GENERATORS

Constructional details - Principle of operation - EMF equation - Methods of excitation - Self and separately excited generators - Characteristics of series, shunt and compound generators - Armature reaction and commutation - Parallel operation of DC shunt and compound generators.

UNIT III **DC MOTORS**

Principle of operation - Back EMF and torque equations - Characteristics of series, shunt and compound motors - Starting of DC motors - Types of starters - Speed control of DC series and shunt motors.

UNIT IV TRANSFORMERS

Constructional details - principle of operation - types - EMF equation - Transformation ratio -Transformer on no-load - Transformer on load - Equivalent circuit - Regulation - Parallel operation of transformers - Three phase transformer connections - Auto transformer. 9

TESTING OF DC MACHINES AND TRANSFORMERS UNIT V

Losses and efficiency in DC machines and transformers - Condition for maximum efficiency Testing of DC machines - Brake test, Swinburne's test, Hopkinson's test and Retardation test -Testing of transformers - Polarity test - Open circuit and short circuit tests - Sumpner's test-All day efficiency.

Total: 45 Periods

Text Books

- 1. Kothari D.P., & Nagrath I.J., "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 4th Edition, 2010.
- 2. Albert E. Clayton and Hancock N. N., "The performance and Design of Direct Current Machines", Oxford and IBH Publishing Company Pvt. Ltd., New Delhi, 1990.

Reference Books

- 1. Gupta J.B., "Theory and Performance of Electrical Machines", S.K.Kataria and Sons, 14th Edition,2009.
- 2. Fitzgerald.A.E., Charles Kingsely Jr, Stephen D.Umans, "Electric Machinery", McGraw Hill BooksCompany, 6th Edition, 2003.
- 3. Irving L. Kosow "Electric Machinery and Transformers" PHI, New Delhi, 2nd Edition, 1991.

Additional References

- 1. Gate https://www.youtube.com/watch?v=9oKhlyEeYjw
- 2. NPTEL https://nptel.ac.in/courses/108/105/108105155/
- 3. MOOC Courses https://www.mooc-list.com/tags/electric-machines

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
<u> </u>	POs												PS	PSOs	
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO 1	3	2		1								1			
CO 2	3	3		2								1			
CO 3	3	3		2								1			
CO 4	3	2		2								2			
CO 5	3	3 3 1 2													
		3-High 2-Medium 1-Low													

Formative Assessment										
Blooms Taxonomy	Assessment Component	Marks	Total marks							
Remember	Quiz	5								
Understand	Tutorial class / Assignment	5	15							
Apply		5	10							
	Attendance	5								

Summative Assessment										
Bloom's Category	Internal As	Final Examinations (FE)								
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60						
Remember	10	10	10	20						
Understand	30	30	30	60						
Apply	10	10	10	20						
Analyse										
Evaluate										
Create										

20EE301		Electronic Devices and Circuits	L	Т	Ρ	С
2022301		Lieutonic Devices and Circuits	3	0	0	3
Nature of C	Course	Professional Core				
Pre requisi	tes	Physics				

The course is intended to

- 1. Enumerate the basics of Electron Ballistics.
- 2. Compute the operation of semi conductor diodes and it's applications.
- 3. Illustrate the working principle and characteristics of bipolar junction transistor.
- 4. Explain the principle and operation of FET and UJT.
- 5. Describe the basic concepts of special semiconductor devices

Course Outcomes

On successful completion of the course the students will be able to

CO.	Course Outcome	Bloom's Level
No		
CO 1	Describe the behaviour of PN junction diode and Zener diode in forward and reverse characteristics and develop the Half-wave, Full-wave and Bridge rectifier circuit.	Understanding
CO 2	Enlighten the structure and operation of BJT, JFET, MOSFET and UJT analyze its input and output characteristics.	Applying
CO 3	Analysis the frequency response characteristics of Common emitter amplifier and calculate the voltage gain using BJT small signal model.	Analyzing
CO 4	Discuss about common mode and differential mode operation of Differential amplifier and construct the cascade and cascade model of amplifier and analysis it's performance.	Applying
CO 5	Discuss about the positive and negative feedback amplifiers and determine the frequency of oscillation using RC, Wein bridge, Hartley oscillators.	Understanding

Course Contents

UNIT I PN JUNCTION DEVICES

PN junction diode -structure, operation,V-I characteristics and application,- Rectifiers – Half Wave and Full Wave Rectifier,- Display devices- LED, Laser diodes, Zener diode characteristics-Zener Reverse characteristics – Zener as regulator

UNIT II TRANSISTORS AND THYRISTORS

BJT, JFET, MOSFET- structure, operation, characteristics and Biasing UJT, Thyristors and IGBT - Structure and characteristics.

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Chairman - Board of Studies

UNIT III AMPLIFIERS

BJT small signal model - Analysis of CE, CB, CC amplifiers- Gain and frequency response - MOSFET small signal model- Analysis of CS and Source follower – Gain and frequency response- High frequency analysis.

UNIT IV MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER

BIMOS cascade amplifier, Differential amplifier - Common mode and Difference mode analysis - FET input stages - Single tuned amplifiers - Gain and frequency response - Neutralization methods.

UNIT V FEEDBACK AMPLIFIERS AND OSCILLATORS

Advantages of negative feedback - voltage / current, series , Shunt feedback -positive feedback - Condition for oscillations, Wien bridge, Hartley, Colpitts and Crystal oscillators.

Total: 45 Periods

Laboratory components

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy
1	Characteristics of Semiconductor diode and Zener diode	CO1	Understand
2	Characteristics of a NPN Transistor under common emitter, common collector and common base configurations	CO1	Understand
3	Characteristics of JFET and draw the equivalent circuit	CO2	Understand
4	Characteristics of UJT and generation of saw tooth waveforms	CO2	Understand
5	Design and Frequency response characteristics of a Common Emitter amplifier	CO3	Apply
6	Design and testing of RC phase shift and LC oscillators	CO3	Apply
7	Characteristics of photo diode & photo transistor	CO4	Analyzing
8	Characteristics of Single Phase half-wave and full wave rectifiers with inductive and capacitive filters	CO4	Understand
9	Study of light activated relay circuit	CO5	Remember
10	Study of CRO for frequency and phase measurements	CO5	Remember

Text Books

- 1. David A. Bell ,"Electronic devices and circuits", Oxford University higher education, 5th Edition 2018.
- 2. Sedra and smith, "Microelectronic circuits",7th Ed., Oxford University Press 2017

Reference Books

- 1. Balbir Kumar, Shail.B.Jain, "Electronic devices and circuits" PHI learning private limited, 2nd edition 2018.
- 2. Thomas L.Floyd, "Electronic devices" Conventional current version, Pearson prentice hall, 10th Edition, 2017.
- 3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGraw Hill, 3rd Edition, 2016.

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Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
<u> </u>						Р	Os						PS	Os
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	3		3							2		
CO2	3	2	3		3							2		
CO 3	3	2	3		3							2		
CO 4	3	2	3		3							2		
CO 5	3 2 3 2 2 2													
	3-High 2-Medium 1-Low										•			

Formative Assessment										
Blooms Taxonomy	Assessment Component	Marks	Total marks							
Remember	Quiz	5								
Understand	Tutorial class / Assignment	5	15							
Apply		5	15							
	Attendance	5								

Summative Assessment										
Dia amala		1			Practical	Final Examination (Theory)				
Category	IAE-I	IAE-II	IAE-III	Attendance	CIA					
	(7.5) ((7.5)	(10)	[5]	[20Marks]	[50Marks]				
Remember	20	10	20		20	20				
Understand	30	20	30		20	40				
Apply		20			60	40				
Analyze										
Evaluate										
Create										

20EE306	DC	Machines & Transformer Laboratory	L	Т	Ρ	С				
2022300			0	0	2	1				
Nature of C	Course	Professional Core								
Pre requisi	tes	Electric Circuits laboratory								

The course is intended to

- 1. Acquire knowledge on concept of DC Generators
- 2. Construction, principle of operation and performance of DC machines.
- 3. Understand the Principle of operation and performance of DC motors
- 4. Starting and speed control of DC motors
- 5. Construction, principle of operation and performance of single phase transformer

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Operate D.C. shunt generators, D.C. compound generators, D.C. series motors and D.C. shunt motor to determine the load characteristics.	Understanding
CO 2	Conduct experiments to obtain the performance characteristics of DC Generators	Analyzing
CO 3	Experiment to determine the performance characteristics and speed control of DC shunt motors by conducting load test.	Analyzing
CO 4	Interpret by experimenting to determine the losses and efficiency of D.C. machines and Transformers.	Understanding
CO 5	Experiment to determine the performance characteristics and the equivalent circuit parameters of single phase Transformer	Understanding

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy
1	Open circuit and load characteristics of D.C separately and self excited shunt generator	CO1	Analyzing
2	Load characteristics of D.C. compound generator with differential and cumulative connections	CO1	Understand
3	Load characteristics of D.C. shunt motor	CO2	Understand
4	Load characteristics of D.C. compound motor	CO2	Understand
5	Load characteristics of D.C series motor	CO3	Understand
6	Swinburne's test	CO3	Understand
7	Speed control of D.C shunt motor	CO4	Analyzing
8	Load test on single-phase transformer	CO4	Understand
9	Open circuit and short circuit tests on single phase transformer	CO5	Analyzing
10	Study of starter for DC Motors and various connections in three phase transformer	CO5	Remember

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
60-	POs													PSOs	
005	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO 1	3	2	3		3							1			
CO 2	3	2	3		3							1			
CO 3	3	2	3		3							1			
CO 4	3	2	3		3							1			
CO 5	3	2	3		2							1			
	3-High 2-Medium 1-Low														

Summative Assessment									
					Practical	Final Examination (Theory)			
Bloom's Category	IAE-I (7.5)	IAE-II (7.5)	IAE-III (10)	Attendance	Rubric based CIA				
	(7.5)			[9]	[20Marks]	[50Marks]			
Remember	20	10	20		20	20			
Understand	30	20	30		20	40			
Apply		20			60	40			
Analyze									
Evaluate									
Create									
B.E. Electrical and Electronics Engineering (R2020)

2009305		ect Oriented Programming Laboratory	Ľ	Ρ	С	
2000303	005		0	0	4	2
Nature of C	Course	Professional Core				
Pre requisi	tes	Programming in C				

Course Objectives

The course is intended to

- 1. Make familiar with java programming Language
- 2. Write simple programs using java applets
- 3. Develop applications in java using I/O streams and Exception handling mechanism
- 4. Implement generic programming for real time applications
- 5. Apply AWT and Java Swing to create GUI based applications

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Write simple java programs using basic language constructs	Understanding
CO 2	Execute programs using inheritance and interfaces	Apply
CO 3	Solve complex problems using Exception Handling	Apply
CO 4	Extend the concepts of multithreading and generic programming to solve real world problems.	Apply
CO 5	Integrate the concept of event driven programming to develop GUI based applications	Analyze

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy
1	Create java applications using java classes and methods	CO1	Analyzing
2	Write java applications using constructors	CO1	Understand
3	Design java applications to implement different types of inheritance.	CO2	Understand
4	Develop a simple program to get and display data using command line arguments.	CO2	Understand
5	Implement the concept of exception handling to solve complex problems.	CO3	Understand

ne

6	Write programs to read and display the contents of a file using I/O streams	CO3	Understand
7	Creation of real time applications using multithreading	CO4	Analyzing
8	Develop a java application using generic programming	CO4	Understand
9	Write programs in Java to create three-tier applications.	CO4	Analyzing
10	Create a GUI based java applet using appropriate controls from abstract window toolkit.	CO5	Remember
11	Develop a java GUI applet using Swings	CO5	Understand

Total: 60 Periods

Ma	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
COs						Р	Os						PS	Os
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	1	1	1	3						1	2		
CO 2	3	1	1	1	3						1	2		
CO 3	3	1	1	1	3						1	2		
CO 4	3	2	1	2	3						1	2		
CO 5	3	2	1	1	3						1	2		
	3-High					2-Medium			1-Low					

Summative Assessment								
		Continue	ous Ass	essment Tests	6			
Bloom's Category	IAE-I IAE-II IAE-III (7.5) (7.5) (10)		Attendance [5]	Practical Rubric based CIA [20Marks]	Final Examination (Theory) [50Marks]			
Remember	20	10	20		20	20		
Understand	30	20	30		20	40		
Apply		20			60	40		
Analyze								
Evaluate								
Create								

Passed in Board of Studies Meeting (24.02.2022)

20MC301		Environmental Science	LT					
			2	0				
Nature of Co	ourse	Mandatory Course						
Pre requisites		Nil						

The course is intended to

- 1. Understand the concept of eco system and environment.
- 2. Predict ecological balance and values of bio diversity.
- 3. Prepare human in prevention of pollution and making a clean environment.
- 4. Cite conservation of non conventional energy resources.
- 5. Device the nature and management of e-waste and solid waste.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Describe the ecosystem and environment	Understand
CO 2	Summarize the ecological balance and preservation of bio diversity	Understand
CO 3	Examine various types of pollution in order to control pollution	Apply
CO 4	Classify the energy sources for the conservation of non conventional energy sources	Understand
CO 5	Evaluate the nature and management of e-waste and solid waste	Analyze

Course Contents

UNIT I Ecosystem

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Eco system - Food chains, Food webs and Ecological pyramids. Ecosystem - (a) Forest eco system, (b) Aquatic eco system (pond ecosystem and marine ecosystem).

UNIT II Biodiversity

Introduction to Bio diversity, Values of Bio diversity, Threads to Bio diversity, Endangered and Endemic species of India, Hotspots of biodiversity. Conservation of Bio diversity: In-Situ and Ex-Situ conservation of bio diversity.

UNIT III Environmental Pollution

Definition, Causes, Effects and Control of (a) Air pollution (b) Water pollution (c) Soil pollution Electrostatic Precipitator for controlling air pollution

UNIT IV Non Conventional Energy Resources

Introduction, Types: Solar Energy, Wind Energy and Geo Thermal Energy.

UNIT V Environmental Management

Sustainable Development, Role of Information technology in Environment and Human HIV and AIDS: causes and control measures. Green chemistry: Definition and Principles

Total: 30 Periods

Activity Component

S.No	Name of the Experiment	CO Mapping	RBT
1	Field study of simple eco system: pond, river and hill slopes	CO1	Understand
2	Case study regarding environmental management	CO5	Apply

Text Books

- 1. Anubha Kaushik and C.P. Kaushik, "Environmental Science and Engineering, New Age International Publishers, New Delhi, 2nd Edition, 2015
- 2. V. Kumar, "An Introduction to Green Chemistry" Vishal publishing Co. Reprint Edition, 2010

Reference Books

- 1. Masters, Gilbert M, "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi, 2nd Edition, 2012
- Santosh Kumar Garg and Rajeshwari Garg "Ecological and Environmental Studies", Khanna Publishers, Nai Sarak, Delhi, 2nd Edition, 2014

Additional References

1. NPTEL - http://nptel.ac.in/courses/104103020

Approved in Academic Council Meeting (09.03.2022)

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs						P	Os							PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1							3					3			
CO2							3					3			
CO3							3					3			
CO4							3					3			
CO5							3					3			
	3	3 High					2		Mee	dium		1		Low	

Summative Assessment									
Bloom's Category	Internal A	Final Examinations (FE)							
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60					
Remember	10	10	10	20					
Understand	30	30	30	60					
Apply	10	10	10	20					
Analyse									
Evaluate									
Create									

20MA405	Numerical Methods (Common to EEE & PCT)	L 3	T 2	P 0	C 4
Nature of C	ourse Basic Sciences				
Pre requisi	Mathematics- I & II for Electrical Sciences Mathematics - I & II for Chemical Sciences	or			

The course is intended to

- 1. Introduce the basic concepts of algebraic and transcendental equations.
- 2. Interpret the Numerical Techniques of interpolation in various intervals.
- 3. Acquire the concept of numerical techniques of differentiation and integration.
- 4. Study the numerical techniques in solving ordinary differential equations.
- 5. Acquaint with the Numerical techniques in solving one dimensional and two dimensional heat equations.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Illustrate the algebraic and transcendental equations.	Understand
CO 2	Appreciate the numerical techniques of interpolation and error approximations in various Intervals.	Apply
CO 3	Apply the numerical techniques of differentiation and integration for engineering problems.	Apply
CO 4	Classify the numerical techniques for solving first order ordinary differential equations.	Understand
CO 5	Interpret the solution of boundary value problems.	Understand

Course Contents

UNIT I Solution of Linear Equations and Eigen Value Problems

Solution of linear system of equations – Gauss elimination method – Pivoting – Gauss Jordan method - Iterative methods of Gauss Jacobi method and Gauss Seidel method- Eigen values of a matrix by Power method.

UNIT II Interpolation

Interpolation with equal intervals - Newton's forward and backward difference formulae -Interpolation with unequal intervals - Lagrange's interpolation - Newton's divided difference interpolation.

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UNIT III Numerical Differentiation and Integration

Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal and Simpson's 1/3 rules - Two point and three point Gaussian Quadrature formulae - Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

UNIT IV Numerical Solution of Ordinary Differential Equation

Single step methods: Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods: Milne's -predictor corrector methods for solving first order equations.

UNIT V Boundary Value Problems in Partial Differential Equations

Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods.

Total : 60 Periods

Text Books

- 1. Grewal B.S, and Grewal J.S, "Numerical methods in engineering and science "Khanna Publishers, 10th Edition,2015
- 2. Burden, R.L. and Faires, J.D, "Numerical Analysis" Cengage Learning, 9th Edition, 2016

Reference Books

- 1. Sankara Rao. K., "Numerical Methods for Scientists and Engineers", Prentice Hall of India Pvt. Ltd, New Delhi, 3rd Edition,2007.
- 2. Sastry, S.S., "Introductory Methods of Numerical Analysis", PHI Learning pvt Ltd, 5th Edition, 2015.

Additional References

- 1. https://nptel.ac.in/courses/111/107/111107105
- 2. https://nptel.ac.in/courses/127/106/127106019

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Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
COs	POs													PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO 6	3	3	2									1	1		
CO 7	3	2	2									1	2		
CO 8	3	3	1									1	1		
CO 9	2	2	2									1	2		
CO 10	3	3	2									1	2		
	3-High				2-Medium				1-Low						

Formative Assessment											
Blooms Taxonomy	Assessment Component	Marks	Total marks								
Remember	Quiz	5									
Understand	Tutorial class / Assignment	5	15								
	Attendance	5									

Summative Assessment												
Bloom's Category	Internal As	Final Examinations (FE)										
	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60								
Remember	10	10	10	20								
Understand	30	30	30	60								
Apply	10	10	10	20								
Analyse												
Evaluate												
Create												

Passed in Board of Studies Meeting (24.02.2022)

2055404			L	Т	Ρ	С		
2022401		Digital Logic Circuits						
Nature of C	ourse	Engineering Sciences						
Pre requisit	es	Electronic Devices						

The course is intended to

- 1. Study the Digital fundamentals, Boolean algebra, Logic circuit minimization techniques and its applications in digital systems
- 2. Develop the combinational digital circuits using logic gates
- 3. Articulate synchronous sequential circuits with flip-flop elements.
- 4. Study the procedures for asynchronous sequential circuits.
- 5. Explain various semiconductor memories and related technology.

Course Outcomes:

On successful completion of the course, students will be able to

CO.No.	Course Outcome	Bloom's Level
CO1	Estimate the Digital logic functions and minimization of logic circuits.	Understand
CO2	Develop the various combinational digital circuits using logic gates.	Apply
CO3	Construct various synchronous sequential circuits.	Apply
CO4	Compare various asynchronous sequential circuits.	Understand
CO5	Illustrate the semiconductor memories and Programmable Logic devices.	Understand

Course Contents

UNIT I **Digital Fundamentals**

Number Systems - Decimal, Binary, Octal, Hexadecimal, radix conversion, 1s and 2s complements, Codes - Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems & Postulates, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh Map Minimization 11

Combinational Circuit Design UNIT II

Design of Half and Full Adders, Subtractors, Binary Parallel Adder - Carry look ahead Adder, BCD Adder, Binary Multiplier, Multiplexer, De Multiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder, Parity Checker & Generator.

UNIT III Synchronous Sequential Circuits

Latches, Flip flops - SR, JK, T, D, Master/Slave FF - operation and excitation tables, Triggering of FF. Analysis and design of clocked sequential circuits - Design - Moore/Mealy models, state minimization, state assignment, circuit implementation - Design of Counters -Ripple Counters, Synchronous Counter, Ring Counters, Shift registers, Universal Shift Register.

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UNIT IV Asynchronous Sequential Circuits

Stable and Unstable states, output specifications, cycles and races, state reduction, race free assignments, Hazards, Essential Hazards, Pulse mode sequential circuits, Design of Hazard free circuits.

UNIT V Memory Devices And Digital Integrated Circuits

Basic memory structure - ROM - PROM - EPROM - EEPROM - EAPROM, RAM - Static and dynamic RAM - Programmable Logic Devices - Programmable Logic Array (PLA) -Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) -Implementation of combinational logic circuits using PLA, PAL.

Total: 45 Periods

Text Books:

- 1. Morris Mano.M and Michael D. Ciletti,"Digital Design", Pearson Publication, Sixth Edition 2018.
- 2. Salivahanan.S and Arivazhagan.S,"Digital Electronics",Vlikas Publishing House Pvt Ltd, First Edition ,2012

References :

- 1. A.Anand Kumar, "Fundamentals of Digital Circuits", PHI Learning Private Limited, Fourth Edition, 2016.
- 2. Charles H.Roth,"Fundamentals of Logic Design", Thomson Learning, Sixth Edition ,2013.
- 3. Thomas L. Floyd," Digital Fundamentals", Pearson Education Inc, Eleventh Edition, 2015.

Additional References:

- 1. <u>https://www.youtube.com/watch?v=CeD2L6KbtVM</u>
- 2. https://nptel.ac.in/courses/108/105/108105132/

Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs	POs												PSOs	PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	3	3	3	3											
CO2	3	3	3	3											
CO3	3	3	3	3											
CO4	3	3	3	3											
CO5	3	2	2	2											
	3		High				2	Medium 1		Low					

Passed in Board of Studies Meeting (24.02.2022)

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Formative Assessment											
Blooms Taxonomy	Assessment Component	Marks	Total marks								
Remember	Quiz	5									
Understand	Tutorial class / Assignment	Б	15								
Apply		5	15								
	Attendance	5									

summative											
	Continu	ous Assessm	Terminal								
Bloom's Category	IAE I (7.5)	IAE II (7.5)	IAE III (10)	Examination (60)							
Remember	10	10	10	20							
Understand	20	20	20	40							
Apply	20	20	20	40							
Analyze											
Evaluate											
Create											

Approved in Academic Council Meeting (09.03.2022)

Chairman - Board of Studies

20EE402		Transmission and Distribution	L	Т	Ρ	С
2022402			3	0	0	3
Nature of C	Course	Professional Core				
Pre requisi	tes	Power Generation System				

The course is intended to

- 1. Analyze the various types of transmission system and deduce the mathematical models for line parameters.
- 2. Discuss the voltage regulation and efficiency using line parameters.
- 3. Distinguish the voltage distribution in insulator strings and grading of cables in transmission Lines.
- 4. Analyze the different types of distribution system and substations with its layout.
- 5. Identify the application of electrical energy in domestic and industrial loads.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Categorize the line parameters of overhead transmission lines.	Analyzing
CO 2	Illustrate the voltage regulation and transmission efficiency of short, medium and long transmission lines.	Understand
CO 3	Explain the different types of cables and insulators and estimate the string efficiency of insulators.	Understand
CO 4	Classify the substations and analyze the performance of single and three phase distribution system.	Analyzing
CO 5	Describe the utilization of electric energy in heating and welding applications.	Understand

Course Contents

UNIT I LINE PARAMETERS

Resistance, Inductance and capacitance of single phase and three phase line - Stranded and bundled conductor configurations - Symmetrical and unsymmetrical spacing - Transposition of line conductors - Double circuit lines - Skin and proximity effects.

UNIT II PERFORMANCE OF TRANSMISSION LINES

Regulations and Efficiency of Short Lines, Medium transmission lines by nominal T & Ž methods - Long Transmission line by Rigorous Solutions - ABCD Constant - Ferranti Effect - Corona Effect - Corona loss.

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CABLES AND INSULATORS UNIT III

Cables - Types - Capacitance - Grading of cables - Testing of cables - Insulators - Types and comparison - Voltage distribution in insulator string - String efficiency - Methods of improving string efficiency.

UNIT IV **MECHANICAL DESIGN OF LINES**

Mechanical design of OH lines – Line Supports -Types of towers – Stress and Sag Calculation – Effects of Wind and Ice loading. Insulators: Types, voltage distribution in insulator string, improvement of string efficiency, testing of insulators.

UNIT V DISTRIBUTION SYSTEMS

Distribution Systems - General Aspects - Kelvin's Law - AC and DC distributions - Techniques of Voltage Control and Power factor improvement - Distribution Loss -Types of Substations -Methods of Grounding - Trends in Transmission and Distribution: EHVAC, HVDC and FACTS (Qualitative treatment only - National Grid Systems.

Total: 45 Periods

Text Books

- 1. C.L .Wadhwa, Electrical Power Systems, New Age International Edition, New Delhi 2018.
- 2. I.J.Nagrath, D.P.Kothari, Power System Engineering, Tata McGraw Hill Ltd, New Delhi. 2017.
- 3. V. Kamaraju, Electrical Power Distribution Systems, Tata McGraw Hill Ltd, New Delhi, 2017.

Reference Books

- 1. Turan Gonen, Electric Power Distribution system, Engineering, CRC Press 2017.
- 2. H Partap Art and Science of Utilization of Electrical Energy, Dhanpat Rai & Sons 2017.
- 3. E. Openshaw Taylor and V. V. L. Rao, Utilization of Electric Energy, University Press 2017.

Additional References

- 1. Gate https://www.youtube.com/watch?v=zpgsAgJ9S3c
- 2. NPTEL https://nptel.ac.in/courses/108/102/108102047/
- 3. MOOC Courses https://www.mooc-list.com/course/electric-power-systems-coursera

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Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)														
<u> </u>	POs													PSOs	
CUS	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO 1	3	2		2								1			
CO 2	3	3		1								1			
CO 3	3	2		1								1			
CO 4	3	1		2								2			
CO 5	3	1		1								2			
	3	3 High				2		Mec	lium		1	L	ow		

Formative Assessment							
Blooms Taxonomy	Assessment Component	Marks	Total marks				
Remember	Quiz	5					
Understand	Tutorial class / Assignment	Б	15				
Apply		5	15				
	Attendance	5					

Summative Assessment								
Bloom's	Internal As	sessment Exar	ninations (IAE)	Final Examinations (FE)				
Category	IAE – I (7.5)	IAE – II (7.5)	60					
Remember		20	10	20				
Understand	20	30	30	40				
Apply			10					
Analyse	30			40				
Evaluate								
Create								

Passed in Board of Studies Meeting (24.02.2022)

20FF403		Measurement and Instrumentation	L	Т	Ρ	С
2022400			3	0	0	3
Nature of C	Course	Professional Core				
Pre requisi	tes	Nil				

The course is intended to

- 1. Infer the fundamental concepts of general instrument system.
- 2. Express the knowledge on various types of measuring instruments.
- 3. Predict various bridges for measuring R, L and C.
- 4. Relate the suitable transducers for measuring non-electrical parameters.
- 5. Indicate the principle of working and applications of special Instruments.

Course Outcomes

On successful completion of the course the students will be able to

CO.No	Course Outcome	Bloom's Level
CO 1	Explain the types of characteristics, errors of an instrument and do the calibration of instruments.	Understand
CO 2	Evaluate the principle and operation of analog instruments.	Understand
CO 3	Construct various bridge circuits for measurement of R, L and C.	Apply
CO 4	Predict suitable transducers for measurement of non-electrical quantities.	Apply
CO 5	Interpret the principle and working of digital instruments.	Understand

Course Contents

UNIT I INTRODUCTION

Elements of Generalized measurement system - Methods of measurement - Classification of instruments. Characteristics of instruments - Static and dynamic Characteristics - Errors in measurement - Statistical evaluation of measurement data: Mean, standard deviation, probability of error. Standards and Calibration of Instruments.

UNIT II ANALOG INSTRUMENTS

Principle and types of analog voltmeters and ammeters - Permanent Magnet Moving Coil Instruments – Moving Iron Instruments – Electrodynamometer type instruments ,use of shunts and multipliers. Dynamometer type wattmeter – Torque expression, Errors. Energy meters, Calibration of energy meters. Measurement of power using Instrument Transformers. Power factor meter.

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UNIT III MEASUREMENT OF ELECTRICAL PARAMETERS

Resistance Measurement: Substitution method, Loss of charge method, Wheatstone bridge, Kelvin's double bridge – Measurement of Earth resistance, Insulation resistance – Megger. Measurement of Inductance and Capacitance: Maxwell's Bridge, Anderson Bridge, Desauty's Bridge and Schering bridge -Transformer ratio bridges.

UNIT IV MEASUREMENT OF MECHANICAL PARAMETERS

Transducers - Classifications, Strain Gauge based torque and pressure measurement, Inductive and capacitive transducers, LVDT, Piezo electric transducers. Encoders. Photo sensors and its applications. Measurement of Temperature – Resistance thermometer, thermistor, thermostat and thermocouple.

UNIT V DIGITAL AND SPECIAL PURPOSE INSTRUMENTS

Digital voltmeter – Types: Ramp and Integrating – Digital Multimeter – Digital Storage Oscilloscope.LED - LCD - dot matrix display Data Loggers. Power quality analyzer - Instruments for energy auditing - Smart energy meter - Industrial Sensors

Total: 45 Periods

Text Books

- 1. Sawhney A K, A Course in Electrical and Electronic Measurement and Instrumentation, Dhanpat Rai & Sons, New Delhi, 2011.
- 2. Doeblin E O and Dhanesh N Manik, Measurement Systems", McGraw-Hill, NewDelhi, 2012.
- 3. Helfrick, D.Albert and Cooper, W.D., "Electronic Instrumentation and Measurement Techniques", Prentice Hall of India Limited, New Delhi, 2010.

Reference Books

- 1. Rangan, C.S., Sharma, G.R., Mani, V.S., "Instrumentation Devices and Systems", 2nd edition Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2010.
- 2. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2011.
- 3. David A. Bell, Electronic Instrumentation and Measurements, Oxford University Press, New Delhi, 2012.

Additional References

- 1. **NPTEL** https://nptel.ac.in/courses/108/105/108105153
- 2. Youtube https://youtu.be/sl_jdArBA5Q
- 3. Unacademy https://unacademy.com/course/comprehensive-course-on-

measurement-and-instrumentation-307/ZI3YYQM7

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Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)																
COs						Р	Os						P	PSOs		
003	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
CO1	3	3	2				3					3				
CO2	3	2	2				3					3				
CO3	3	3	3				3					3				
CO4	3	2	3				3					3				
CO5	3 2 3 3 3															
	3			Higł	า		2		Me	diun	n	1	Lc	W		

Formative Assessment							
Blooms Taxonomy	Assessment Component	Marks	Total marks				
Remember	Quiz	5					
Understand	Tutorial class / Assignment	5 15					
Apply	Tutorial class / Assignment	5	15				
	Attendance	5					

Summative Assessment								
Bloom's	Internal As	sessment Exar	minations (IAE)	Final Examinations (FE)				
Category	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	60				
Remember								
Understand	30	30	30	60				
Apply	10	10	10	20				
Analyze	10	10	10	20				
Evaluate								
Create								

Passed in Board of Studies Meeting (24.02.2022)

20FF404		Electrical Machines II	L	Т	Ρ	С
2022404			3	1	0	4
Nature of C	Course	Professional Core				
Pre requisi	tes	Electrical Machines- I				

The course is intended to

- 1. Understand the Construction and performance of salient and non - salient type synchronous generators
- 2. Apply the Principle of operation and performance of synchronous motor
- 3. Infer the Construction, principle of operation and performance of induction machines.
- 4. Predict the Starting and speed control of three-phase induction motors
- 5. Represent the Construction, principle of operation and performance of single phase induction motors and special machines

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Describe the basic constructional and working principle of synchronous and induction machines	Understanding
CO 2	Compute the performance of AC machines with different parameters	Applying
CO 3	Analyze the performance characteristics of induction machines	Analyzing
CO 4	Apply starting and speed control methods to AC motors	Applying
CO 5	Demonstrate the operation of single phase induction machine and special electrical machines	Understanding

Course Contents

UNIT I Alternator

Introduction to Rotating MMF - Construction and Operation Details - Types of Rotors - EMF Equation - Synchronous Reactance - Armature Reaction - Voltage Regulation: EMF, MMF and ZPF Methods - Synchronizing and Parallel Operation - Synchronizing Power - Power Output Equations - Change of Excitation and Mechanical Input

UNIT II Synchronous Motor

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

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UNIT III Three Phase Induction Motor

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 - Double Cage Rotors - Induction Generator - Applications.

UNIT IV Starting and Speed Control of Three Phase Induction Motor

Need for Starters - Types of Starters - Rotor Resistance, Autotransformer, Star-Delta and DOL Starters - Speed Control by Varying Voltage, Frequency, Poles and Rotor Resistance - Slip Power Recovery Scheme.

UNIT V Single Phase Induction Motors and Special Machines

Construction and Operation Details - Double Revolving Field Theory - Equivalent Circuit -Simple Problems Starting Methods: Split Phase, Capacitor Start, and run, Shaded Pole -Applications - Servo Motor, Stepper Motor and Universal Motor.

Total : 45 Periods

Text Books

- 1. Kothari D.P and Nagrath I.J., "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 4 th Edition, 2017.
- 2. "Theory and performance of electrical machines" by J.B.Gupta, S.K. Kataria & Sons pvt Ltd New Delhi, 2009.
- 3. B.L Theraja and A.K .Theraja "A Textbook of Electrical Technology Volume II AC and DC Machines" S. Chand Publishing New Delhi, 1959. ISBN-9788121924375.

Reference Books

- 1. Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016.
- 2. B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers, 3rd Edition, and Reprint 2015.
- Murugesh Kumar K, "Induction and synchronous machines" Vikas publishing house Pvt Ltd., 2009

Additional References

1. **NPTEL** - https://nptel.ac.in/courses/108/105/108105131/

2. Virtual laboratory - Ministry of Education - https://www.vlab.co.in/ vlabs-

dev/vlab_bootcamp/bootcamp/Sadhya/experimentlist.html

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Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)												
<u> </u>	POs										PS	iOs	
COS	1 2 3 4 5 6 7 8 9 10 11 12									1	2		
CO 1	3	3			2						2		
CO 2	3	3			2						2		
CO 3	3	3			2						2		
CO 4	3	3			2						2		
CO 5	3 3 2 2 2												
	3-High 2-Medium 1-Low												

Formative Assessment							
Blooms Taxonomy	Marks	Total marks					
Remember	Quiz	5					
Understand	Tutorial class / Assignment	5	15				
Apply		5	15				
	Attendance	5					

Summative Assessment							
Dia amia Catanamu	Internal As	sessment Exa	minations (IAE)	Final Examinations (FE)			
Bloom's Calegory	IAE – I (7.5)	IAE – II (7.5)	IAE – III (10)	(60)			
Remember	10	10	10	20			
Understand	30	30	30	60			
Apply	10	10	10	20			
Analyse							
Evaluate							
Create							

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

Chairman - Board of Studies

20EE405		ntegrated Circuits and Applications	L	Т	Р	С
2022403		megrated oricults and Applications	2	0	2	4
Nature of C	Course	Professional Core				
Pre requisi	tes	Electronic Devices and Circuits				

The course is intended to

- 1. Infer knowledge on the IC fabrication
- 2. Predict the linear and non-linear applications of operational amplifiers
- 3. Show the response of ADC and DAC in Real time Systems.
- 4. Construct the astable and monostable multivibrator using 555 timer for practical applications
- 5. Illustrate Regulator ICs, Drivers and its applications

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Summarize the IC manufacturing processor	Understanding
CO 2	Examine the operational amplifiers with linear integrated circuits.	Applying
CO 3	Describe the working principles of A /D and D/A Data Converters.	Understanding
CO 4	Compare the Special Function IC's and its Applications.	Analyze
CO 5	Interpret the simple filter circuits, Regulators and audio amplifier	Understanding

Course Contents

UNIT I IC FABRICATION

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realisation of monolithic ICs and packaging. Fabrication of diodes, capacitance, resistance, FETs and PV Cell.

UNIT II CHARACTERISTICS OF OPAMP

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – Inverting and Non-inverting Amplifiers, summer, differentiator and integrator-V/I & I/V converters.

UNIT III APPLICATIONS OF OPAMP

Instrumentation amplifier and its applications for transducer Bridge, Log and Antilog Amplifiers-Analog multiplier & Divider, first and second order active filters, comparators, multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using op amps.

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UNIT IV SPECIAL ICs

Functional block, characteristics of 555 Timer and its PWM application - IC-566 voltage controlled oscillator IC; 565-phase locked loop IC, AD633 Analog multiplier ICs.

UNIT V **APPLICATION ICs**

LM 393 Differential amplifier.LM386 low voltage audio amplifier-TLE94003XX BLDC motor control ICs - IC voltage regulators -LM78XX, LM79XX; Fixed voltage regulators its application as Linear power supply - LM317, 723 Variability voltage regulators, switching regulator- SMPS - ICL 8038 function generator IC.

Total: 45 Periods

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy	
1	Implementation of Boolean Functions, Adder/ Subtractor,	CO1	Understand	
	Multiplexer/Demultiplexer.			
2	Code converters: Excess-3 to BCD and Binary to Gray code	CO1	Understand	
-	converter and vice-versa.	001	ondorotaria	
3	Implementation of Adder, comparator, Integrator and	CO2	Apply	
5	Differentiator	002	, apply	
4	Design differential amplifier, clippers, clampers.	CO2	Apply	
5	Parity generator and parity checking.	CO3	Apply	
6	Analog to digital converter	CO3	Understand	
7	Digital to analog converter	CO4	Understand	
8	IC 555 timer in Astability ,Monostability operation	CO4	Understand	
9	IC voltage regulators -LM78XX, LM79XX	CO5	Apply	
10	Variability Voltage Regulator using IC LM317.	CO5	Apply	

Laboratory components

Total: 30 Periods

Text Books

- 1. Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', Mc Graw Hill, 2018.
- 2. Roy Choudhary D, Sheil B.Jani, "Linear Integrated Circuits", 5th Edition, New Age International Publishers, 2017.
- David A. Bell, 'Op-amp & Linear ICs', Oxford, 2013. 3.

Reference Books

- 1. Floyd ,Buchla, "Fundamentals of Analog Circuits, Pearson, 2013.
- 2. Robert F.Coughlin, Fredrick F. Driscoll, 'Op-amp and Linear ICs', Pearson, 6th edition, 2012.
- 3. Fiore, "Opamps & Linear Integrated Circuits Concepts & applications", Cengage, 2010.

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Additional References

- 1. NPTEL <u>https://nptel.ac.in/courses/108/108/108108111/</u>
- 2. NPTEL https://nptel.ac.in /courses/117107094/5

Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
<u> </u>	POs											PS	PSOs	
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	3			2							2		
CO 2	3	3			2							2		
CO 3	3	3			2							2		
CO 4	3	3			2							2		
CO 5	3	3 3 2 2												
		3-ŀ	ligh			2-Me	dium			1-L	.ow			

Formative Assessment									
Blooms Taxonomy	Assessment Component	Marks	Total marks						
Remember	Quiz	5							
Understand	Tutorial class / Assignment	Б	15						
Apply		5	15						
	Attendance	5							

		Sumi	mative A	Assessment		
					Practical	Final
Bloom's Category	IAE-I (7.5)	IAE-II (7.5)	IAE-III (10)	Attendance [5]	Rubric based CIA [20Marks]	Examination (Theory) [50Marks]
Remember	20	10	20		20	20
Understand	30	20	30		20	40
Apply		20			60	40
Analyze						
Evaluate						
Create						

Passed in Board of Studies Meeting (24.02.2022)

Laboratory 0 0			C	
Nature of Course Professional Core	Nature of Course			
Pre requisites DC Machines and Transformers laboratory	Pre requisites			

The course is intended to

- 1. Infer the concept of synchronous and asynchronous machines
- 2. Understand the Principle of operation and performance of synchronous motor
- 3. Deduce the Construction, principle of operation and performance of induction machines.
- 4. Predict the operation and speed control of three-phase induction motors
- 5. Represent the Construction, principle of operation and performance of single phase induction motors and special machines

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Predict the regulation of an Alternator by various methods namely EMF, MMF, ZPF, ASA and slip test.	Understanding
CO 2	Estimate the positive, negative and zero sequence impedances of an Alternator and also to obtain V and inverted V curves of Synchronous motor.	Analyzing
CO 3	Evaluate the performance characteristics, equivalent circuit, losses of three phase and single phase induction motors.	Analyzing
CO 4	Observe the performance characteristics of induction motor by conducting load test.	Understanding
CO 5	Trace the performance characteristics and the equivalent circuit parameters of single phase induction motor.	Understanding

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy
1	Regulation of three phase alternator by EMF and MMF methods	CO1	Understand
2	Regulation of three phase alternator by ZPF method	CO1	Understand
3	Regulation of three phase salient pole alternator by slip test	CO2	Understand
4	Separation of No-load losses of three phase induction motor	CO2	Analyzing
5	V and Inverted-V curves of Three Phase Synchronous Motor	CO3	Analyzing

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

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6	Load test on three-phase induction motor	CO3	Understand
7	No load Test and Blocked Rotor Test on Three Phase Induction Motor	CO4	Analyzing
8	Separation of No-load losses of three phase induction motor	CO4	Analyzing
9	Load test on single phase induction motor	CO5	Understand
10	Study of starters for synchronous and induction motors	CO5	Remember

Total: 30 Periods

Ма	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)													
<u> </u>	POs											PSOs		
COS	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO 1	3	2	3		3							1		
CO 2	3	2	3		3							1		
CO 3	3	2	3		3							1		
CO 4	3	2	3		3							1		
CO 5	3	3 2 3 2 1												
		3-ł	ligh			2-Me	dium			1-L	.ow			

Summative Assessment											
					Practical	Final					
Bloom's Category	IAE-I (7.5)	IAE-II (7.5)	IAE-III (10)	Attendance [5]	Rubric based CIA [20Marks]	Examination (Theory) [50Marks]					
Remember	20	10	20		20	20					
Understand	30	20	30		20	40					
Apply		20			60	40					
Analyze											
Evaluate											
Create											

Passed in Board of Studies Meeting (24.02.2022)

Approved in Academic Council Meeting (09.03.2022)

Chairman - Board of Studies

20FF407	Instrum	pentation Engineering Laboratory	L	Т	Ρ	С
2022407	mətrun		0	0	2	1
Nature of C	Course	Professional Core				
Pre requisi	tes	Instrumentation laboratory				

The course is intended to

- 1. Understand basic principles of instrumentation and control systems
- 2. Understand calibration of measuring instruments for temperature
- 3. Apply calibration of measuring instruments of flow and speed measurement
- 4. Analyze the functioning of strain gauges for measuring pressure and vibration
- 5. Understand the software tool and simulation.

Course Outcomes

On successful completion of the course the students will be able to

CO. No	Course Outcome	Bloom's Level
CO 1	Illustrate the calibration of electrical equipments	Understanding
CO 2	Understand the construction and working of bridges	Understanding
CO 3	Predict the usage of LVDT and Strain Guage	Apply
CO 4	Analyze the pressure by using flow meter	Analyzing
CO 5	Understand the process of analog and digital converter	Understanding

S.No	List of Experiments	CO Mapping	Revised Blooms Taxonomy
1	Calibration of single phase energy meter	CO1	Analyzing
2	Measurement of DC resistance by Wheatstone and Kelvin Double Bridge	CO1	Understand
3	Measurement of Inductance using Maxwell's Bridge	CO2	Understand
4	Measurement of capacitance using Schering Bridge	CO2	Understand
5	Measurement of Displacement using LVDT	CO3	Understand
6	Measurement of pressure using strain gauge	CO3	Applying
7	Measurement of pressure using Flow.	CO4	Analyzing
8	Signal Conditioning Instrumentation Amplifier	CO4	Understand
9	Signal Conditioning Analog - Digital and Digital - Analog converters (ADC and DACs)	0.CO5	Analyzing
10	Study Experiment for MATLAB and Simulation Process	CO5	Understand

Total: 30 Periods

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Марр	Mapping of Course Outcomes (COs) with Programme Outcomes (POs) Programme Specific Outcomes (PSOs)															
COs		POs														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2		
CO 1	3	2	3		3							1				
CO 2	3	2	3		3							1				
CO 3	3	2	3		3							1				
CO 4	3	2	3		3							1				
CO 5	3	2	3		2							1				
		3-ŀ	ligh	•		2-Me	dium	•	1-Low							

	Summative Assessment													
		6												
					Practical	Final								
Bloom's Category	IAE-I (7.5)	IAE-II (7.5)	IAE-III (10)	Attendance [5]	Rubric based CIA [20Marks]	Examination (Theory) [50Marks]								
Remember	20	10	20		20	20								
Understand	30	20	30		20	40								
Apply		20			60	40								
Analyze														
Evaluate														
Create														

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20EE 401		L	Т	Ρ	С
ZULLAUI	FLEADTOWATION	1	0	0	1
Nature of	Employability Enhancement Course				
course	[]]				
Prerequisites	Fundamentals of Electrical Engineering				

Course Objectives

The course is intended to

- 1. Observe the fundamentals and real time project training with hardware implementation by usingPLC.
- 2. Predict the Logical operations of PLC.

Course Outcomes

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO1	Summarize the basics concept of Programmable Logic Circuits	Understan d
CO2	Simulate and develop the model by using PLC	Apply

Course Contents

UNIT-I PLC FUNDAMENTALS

PLC Fundamentals - (Block diagram of PLC's)Applications and Types of Transformers - Selection of PLC components(Power supply, CPU, I/O's List , Communication bus Various ranges available in PLC's) - I/O list selection - Open-Circuit and Short - Circuit Tests - Types of Inputs & outputs / Source Sink Concepts - Parallel Operation of Transformers - Wiring of the I/O devices - Architectural Evolution of PLC - Introduction to the field devices - Types of Inputs & outputs / Source Sink Concepts - Wiring of the I/O devices - Concept of flags and Scan cycle execution.

UNIT-II LOGICAL OPERATIONS OF PLC

Concept of flags and Scan cycle execution - Setting up PLCs / Connecting CPU, I/O modules, Rack,Backplane and Communication bus - Connecting Field devices to PLCs I/O's - Programming instructions arithmetic and logical - Load /and /or/out / and Read / Write - Compare / Add / Sub /And /Or – Blocks - Edge / trailing edge instructions - MOVE block application, Timer and Counter Blocks programming -Advanced instructions - File handling and Comment functions - Master control /set /reset function.

	Mapping of Course Outcomes(COs) with Programme Outcomes(POs) Programme Specific Outcomes (PSOs)																
COs	POs													PSOs			
	1	2	3	4	5	6	7	8	9	1	1	1	1	2	3		
										0	1	2					
CO1	2	3		2	3							2					
CO2	2	3		2	3							2					
	3 High 2						Medium 1					L					

Passed in Board of Studies Meeting (24.02.2022)

Bloom's Level	Summative	Summative Assessment (Internal Mode)										
	Assessment 1 (50Marks)	Assessment 2 (50Marks)										
Remember	10	10										
Understand	10	10										
Apply	30	30										
Analyze												
Evaluate												
Create												

20FF402	MATI AB DESIGN	L	Т	Ρ	С
ZULLAUZ		1	0	0	1
Nature of course	Employability Enhancement Course				
Prerequisites	Fundamentals of Electrical Engineering				

The course is intended to

- 1. Observe the fundamentals of MATLAB and SIMULINK.
- 2. Develop the model by using SIMULINK.

Course Outcomes

On successful completion of the course, students will be able to

CO. No	Course Outcome	Bloom's Level
CO1	Contrast the basics concept of MATLAB and SIMULINK	Understand
CO2	Simulate the model by using SIMULINK	Apply

Course Contents

Unit-I INTRODUCTION OF MATLAB and SIMULINK

Introduction to MATLAB - Historical Background Applications - Importance of MATLAB for Engineers-Features-SIMULINK - SIMULINK based circuit designing - Network model for various power systems -Smart and micro grid model - Hybrid filter, Harmonic Compensation - Unit commitment Calculator.

PRODUCT DESIGN BY USING SIMULINK Unit-II

Inverters and types like Z-Source Inverters, CSI,VSI, multilevel inverters - Converter and types like Luo converter, Soft switching converters - Sliding mode controller - Classical controllers - Fuzzy logic controller - Neural network controller - FACTS Devices - MATLAB interfacing with Embedded system (SIMULINK based load control).

	Mapping of Course Outcomes(COs) with Programme Outcomes(POs) Programme Specific Outcomes(PSOs)																
COs	POs													PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO1	2	3		2	3							2					
CO2	2	3		2	3							2					
	3 High 2						2 Medium 1					Lo	w				

Bloom's Level	Summative Assessment (Internal Mode)	
	Assessment 1 (50Marks)	Assessment 2 (50Marks)
Remember	10	10
Understand	10	10
Apply	30	30
Analyze		
Evaluate		
Create		

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