

VIVEKANANDHA



COLLEGE OF ENGINEERING FOR WOMEN

(An Autonomous Institution Affiliated to Anna University-Chennai Approved by AICTE – Accredited by NAAC and ISO 9001:2008 Certified) Elayampalayam , Tiruchengode – 637 205, Namakkal District, Tamilnadu.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.E- ELECTRICAL AND ELECTRONICS ENGINEERING (CURRICULUM & SYLLABUS -2019)



Applicable to the students admitted from the academic year 2021-2022 onwards

(Regulation 2019)

COLLEGE VISION

To impart value based education in Engineering and Technology to empower young women to meet the societal exigency with a global outlook.

COLLEGE MISSION

• To provide holistic education through innovative teaching-learning Practices

- To instill self confidence among rural students by supplementing with Co-curricular and extra-curricular activities
- To inculcate the spirit of innovation through training, research and Development
- To provide industrial exposure to meet the global challenges
- To create an environment for continual progress through lifelong learning

DEPARTMENT VISION

The Vision of Electrical and Electronics Engineering Department is to be a center of excellence in technical education and research by producing world-class graduates to meet future challenges of the country.

DEPARTMENT MISSION

The Mission of the Electrical and Electronics Engineering Department is

- To impart quality education to our students and provide a comprehensive understanding of Electrical & Electronics Engineering and produce a new generation of knowledgeable, skilled, innovative engineers.
- To stabilize the students to understand the responsibility as an engineer who prove to be good citizens having concern for society, environment and ethical issues.
- To evolve the student community to adapt appropriate sustainable technologies through remarkable contribution for rural needs.

PROGRAM EDUCATIONAL OBJECTIVES (PEO's)

PEO1: To provide students with the knowledge of Basic Sciences in general and Electrical and electronics Engineering in particular so as to acquire the necessary skills for analysis and synthesis of problems in generation, transmission and distribution.

PEO2: To provide technical knowledge and skills to identify, comprehend and solve complex tasks in industry and research and inspire the students to become future researchers / scientists with innovative ideas.

PEO3: To prepare the students for successful employment in various Industrial and Government organizations, both at the National and International level, with professional competence and ethical administrative acumen so as to handle critical situations and meet deadlines.

PEO4: To train the students in basic human and technical communication skills so that they may be good team-members, leaders and responsible citizen

PROGRAM SPECIFIC OUTCOMES (PSO's):

PSO 1. Basic Knowledge: Apply fundamental knowledge to identify, formulate, design and investigate various problems of electrical, electronic circuits and power systems.

PSO 2. Software Tools: Apply modern software tools for design, simulation and analysis of electrical systems to engage in life- long learning and to successfully adapt in multi-disciplinary environments.

PSO 3. Electrical Engineering Problem Solved: Solve ethically and professionally various Electrical Engineering problems in societal and environmental context and communicate effectively.

PSO 4. Understand Recent Technology: Ability to understand the recent technological developments in Electrical & Electronics Engineering and develop products/software to cater the societal & Industrial needs.

PROGRAM OUTCOMES (PO's)

PO1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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Programme	B.E. / B.Tech.		Progra	amme	e Code	e 1	02	Regula	tion	2019		
Department	ELECTRICAL AN ENGINEERING	D ELECTRON	NICS					Seme	ster	Ι		
	Applicable to the stu	CU dents admitted	RRICU from the	LUN e aca	I demic	: yea	ur 201	19 - 202	0 onwa	rds)		
Course	Course N	ame	Catego	ory	Per V	riods Veek	s /	Credit	Ma	ximum	Marks	
Code					CA	ESE	Total					
	THEORY											
U19MA101	Calculus*		BSC		3	1	0	4	40	60	100	
U19EN101	English For Commu	nication- I *	HSC		3	0	0	3	40	60	100	
U19CH105	Engineering Chemist	ary [@]	BSC		3	0	0	3	40	60	100	
U19CS101	Programming for Problem Solving*		ESC		3	0	0	3	40	60	100	
U19GE101	Engineering Graphic	s*	ESC		2	0	3	3	40	60	100	
		P	RACTIC	CAL								
U19CH106	Chemistry Laborate	ory [@]	BSC	0	0		4	2	60	40	100	
U19CS102	Computer Practices Laboratory*	Computer PracticesESC00Laboratory*00							60	40	100	
		MANDATORY COURSES										
	Mandatory course - I	Ι	MC	3	0		0	0	100	-	100	
	Total 20 420 380 800											

BSC - Basic Science Courses, ESC- Engineering Science Courses, PCC- Professional core courses, PEC- Professional Elective courses, OEC- Open Elective courses, MC- Mandatory courses,

HS- Humanities and Social Sciences, EEC- Employability Enhancement Courses, SI- Summer Industry Internship, PROJ-IT- Project, CA- Continuous Assessment, ESE - End Semester Examination. *Common for all branches

@ Common for ECE,EEE,BME

	VIVEKANANDI (Auto	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B.E		Programm	e Code		102	I	Regulation	I	2019	
Department	ELECTRICAI ENGINEERIN	AND ELECT	RONICS				·	Sei	mester	II	
	(Applicable to	the students admi	CURRIC tted from t	U LUM he acad	lemic y	vear 201	19–20	20 onward	ls)		
Course Code	Course	Name	Category	Peri	ods / V	Veek	Credi	t Max	imum N	Aarks	
				L	Т	ESE	Total				
THEORY											
U19MA202	2Linear Algebra and Ordinary Differential Equations *BSC31044060100										
U19EN202	English For Co II *	ommunication-	HSC	3	0	0	3	40	60	100	
U19PH207	Engineering Pl	Engineering Physics ^{\$}			0	0	3	40	60	100	
U19CS203	Python Program	mming	ESC	3	0	0	3	40	60	100	
U19GE202	Basic Civil and Engineering*	l Mechanical	ESC	3	0	0	3	40	60	100	
U19EE202	Electric Circui	t Theory	P C	3	0	0	3	40	60	100	
U19TA201	Heritage of Tam	nils [#] / தமிழர்மரபு	# HSC	2	0	0	1	40	60	100	
			PRACT	ICAL							
U19PH208	Physics Labora	atory ^{\$}	BSC	0	0	4	2	60	40	100	
U19GE203	Engineering Pr Laboratory*	ractices	ESC	0	0	4	2	60	40	100	
		MANDATORY COURSES									
	Mandatory cour	rse - I	MC	3	0	0	0	100	-	100	
	Total 23 460 440 900										
				Т	otal C	redits [#]	24	500	500	1000	

CA- Continuous Assessment, ESE - End Semester Examination.

* Common for all branches

\$ Common for ECE,EEE,BME

[#]Applicable to the students admitted from the academic year 2022-2023

	VIVEKANANDHA ((Autonomous) Elay	EN ai)	TÜVRheinland CERTIFIED	2 461 2015						
Programme	B.E	P	rogran	nme Code	102	Regulatio	n	2019		
Department	ELECTRICAL AND E ENGINEERING	ELECTRO	DNICS			Semest	er	III		
	(Applicable to the students	CUR admitted fr	RICUI	LUM e academic	year 2019	– 2020 o	nwards)			
Course Code	Course Name	Category		Periods / V	Veek	Credit	Max	imum N	Iarks	
course coue	Course raine	cutogory	L	Т	Р	C	CA	ESE	Total	
	THEORY									
U19MA303	Transforms and Partial Differential Equations*	BSC	3	1	0	4	40	60	100	
U19EE303	Analog Electronics	PCC	3	0	0	3	40	60	100	
U19EE304	Digital Logic Circuits	PCC	3	0	0	3	40	60	100	
U19EE305	Electromagnetic Fields	PCC	3	0	0	3	40	60	100	
U19EE306	Measurements and Instrumentation	PCC	3	0	0	3	40	60	100	
U19EE307	DC Machines and Transformers	PCC	3	0	0	3	40	60	100	
U19TA302	Tamils & Technology# / தமிழரும் தொழில்நுட்பமும்	# HSC	2	0	0	1	40	60	100	
		PRA	ACTIC	CAL						
U19EE308	Analog and Digital Electronics Laboratory	PCC	0	0	4	2	60	40	100	
U19EE309	DC Machines and TransformersPCC00426040100Laboratory									
	I	MANDAT	ORY	COURSE	S					
	Mandatory Course - III	MC	3	0	0	0	100		100	
		I	1	Tota	l Credit	23	460	440	900	
				Total	Credits [#]	24	500	500	1000	

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, PCC – Professional Core Courses, MC-Mandatory courses

* Common Syllabus for CSE, EEE, ECE, IT& BT

[#]Applicable to the students admitted from the academic year 2022-2023



(Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205



Programme	B.E	I	Programme C	Code	02	Regulation		2019		
Department	ELECTRICAL A	AND ELEC	CTRONICS	ENG	INEER	RING	S	emester	I	V
(Ap	plicable to the stu	udents adn	CURRIC	ULUI the ac	M ademic	e year 2	2019–20	20 onwa	rds)	
Course Code	Course Na	ame	Category	Peri	ods / V	Veek	Credit	Maxi	mum N	Iarks
	Course In		Category	L	Т	Р	С	CA	ESE	Total
			THEO	RY						
U19MA406	Numerical Met	hods	BSC	3	1	0	4	40	60	100
U19EE410	Linear Integrate Circuits	ed	PCC	3	0	0	3	40	60	100
U19EE411	AC Machines		PCC	3	0	0	3	40	60	100
U19EE412	Transmission a Distribution of Electrical Energy	nd gy	PCC	3	0	0	3	40	60	100
U19EE413	Control System	S	PCC	2	2	0	3	40	60	100
U19CS417	Data Structures		ESC	3	0	0	3	40	60	100
			PRACT	ICAL	4					
U19EE414	AC Machines Laboratory		PCC	0	0	4	2	60	40	100
U19EE415	Linear Integrate Circuits Labora	ed itory	PCC	0	0	4	2	60	40	100
		MA	ANDATORY		JRSES					
	Mandatory Cou	ırse - IV	MC	3	0	0	0	100		100
	•]	Fotal C	Credit	23	460	440	900

CA - Continuous Assessment, ESE - End Semester Examination, BSC - Basic Science Courses, PCC – Professional Core Courses, ESC- Engineering Science Courses, MC-Mandatory courses

	VIVEKANANDHA (Autonomous In Elay	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme	B.E	Programme C	Code		102]	Regulatio	on	2019				
Department	ELECTRICAL AN ENGINEERING	D ELECTRON	ICS				Semest	er	V				
(AI	oplicable to the studen	CURRI ts admitted from	CUL	U M acadei	nic yea	ar 2019–	2020 on	wards)					
Course	Course Norma	Catalog	Peri	ods /	Week	Credit	Max	kimum	Marks				
Code	Course Name	Category	L	Т	Р	С	CA	ESE	Total				
	THEORY												
U19EE516	Microprocessors and MicrocontrollersPCC30034060100Power System												
U19EE517	Power System Protection and Switchgear	3	40	60	100								
U19EE518	Power System Anal	ysis PCC	3	1	0	4	40	60	100				
U19EE519	Power Electronics	PCC	3	0	0	3	40	60	100				
	Professional Electiv	e-I PEC	3	0	0	3	40	60	100				
	Open Elective - I	OEC	3	0	0	3	40	60	100				
		PRAC	TICA	L									
U19EE520	Microprocessors and Microcontrollers Laboratory	1 PCC	0	0	4	2	60	40	100				
U19EE521	Control Systems and Instrumentation Laboratory	PCC	0	0	4	2	60	40	100				
		MANDATO	RYC	DURS	SES								
	Mandatory Course -	V MC	3	0	0	0	100		100				
	•		Т	otal C	Credit	23	460	440	900				

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses, PEC - Professional Elective Courses, OEC-Open Elective Courses, MC-Mandatory courses

	VIVEKANANDHA CO (Autonomous Institut Elayampa	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205Image: Coll of the second secon											
Programme	B.E	Programme	e Code	102		Regu	lation	2019					
Department	ELECTRICAL AND ELE ENGINEERING	CTRONIC	S			Seme	ester	V	Ι				
	(Applicable to the students a	CURRI dmitted from	CULUN	M ademic	year 20	19– 2020	onwards	5)					
Course Code	Course Name	Category	Peri	ods / W	leek	Credit	Max	imum M	arks				
Course Code	Course rvanie	Category	L	Т	Р	С	CA	ESE	Total				
	THEORY												
U19EE622	Generation of Electrical EnergyPCC30034060100												
U19EE623	Power System Operation and Control	PCC	3	1	0	4	40	60	100				
U19HS603	Principle of Management	HSC	3	0	0	3	40	60	100				
	Professional Elective-II	PEC	3	0	0	3	40	60	100				
	Open Elective-II	OEC	3	0	0	3	40	60	100				
		PRAC	TICAL										
U19EE624	Power Electronics Laboratory	PCC	0	0	4	2	60	40	100				
U19EE625	Power System Simulation Laboratory	PCC	0	0	4	2	60	40	100				
	N	IANDATO	RY CO	URSES									
	Mandatory Course - VI	MC	3	0	0	0	100		100				
	Total Credit 20 420 380 800												

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses , HSC - Humanities and Social Science Courses, PEC - Professional Elective Courses, OEC-Open Elective Courses, MC-Mandatory courses

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme	B.E P	Programme C	Code			102 Reg	gulation	2019				
Department	ELECTRICAL AND ELEC ENGINEERING	CTRONICS				Semester		VII				
	CURRICULUM (Applicable to the students admitted from the academic year 2019–2020 onwards)											
0 0 1			Pe	riods / V	Veek	Credit	Maxi	mum M	Iarks			
Course Code	Course Name	Category	L	Т	Р	С	CA	ESE	Total			
	THEORY											
U19HS704	Total Quality Management	Fotal Quality ManagementHSC30034060										
U19EE726	Digital Signal Processing	PCC	3	0	0	3	40	60	100			
U19EE727	Embedded System	PCC	3	0	0	3	40	60	100			
	Professional Elective-III	PEC	3	0	0	3	40	60	100			
	Open Elective-III	OEC	3	0	0	3	40	60	100			
		PRACT	ICAL									
U19EE728	Embedded System Laboratory	PCC	0	0	4	2	60	40	100			
U19EE729	Internship Training and Mini ProjectEEC0084100-											
	MA	ANDATORY	Y COI	URSES								
	Mandatory Course - VII	MC	3	0	0	0	100		100			
			•	Total	Credit	21	460	340	800			

CA - Continuous Assessment, ESE - End Semester Examination, PCC – Professional Core Courses , HSC - Humanities and Social Science Courses, PEC - Professional Elective Courses , EEC - Employability Enhancement Courses, OEC-Open Elective Courses, MC-Mandatory courses

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Comparison of Comparison											
Programme	B.E	Programme (Code		102	Regulati	on	2019				
Department	ELECTRICAL AND EL ENGINEERING	ECTRONICS	5			Seme	ster	VIII				
	CURRICULUM (Applicable to the students admitted from the academic year 2019–2020 onwards)											
Course Code	Course Nome	Catagory	Pe	riods / Y	Week	Credit	Max	mum M	larks			
Course Code	Course Maine	Course Name Category Periods / Week Credit Maximu L T P C CA E							Total			
		THE	ORY									
	Professional Elective-IV	PEC	3	0	0	3	40	60	100			
	Professional Elective-V	PEC	3	0	0	3	40	60	100			
		PRACT	FICAL	4								
U19EE830	Project Work & Viva voo	e EEC	0	0	12	6	60	40	100			
	MAI	NDATORY C	OURS	SES								
	Mandatory Course - VI	II MC	3	0	0	0	100		100			
	Total Credit 12 240 160 400											

CA - Continuous Assessment, ESE - End Semester Examination, PEC - Professional Elective Courses, EEC - Employability Enhancement Courses, OEC-Open Elective Courses

Cumulative Course Credit: 165 Cumulative Course Credit: 167[#]

[#] Applicable to the students admitted from the academic year 2022-2023

PROFESSIONAL ELECTIVE COURSES:VERTICALS

S.No	Sustainable Energy System (VERTICAL- 1)	Converters & Electric Drives (VERTICAL- 2)	Instrumentation & Control (VERTICAL- 3)
1	U19EEV11 HVDC Transmission System	U19EEV21 Solid State Drives	U19EEV31-Communication Engineering
2	U19EEV12 Power Quality in Power Systems	U19EEV22 Special Electrical Machines	U19EEV32-Computer Architecture
3	U19EEV13 Restructure power system	U19EEV23 Electrical and Hybrid Vehicles	U19EEV33-Intelligence Techniques
4	U19EEV14 Smart Grid Technologies	U19EEV24 Design of Electrical Apparatus	U19EEV34-Bio Medical Instrumentation
5	U19EEV15 Flexible AC Transmission Systems	U19EEV25 Wind and Solar Energy Systems	U19EEV35-Robotics and Control
6	U19EEV16 Utilization of Electrical Energy	U19EEV26 Advanced Electric Drives	U19EEV36-Modern Control Theory
7	U19EEV17 EHV AC And DC Transmission	U19EEE27 Industrial Electrical Systems	U19EEV37-PLC & SCADA
8	U19EEV18 Static Relays	U19EEV28 Power Switching Converters	U19EEV38-Intellectual Property Rights

VERTICAL I

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	VIVEKAN (Autonomous II	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	B.E	Programm	ne Code	102				Regula	tion 2()19		
Department	ELECTRICAL ENGINEERIN	AND ELECTR G	RONICS					Seme	ester	•	-	
CURRICULUM (Applicable to the students admitted from the academic year 2021- 2022 onwards)												
Course Code	Course Name		Perio	ods / W	/eek	Credit	Max	timum	Marks			
			8	5	L	Т	Р	С	CA	ESE	Total	
		THEORY										
U19EEV11	HVDC Transm	ission System		PEC	3	0	0	3	40	60	100	
U19EEV12	Power Quality i	in Power Syster	ms	PEC	3	0	0	3	40	60	100	
U19EEV13	Restructure pov	ver system		PEC	3	0	0	3	40	60	100	
U19EEV14	Smart Grid Tec	hnologies		PEC	3	0	0	3	40	60	100	
U19EEV15	Flexible AC Tra	ansmission Sys	stems	PEC	3	0	0	3	40	60	100	
U19EEV16	Utilization of E	lectrical Energ	у	PEC	3	0	0	3	40	60	100	
U19EEV17	EHV AC And I	DC Transmissio	on	PEC	3	0	0	3	40	60	100	
U19EEV18	Static Relays			PEC	3	0	0	3	40	60	100	

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VERTICAL II

	VIVEKAN (Autonomous Ir	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	B.E	Programm	ne Code	102				Reg	gulation	2019		
Department	ELECTRICAL ENGINEERIN	AND ELECTR G	RONICS					Se	emester	-		
CURRICULUM (Applicable to the students admitted from the academic year 2021- 2022 onwards)												
Course Code	Course Name		ods / W	Veek	Cred	lit M	aximum	Marks				
Course Code	Course runne		Culogo	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	L	Т	Р	С	C	A ESE	Total	
			TH	EORY								
U19EEV21	Solid State Driv	Solid State Drives			3	0	0	3	40	60	100	
U19EEV22	Special Electric	al Machines		PEC	3	0	0	3	40	60	100	
U19EEV23	Electrical and H	Iybrid Vehicles	8	PEC	3	0	0	3	40	60	100	
U19EEV24	Design of Elect	rical Apparatus	8	PEC	3	0	0	3	40	60	100	
U19EEV25	Wind and Solar	Energy Syster	ns	PEC	3	0	0	3	40	60	100	
U19EEV26	Advanced Elect	Advanced Electric Drives			3	0	0	3	40	60	100	
U19EEE27	Industrial Elect	dustrial Electrical Systems			3	0	0	3	40	60	100	
U19EEV28	Power Switchin	g Converters		PEC	3	0	0	3	40	60	100	

VERTICAL III

	VIVEKAN (Autonomous In	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205 B E Programme Code 102 Regulation 2019											
Programme	B.E	Programm	ne Code	102				Regu	lation	2019			
Department	ELECTRICAL ENGINEERIN	AND ELECTE G	RONICS					Sen	nester	-			
CURRICULUM (Applicable to the students admitted from the academic year 2021- 2022 onwards)													
Course Code	Course Name		Catego	rv	Perio	ods / W	Veek	Credit	M	aximum	Marks		
		7			L	Т	Р	С	CA	A ESE	Total		
	THEORY									· · · · · ·			
U19EEV31	Communication	Engineering		PEC	3	0	0	3	40	60	100		
U19EEV32	Computer Archit	ecture		PEC	3	0	0	3	40	60	100		
U19EEV33	Intelligence Tech	nniques		PEC	3	0	0	3	40	60	100		
U19EEV34	Bio Medical Inst	rumentation		PEC	3	0	0	3	40	60	100		
U19EEV35	Robotics and Co	ntrol		PEC	3	0	0	3	40	60	100		
U19EEV36	Modern Control Theory			PEC	3	0	0	3	40	60	100		
U19EEV37	PLC & SCADA		PEC	3	0	0	3	40	60	100			
U19EEV38	Intellectual Prope	erty Rights		PEC	3	0	0	3	40	60	100		

OPEN ELECTIVE (OE) OFFERED DETAILS OF OPEN ELECTIVE (OE) FOR UG COURSE

	Course Name	Perio	ds / V	Veek	Credit	Maximum Marks		
Course Code	Course Name	L	Т	Р	С	CA	ESE	Total
U19EEOE1	Electron Devices	3	0	0	3	40	60	100
U19EEOE2	Electrical Safety	3	0	0	3	40	60	100
U19EEOE3	Energy Auditing	3	0	0	3	40	60	100
U19EEOE4	Energy Storage Technologies	3	0	0	3	40	60	100
U19EEOE5	Biomass Energy Systems	3	0	0	3	40	60	100
U19EEOE6	Energy Efficient Lighting System	3	0	0	3	40	60	100
U19EEOE7	Soft Computing techniques	3	0	0	3	40	60	100
U19EEOE8	Electrical Systems in industry	3	0	0	3	40	60	100

MANDATORY COURSE

Course Code	Course Name	Perio	ds / V	Veek	Credit	Maximum Marks			
		L	Т	Р	С	CA	ESE	Total	
U19MCFY1	Environmental Science and Engineering	3	0	0	0	100	-	100	
U19MCFY2	Indian Constitution and Universal Human values	3	0	0	0	100	-	100	
U19MCSY3	Numerical Ability	3	0	0	0	100	-	100	
U19MCSY4	Verbal Ability	3	0	0	0	100	-	100	
U19MCTY5	Logical Reasoning	3	0	0	0	100	-	100	
U19MCTY6	Personality Development	3	0	0	0	100	-	100	
U19MCFY7	Comprehension on Electricity-Theory and Practice-I	3	0	0	0	100	-	100	
U19MCFY8	Comprehension on Electricity-Theory and Practice-II	3	0	0	0	100	-	100	





(AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

DEPARTMENT OF INFORMATION TECHNOLOGY

MINOR DEGREE - INTERNET OF THINGS & CLOUD COMPUTING

Course	Course Name	Catalogue	Peri	ods /	Week	Credit	Max	imum 🛛	Marks
Code	course rvame	Category	L	Т	Р	С	CA	ESE	Total
		THEORY							
U19CSV41	Embedded Systems	PEC	3	0	0	3	40	60	100
U19CSV42	Smart Sensor Technologies	PEC	3	0	0	3	40	60	100
U19CSV43	Security in Computing	PEC	3	0	0	3	40	60	100
U19ITV41	Software Defined Networks	PEC	3	0	0	3	40	60	100
U19CTV41	Fundamentals of Virtualization	PEC	3	0	0	3	40	60	100
U19ITV42	Information Storage and Management	PEC	3	0	0	3	40	60	100
U19CTV43	Big Data Tools and Techniques	PEC	3	0	0	3	40	60	100
U19ITV43	Cloud Computing	PEC	3	0	0	3	40	60	100





(AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

MINOR DEGREE - VERTICAL - CYBER SECURITY

Course	Course Name	Category	Periods / Week			ds / Week Credi Maximu			Marks
Code				Т	Р	С	CA	ESE	Total
		THEORY							
U19CSV21	Information Security	PEC	3	0	0	3	40	60	100
U19CSV22	Cyber Security	PEC	3	0	0	3	40	60	100
U19CSV23	Cryptography and Network Security	PEC	3	0	0	3	40	60	100
U19CSV24	Cyber Law and Ethical Hacking	PEC	3	0	0	3	40	60	100
U19CSV25	Social Network Analysis	PEC	3	0	0	3	40	60	100
U19CSV26	Semantic Web	PEC	3	0	0	3	40	60	100
U19ITV23	Cyber Forensics #	PEC	3	0	0	3	40	60	100
U19CTV23	Biometrics Systems [#]	PEC	3	0	0	3	40	60	100





(AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI) DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MINOR DEGREE - VERTICAL - INSTRUMENTATION & CONTROL

Course	Course Name	Category	Peri	iods /	Week	Credi t	Maximum Marks		
Code		Category		Т	Р	С	CA	ESE	Total
THEORY									
U19EEV31	Communication Engineering	PEC	3	0	0	3	40	60	100
U19EEV32	Computer Architecture	PEC	3	0	0	3	40	60	100
U19EEV33	Intelligence Techniques	PEC	3	0	0	3	40	60	100
U19EEV34	Bio Medical Instrumentation	PEC	3	0	0	3	40	60	100
U19EEV35	Robotics and Control	PEC	3	0	0	3	40	60	100
U19EEV36	Modern Control Theory	PEC	3	0	0	3	40	60	100
U19EEV37	PLC & SCADA	PEC	3	0	0	3	40	60	100
U19EEV38	Intellectual Property Rights	PEC	3	0	0	3	40	60	100





(AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MINOR DEGREE - VERTICAL - ELECTRONICS ENGINEERING AND ADMINISTRATION SYSTEM

Course Code	Course Name	Catagory	Per	iods /	Week	Credit	Max	Marks	
		Category	L	Т	Р	С	CA	ESE	Total
		THEORY							
U19ECV71	Pattern Recognition	PEC	3	0	0	3	40	60	100
U19ECV72	Medical Electronics	PEC	3	0	0	3	40	60	100
U19ECV73	Remote Sensing	PEC	3	0	0	3	40	60	100
U19ECV74	Automotive Electronics	PEC	3	0	0	3	40	60	100
U19ECV75	Industry 4.0	PEC	3	0	0	3	40	60	100
U19ECV76	Digital Video Processing	PEC	3	0	0	3	40	60	100
U19ECV77	Principles of Public Administration	PEC	3	0	0	3	40	60	100
U19ECV78	Administrative Theories	PEC	3	0	0	3	40	60	100
U19ECV79	Indian Administrative System	PEC	3	0	0	3	40	60	100



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)



DEPARTMENT OF BIOTECHNOLOGY

Course	Course Name	Perio	ds / V	Veek	Credit	Max	ximum]	Marks
Code	Course Maine	L	Т	Р	С	CA	ESE	Total
U19BTV21	Principles of Management	3	0	0	3	40	60	100
U19BTV22	Bio-Entrepreneurship	3	0	0	3	40	60	100
U19BTV23	Industrial Biosafety	3	0	0	3	40	60	100
U19BTV24	Bioethics & IPR	3	0	0	3	40	60	100
U19BTV25	Bioindustries & Entrepreneurship	3	0	0	3	40	60	100
U19BTV26	Total Quality management	3	0	0	3	40	60	100
U19BTV27	Audit and Regulatory Compliance	3	0	0	3	40	60	100
U19BTV28	Biobusiness	3	0	0	3	40	60	100
U19BTV29	Resource Management & Lean Start- up Management	3	0	0	3	40	60	100

MINOR DEGREE - VERTICAL - ENTREPRENEURSHIP



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)



DEPARTMENT OF BIOMEDICAL ENGINEERING

Course	Course Name	Perio	ds / V	Veek	Credit	Ma	Maximum Marks		
Code		L	Т	Р	С	CA	ESE	Total	
U19BMV61	Clinical Engineering	3	0	0	3	40	60	100	
U19BMV62	Hospital Planning and Management	3	0	0	3	40	60	100	
U19BMV63	Medical Waste Management	3	0	0	3	40	60	100	
U19BMV64	Economics and Management for Engineers	3	0	0	3	40	60	100	
U19BMV65	Bio Statistics	3	0	0	3	40	60	100	
U19BMV66	Forensic Science in Healthcare	3	0	0	3	40	60	100	
U19BMV67	Medical Expert Systems	3	0	0	3	40	60	100	
U19BMV68	Medical Informatics	3	0	0	3	40	60	100	

MINOR DEGREE - VERTICAL - HEALTHCARE MANAGEMENT



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI)



DEPARTMENT OF COMPUTER SCIENCE AND TECHNOLOGY

MINOR DEGREE - VERTICAL - ARTIFICIAL INTELLIGENCE

Course	Course Name	Category		Period Weel	s / K	Credit	Maximum Marks			
Code		Cutogory	L	Т	Р	С	CA	ESE	Total	
U19CTV31	Pattern Recognition Techniques	PEC	3	0	0	3	40	60	100	
U19CTV32	Deep Learning	PEC	3	0	0	3	40	60	100	
U19CTV33	Business Intelligent and its Analytics	PEC	3	0	0	3	40	60	100	
U19CTV34	Data Visualization	PEC	3	0	0	3	40	60	100	
U19CTV35	Natural Language Processing	PEC	3	0	0	3	40	60	100	
U19CTV36	Neuro Fuzzy and Genetic Programming	PEC	3	0	0	3	40	60	100	
U19CTV37	Knowledge Based Decision Support System	PEC	3	0	0	3	40	60	100	
U19ITV31	Data Science	PEC	3	0	0	3	40	60	100	

	VIVE	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme	B.E	Programme Code	101]	Regulation	n	20	19				
Department	COMPU	COMPUTER SCIENCE ENGINEERING Semester -											
	(Applicab	CURRICULUM oplicable to the students admitted from the academic year 2019- 2020 onwards)											
LIST OF OPEN ELECTIVES													
Course Code		Course	Hours	/Wee	k	Credit	Max	kimum Ma	arks				
		Name	L	Т	Р	С	CA	ESE	Total				
U19CSOE1	Introductio	n to IOT	3	0	0	3	40	60	100				
U19CSOE2	Ethical Had	cking	3	0	0	3	40	60	100				
U19CSOE3	Smart Sens	or Technologies	3	0	0	3	40	60	100				
U19CSOE4	Web Desig	ning	3	0	0	3	40	60	100				
U19CSOE5	Data Analy	vtics	3	0	0	3	40	60	100				
U19CSOE6	Enterprise	Java	3	0	0	3	40	60	100				
U19CSOE7	Open Sour	en Source Software 3 0 0 3 40 60 100							100				
U19CSOE8	Python Pro	gramming	3	0	0	3	40	60	100				

Signature of the BOS chairman, EEE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										ISO 9001-2015
Programme	B.E		Programme	Code	107			Regulat	ion	2019	
Department	COMPUTER	MPUTER SCIENCE AND TECHNOLOGY Semester									-
	(Applicable to the	students a	CURRICUL dmitted from the	UM acade	mic ye	ar 20)19- 2()20onwar	ds)		
		LIS	T OF OPEN EI	LECT	IVES						
Course Code	Course Name			Но	urs /We	ek		Credit	M	aximum	Marks
					L	Т	Р	С	CA	ESE	Total
U19CTOE1	Fundamentals of A	Artificial I	ntelligence		3	0	0	3	40	60	100
U19CTOE2	Fundamentals of I	Informati	on Security		3	0	0	3	40	60	100
U19CTOE3	Fundamentals of I	Data Scien	ce		3	0	0	3	40	60	100
U19CTOE4	Fundamentals of M	lamentals of Machine Learning					0	3	40	60	100
U19CTOE5	Fundamentals of I	amentals of Data Visualization					0	3	40	60	100
U19CTOE6	Computer Forensi	ics			3	0	0	3	40	60	100

		EKANANDHA COLLEGE (Autonomous Institution Affili Elayampalayam, Tiruche	EN	TÜVRehand CERTIESD								
Programme	B.Tech.	Programme Code	104			Regulation	L	2019				
Department	INFORM	ATION TECHNOLOGY					-					
	(Applical	CUI ble to the students admitted	RRICULU from the a	J M caden	nic yea	ar 2019- 2	020 onv	vards)				
		LIST OF C	PEN ELI	ECTI	VES							
Course Code	Cou	Course Name Hours /Week Credit Maximum Marks										
Course Code	Cou	ise maine	L	Т	Р	C	CA	ESE	Total			
U19ITOE1	Mobile app	lication development	3	0	0	3	40	60	100			
U19ITOE2	Robotics		3	0	0	3	40	60	100			
U19ITOE3	Basics of C	loud Computing	3	0	0	3	40	60	100			
U19ITOE4	Introduction	n to Data Structures	3	0	0	3	40	60	100			
U19ITOE5	Cyber Secu	rity	3	0	0	3	40	60	100			
U19ITOE6	Information	n Technology Essentials	3	0	0	3	40	60	100			
U19ITOE7	Business in Application	telligence and its	3	0	0	3	40	60	100			
U19ITOE8	Internet of '	Things	3	0	0	3	40	60	100			
U19ITOE9	Introduction	n to Java Programming	3	0	0	3	40	60	100			
U19ITOE10	Introduction	n to R Programming	3	0	0	3	40	60	100			
U19ITOE11	Ethical Hac	king	3	0	0	3	40	60	100			
U19ITOE12	Cyber Fore	nsics	3	0	0	3	40	60	100			
U19ITOE13	E Learning	Techniques	3	0	0	3	40	60	100			

	VIVEKANANDHA Co (Autonomous Insti Elayampalaya	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205													
Programme	B.E.,		2019												
Department	ELECTRONICS AND CO ENGINEERING	MMUNICA		Seme	ester	(EL	OPEN ELECTIVE								
		LIST OF	OPEN	ELE	CTIV	E									
Course Course Name Category Periods / Week Credit Maximum Marks															
Code	Course Name	Category	L	Т	Р	С	СА	ESE	Total						
		OPEN	ELEC	CTIVE	E-I				·						
U19ECOE1	Speech Processing	OE	3	0	0	3	40	60	100						
U19ECOE2	Biomedical Instrumentation	OE	3	0	0	3	40	60	100						
U19ECOE3	Automotive Electronics	OE	3	0	0	3	40	60	100						
		OPEN	ELEC	TIVE	-II										
U19ECOE4	Satellite Communication	OE	3	0	0	3	40	60	100						
U19ECOE5	VLSI Design and Its Applications	OE	3	0	0	3	40	60	100						
U19ECOE6	Digital Image Processing	OE	3	0	0	3	40	60	100						
		OPEN E	LECI	IVE-	III										
U19ECOE7	Basics of Communication Systems	OE	3	0	0	3	40	60	100						
U19ECOE8	Wireless Sensor Networks	OE	3	0	0	3	40	60	100						
U19ECOE9	PCB Design and Fabrication	OE	3	0	0	3	40	60	100						

	VIVEKANANDHA COLLI (Autonomous Institution Elayampala	EGE OF EN a, Affiliated yam, Tirucho	IGINE to Ann engode	E ERI a Un e – 63	NG F iversi 37 205	T OR WO	MEN ai)	TÜVRheidand CERTIFIED	0 9001-2015					
Programme	B.E.	B.E. Programme Code 106 Regulation												
Department	ment BIOMEDICAL ENGINEERING Semester													
	(UM											
		F OPEN EI			,									
General Contraction of the second sec														
Course Code	Course Name	Category	L	Т	Р	С	CA	ESE	Total					
	OP	EN ELECT	IVE-	[1			1						
U19BMOE1	Biotelemetry	OE	3	0	0	3	40	60	100					
U19BMOE2	Virtual Instrumentation	OE	3	0	0	3	40	60	100					
U19BMOE3	Hospital Waste Management	OE	3	0	0	3	40	60	100					
	OP	EN ELECT	IVE-I	I										
U19BMOE4	Medical Robotics	OE	3	0	0	3	40	60	100					
U19BMOE5	Healthcare Management Systems	OE	3	0	0	3	40	60	100					
U19BMOE6	Biometric Systems and Their Applications	OE	3	0	0	3	40	60	100					
	OPI	EN ELECT	IVE-II	I										
U19BMOE7	Basics of Biomedical Instrumentation	OE	3	0	0	3	40	60	100					
U19BMOE8	Medical Informatics	OE	3	0	0	3	40	60	100					
U19BMOE9	ICU and Operation Theatre Equipments	OE	3	0	0	3	40	60	100					
	·			·										

	VIVEKANA (Autonor E	NDHA COLLEGE OF nous Institution Affiliate layampalayam, Tirucher	ENGINE d to Anna 1gode – 63	E RIN Univ 7 205	I G FO ersity, 5	R WOM Chennai	IEN)	TÜVRheinland CERTIFIED	9 901 2015 U SAND U				
Programme	B.Tech.	ion	2019										
Department	BIOTECHNOI	LOGY			Seme	ster	-						
	(Applicable to	CURR the students admitted fro	lemic	e year2	019- 202	20onwa	rds)						
LIST OF OPEN ELECTIVES													
Course Code Course Name Hours /Week Credit Maximum Marks													
			L	Т	Р	C	CA	ESE	Total				
		OPEN EI	LECTIVE	-I									
U19BTOE1	Biology for En	gineers	3	0	0	3	40	60	100				
U19BTOE2	Biofuels and B	io energy	3	0	0	3	40	60	100				
U19BTOE3	Bio-Business		3	0	0	3	40	60	100				
		OPEN EL	ECTIVE-	-II									
U19BTOE4	Basics of Bioin	formatics	3	0	0	3	40	60	100				
U19BTOE5	Human Health	and Nutritional Disorder	·s 3	0	0	3	40	60	100				
U19BTOE6	Waste Manager	ment	3	0	0	3	40	60	100				
		OPEN EL	ECTIVE-	III									
U19BTOE7	Food Processin Technology	g and Preservation	3	0	0	3	40	60	100				
U19BTOE8	Forensic Techn	ology	3	0	0	3	40	60	100				
U19BTOE9	Biodiversity an	d Bioprospecting	3	0	0	3	40	60	100				

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P	rogram	me	B.E.				Pro	gramm	e Code	102	R	legula	tion		2019	
Ľ	Departm	ent	ELECT ENGIN	FRICA	L & E NG	LECTI	RONIC	S			n	Seme	ester		Ι	
Cou	rse Coo	le		Course	Name		Perio I	ds Per	Week P	Credit			Maxir	num Ma	arks Tot	a1
U19	PMA10	1	Calcul	1S *			3	1	0	4		60		40	100)
C Ot	Course Provide the information about Review of limits, continuity and differentiability. Understand maxima and minima of functions of two variables. Demonstrate Integral calculus. Identify the problems based on area, surface and volume. To recognize the Second order linear differential equations. 															
At the end of the course, the student should be able to, Knowledge level																
C Ot	Course OutcomeAt the end of the course, the student should be able to,Knowledge levelC01:ApplyMean value theorem and Taylor's theorem.K1,K3C02: Analyze Total derivative.K2,K4C03: Formulate Reduction Formulae.K3,K5C04: Translate Change of order of integration.K2,K5C05: Apply method of variation of parameters.K3,K5															
Pre-r	equisit	es	-													
	CO / PO Mapping CO/PSO (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak Mapping															
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO 12	PSO 1	PSO 2	PSO	PSO
CO 1	3	3								10	11	14	2	2	5	-
CO 2 CO 3	3	3											2			
CO 4	3	3											2			
CO 5	3	3											2			
Cours	se Asse	ssmei	nt Metho	ods												
Direc	t															
1 2 3	. Cont . Assig . End-	inuou gnme Seme	is Assess nt. ester exai	ment T	est I, II ns	&III										
Indir	ect															
1	. Cour	rse – e	end surve	ey												
Content of the syllabus																
U	Unit – I DIFFERENTIAL CALCULUS Periods 12															
Lim theore Minin ofradi	Unit - 1DIFFERENTIAL CALCULUSPeriods12Limit, continuity, differentiability, rules of differentiation, differentiation of various functions, Rolle''s theorem(excludingproof), Meanvaluetheorem(excludingproof), Taylor's theorem(excludingproof), Maxima and Minima, Physical Applications (Newton's law of cooling – Heat flow problems, Rate of decay ofradioactivematerials–Chemical reactions and solutions, Ohm's law, Kirchoff's law-Simple electric circuit problems)12															

Unit -	II FUNCTIONS OF SEVERAL VARIABLES	Periods	12
Partialdiffe	rentiation-HomogeneousfunctionsandEuler"stheorem(excludingproductionsandEuler"stheorem(excludingprod	oof)–Totalderi	vative-
Changeofy	ariables-Jacobians-Partialdifferentiationofimplicitfunctions-Tayl	or"sseriesforfu	nctions of two
variables(e	xcluding proof) – Maxima and minima of functions of two variabl	es.	10
	II INTEGRAL CALCULUS	Periods	
Riemann in	ntegral-Fundamental theorem of calculus(excluding proof) - method	ods of integrat	ion (Integrationby
parts, ring	π	π	s by partial
		$\overline{2}$	
fraction, Ir	tegration of irrational functions) -Reduction formula on $\int_{0}^{\infty} \cos^{n} x dx$	$\int_{0}^{\infty} \sin^{n} x dx$.	
Unit - I	V MUTIPLE INTEGRALS	Periods	12
Double int	egrals – Change of order of integration – Double integrals in polar	coordinates -	Area enclosed by
plane curv	es – Triple integrals – Volume of solids – Change of variables in d	ouble and trip	e integrals.
Unit –	V ORDINARY DIFFERENTIAL EQUATIONS	Periods	12
Secondord	erLinearordinarydifferentialequationswithconstantcoefficients, Cau	chy ^s -Euler	the defension of
equations()	excluding proof)- Legendre's Linear differential equations(excludi	ng proof) - Me	ethod of variation of
parameters	·,	Total Periods	60
Text Book	S		
1.	Stewart, J. Calculus: Early Transcendentals (8th Edition), Cengag	e Learning, 20)15.
2	Grewal B.S., "Higher Engineering Mathematics", Khanna Publis	hers, New Del	hi, 43rd Edition,
۷.	2014.		
Reference	S		
1.	Kreyszig E, Advanced Engineering Mathematics (10 th Edition),	John Wiley (2	015).
2.	Boyce W E and DiPrima R, Elementary Differential Equations (9	9 th Edition), Jo	hn Wiley (2005).
3.	Nishant Shukla, Elementary Integral Calculus		
4.	Anton H, Calculus: Early Transcendentals, 10th Edition, Wiley (2012).	
5.	B V Ramana, Higher Engineering Mathematics, Tata McGraw H Delhi (2012)	ill Education I	Pvt Ltd., New
E-Resourc	es		
1.	https://freevideolectures.com > All Courses > Calculus > UCLA		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

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Pro	gramme	;	B.E.	Pı	rogram	me Coo	le			102	2	Regula	ation			2019
Dep	partment	t	ELECT ENGIN		AL & I ING	ELECI	RON	ICS			ľ	Sem	ester			I
Co	urse Co	de		Cours	e Nam	e	Peri L	ods Pe	r Weel P	Cre	edit C		Maxim CA	um Ma	rks ESE	Total
U19	9EN101	E	English f	or Cor	nmunic	cation –	I 3	0	0	3	3		60		40	100
Cor Obje	urse ective		 make learners listen to audio files and replicate it in speaking contexts. Make learners read widely in order to practice writing Make learners develop vocabulary and strengthen grammatical understanding Assist students in the development of intellectual flexibility, creativity, and cultural literacy so that they may engage in life-long learning. Identify and begin to apply the language features of academic and professional writing and speaking 													
	Identify and begin to apply the language features of academic and professional writing and speaking At the end of the course, the student should be able to Knowledge level															
			At the end of the course, the student should be able to,Knowledge levelCO1: Speak adequately from the inputs they gained through listeningK1 K3													
Cou	urse		CO1 : Speak adequately from the inputs they gained through listening. K1,K3													
Out	come	r	CO2: Write appropriately based on the knowledge gained through K2,K4													
		C	reading of a variety of materials													
		k	nowled	ve abo	out usi	ng right	word	at the	right co	ntext		uon u	na then	ŀ	K3,K5	
		Ċ	CO4: Lis	ten the	e accen	ts and t	tones o	f the la	anguag	e prot	perly	/.		ŀ	K2.K5	
		C	CO5:Co	mpreh	end ar	nd retai	n the	contex	tual ar	d syr	ıtax	under	standing	т	70 IZE	
		f	rom rea	ding.						•			C	1	13,15	
Pre-1	requisit	es	-													
				(CO / PO) Mapp	ing						CC	/PSO		
(3/2	2/1 indica	ates s	trength o	of corre	elation)	3-Stron	g, 2 – N	<i>l</i> edium	, 1-Wea	ık			Ma	pping		
COs			Progra	nme O	utcome	s (POs)				PO	DO	PO	PSO	PSOs PSO	PSO	PSO
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	10	11	12	1	2	3	4
CO 1						2			3	3		3	3	_		
CO_2						2			3	3		3	3			
CO 4						2			3	3		3	3			
CO 5						2			3	3		3	3			
	• I				•	ı I			l I							
Cour	rse Asses	ssme	nt Meth	ods												
Direc	et															
1	. Cont	inuo	us Asses	sment	Test I,	II & III										
$\begin{vmatrix} 2 \\ 2 \end{vmatrix}$. Assig	gnme Sorre	ent: Sim	ilation	using t	tool										
India	ect	sem	ester exa	minat	IOIIS						_					
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Unit - I Periods 9 Listening-Introduction to Different Types of Listening, Listening to Casual Onversations, Speaking-Introduction, and TechnicalManuals.WritingIntroductiontowritingstrategies, WritingDefinitions, FocusonLanguage- Technicalterns (Jargon), Word Formation with Perfixes and Suffixes, Using Active Voice and Passive Voice, Basis sentence patterns, Tenses (past, present, perfect and continuous tenses). Periods 9 Unit - II Periods 9 1 Sentence patterns, Tenses (past, present, perfect and continuous tenses). Periods 9 Unit - III Listening to lectures, listening to description of equipment, Speaking- Strategies for Developing Conversational Skills, Short Conversations through Role Play Activities, ReadingReading Comprehension, Reading e-mails, Reading Headlines, Predicting the Content, Writing, Note making, Writing Descriptions, Focus on Language - Collocations, Functional Use of Tenses, Subject - verb agreement. Periods 9 Unit - III Listening - Listening to different kinds of interviews (Face - to - face, radio, TV and telephone interviews), Speaking Describting an Object, Asking Questions, Participating in Discussions ReadingReading passages for gist. Writing- Informal writing -short - emails with emphasis on Brevity, Clarity, Coherence and Conston), Focus on Language - Sequential Connectives, Impersonal Passive 9 Unit - IV Vintige Speaking Improving Fluency through Narration. ReadingReading passages for specific information- Phone messages, Reading and Transferring Information. Writing- Effective writing strategies, Informati upr	00	ntent of the syllabus		
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1 <u>http://www.sparknotes.com/lit/the-alchemist/summary.html</u> 2 <u>https://www.stephencovey.com/7habits/7habits.php</u>	Text 1. 2. Refer 1. 2. 3. 4. 5.	 ils, Describing a Process. Focus on Language -Synonyms and Antonyms, Co Books: Sumant. S, Pereira Joyce, Shameem.M, Selvarajan.R-English Communicatic 2015. Sokkaalingam, S.RM., The Art Of Speaking EnglishVersatile Publishing Ho rences: Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, E language laboratory pvt ltd, 2011. DuttRajeevan, Prakash. A Course in Communication Skill (Anna University, University Press India Pvt.Ltd, 2007. S.P. Dhanavel, English and Communication Skills for Students of Science ar Ltd, 2009. Technical English – I & II, Sonaversity, Sona College of Technology, Salem Meenakshmi Raman and Sangeeta Sharma- "Technical communication Engl University Press, 2008. 	aphs,. Writing- Writing Busi mmon Errors in English. Total Periods n Skills, Vijay Nicole imprint use, 2018. nglish for work, students Boo Coimbatore edition): Cambr Id Engineering, Orient Blacks , First Edition, 2012. ish Skills for Engineers; oxfo	45 45 ts Pvt.Ltd, ok, Ebek tidge swanPvt, ord
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	Text 1. 2. Refer 1. 2. 3. 4. 5. E-Res 1	 ils, Describing a Process. Focus on Language -Synonyms and Antonyms, Co Books: Sumant. S, Pereira Joyce, Shameem.M, Selvarajan.R-English Communicatic 2015. Sokkaalingam, S.RM., The Art Of Speaking EnglishVersatile Publishing Ho rences: Dr. Padma Ravindran, Poorvadevi, M. Y. Abdur Razack- English for life, E language laboratory pvt ltd, 2011. DuttRajeevan, Prakash. A Course in Communication Skill (Anna University. University Press India Pvt.Ltd, 2007. S.P. Dhanavel, English and Communication Skills for Students of Science ar Ltd, 2009. Technical English – I & II, Sonaversity, Sona College of Technology, Salem Meenakshmi Raman and Sangeeta Sharma- "Technical communication Engl University Press, 2008. sources. http://www.sparknotes.com/lit/the-alchemist/summary.html 	aphs,. Writing- Writing Busi mmon Errors in English. Total Periods n Skills, Vijay Nicole imprint use, 2018. nglish for work, students Boc Coimbatore edition): Cambr id Engineering, Orient Blacks , First Edition, 2012. ish Skills for Engineers; oxfo	45 45 ts Pvt.Ltd, ok, Ebek ridge swanPvt, ord

3 <u>http://en.wikipedia.org/wiki/The_Seven_Habits_of_Highly_Effective_People</u>

	VIVEKAN (Autonom Elayampalayam, T	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E.	Programme c	code	102	2	Regula	ation	201	9					
Department	ELECTRICAL & ENGINEERING	ELECTRICAL & ELECTRONICS Semester I ENGINEERING												
Course code	Course name Periods per week Credit Maximum Marks													
	L T P C CA ESE Total													
U19CH105	Engineering Che	mistry	3	0	0	3	60	40	100					
Course Objective	 To recognize the To gain knowled To enrich the applications. Familiarize at application. Gain knowledge At the end of the comparison of the compari	the basic technology requir edge in Polymeric materia Knowledge of the studer bout the renewable ener ge in destruction of metals bourse, the student should b	ements ls towa nts with gy and and pro- be able t	in wate rds eng the b d diffe otection	er treati ineerin asics o rent ty	ment g application f Nano ma pes of ba gineering a	on. aterials, their atteries in the pplications.	properti ne Engir Know Lev	es and neering ledge vel					
	CO1: Implement in	novative solutions in wast	e wate	• treatn	nent pro	ocess.		K3						
Course	CO2: Identify the a	pplications of a specific p	olymer	in the t	field of	engineerin	g.	K2						
Outcome	CO3: Forecast the i	nformation of Nano partic	les and	their in	ndustria	application	ons	K2						
	CO4: Recognize the	e renewable energy device	s for su	istainał	ole ener	·gy.		K3						
CO5 : Identify the rate of corrosion of a metal in a given environment and find out appropriate control techniques to avoid corrosion.														
Pre-Requisites Nil														
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak CO/PSO Mapping														

((3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping			
COs				I	PSOs												
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PSO	PSO	PSO	PSO 4	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
CO 1	3	3	2	2		2	2				1	2	1	1	2		
CO 2	3	2	2	1		2	2				1	1	2	2	2		
CO 3	3	2	3	2	1	2	1				1	1	1	1	1		
CO 4	3	3	2	2	2	3	3				1	2	3	2	2		
CO 5	3	3	2	2	1	3	2				2	2	1	1	2		
Course A	Assessr	nent N	lethod	s													

ourse Assessment

Direct

1.Continuous Assessment Test I, II & III

2.Assignment: Simulation using tool

3.End-Semester examinations

Indirect

1. Course - end survey

36
Conter	t of the syllabus		
Uni	- I WATER TECHNOLOGY	Periods	9
Introdue Determ hard wa feed Wa process	ction-Sources and impurities in Water, Soft and Hard water, Water qua ination of Hardness by EDTA method, Domestic Water Treatment. Boiler F iter in boilers - Scale and Sludge formation in boilers-Caustic Embrittlement ater – Internal conditioning (Carbonate, Phosphate, and Calgon conditioning Zeolite process, Brackish water –Water purification by Reverse osmosis	lity parameters, Types eed Water –Requisites, T nt-Boiler corrosion, Tre) External conditioning	of Hardness – Problems due to atment of boiler – Ion exchange
Unit	- II POLYMER CHEMISTRY	Periods	9
Introdu (Linear molecu copolyr Prepara	ction - Occurrence, definitions – Functionality - Degree of Polymerization Branched & network polymer structure) block, random & graft copolymer ar weight - number and weight average method. Types of polymer nerization. Mechanism of polymerization: Addition - Free radical, c tion, properties and applications of PE, PMMA, PC, nylon6, nylon 66, PET,	Classification of polyn s, properties of polymer izations: Addition, co ationic and anionic p and Bakelite	ners – structure s, Tacticity, Tg, ndensation and polymerization).
Unit	- III NANO CHEMISTRY	Periods	9
Basics- cluster, solvoth of Nanc	distinction between molecules, nano particles and bulk materials; size dependent of the size of the si	endent properties. Nano pitation, Thermolysis ser ablation; Properties	particles: Nano - hydrothermal, and applications
Unit	- IV RENEWABLE ENERGY AND STORAGE DEVICES	Periods	9
cells - V (WPPs) Tidal po Batterie Fuel cel	Working of Photovoltaic cell, Recent advances in solar cell materials, Wind , Components and working of WPPs, Tidal energy - Types of Tidal power power systems. s and fuel cells: Types of batteries - Dry cells-Alkaline battery, lead storage 1 - H2-O2 fuel cell-applications	ber gona only op in Ju lenergy - Types of Win lants (TPPs), Barrage a battery, Ni-Cd battery,	nd Power Plants nd Non-Barrage lithium battery,
Unit	- V CORROSION AND ITS CONTROL	Periods	9
electroc corrosic current. Protecti Electro	hemical corrosion – Galvanic corrosion, Pitting corrosion, Crevice corrosion on, Factors influencing rate of corrosion, corrosion control methods – Sa ve coatings – Paints: constituents and functions, Metallic coatings - step plating, Electroplating (Au), Electro less plating (Ni).	nism, Prining -Bedword n, Corrosion on wire fer crificial anode and imp s involved in cleaning	the surface for
	• •	Total Periods	45
Text B	ooks:		
1.	O.G.Palanna, "Engineering Chemistry "Tata Mc GrawHill PVT,Ltd. Secon	d Edition -2017	
2.	Dr.S.Vairam ,Dr.S.Mageswari,Dr.K.Balachandran, Engineering Ch publication,Reprint-2016	emistry : First E	dition, Wiley
Refere	nces:		
1.	Engineering Chemistry: Jain & Jain, Dhanpat Rai Publishing Company Edit	ion- 16- 2015.	
2.	Arun Bahl, B.S. Bahl, G.D. Tuli, Essentials of Physical Chemistry, Publishe	d by S. Chand & Comp	any Ltd, 2014
3.	Puri, Sharma and Pathnia, Physical Chemistry-II, Vishal Publishers, Edition	- 2019.	
4.	Engineering Chemistry: Sashi Chawla, Dhanpat Rai & Co (pvt.)ltd. Edition	- 5- 2013.	
5.	Dr.S.Vairam ,Dr.Suba Ramesh, Engineering Chemistry: First Edition, Wiley	v publication,Reprint-20	16
E-Reso	urces.		
1	https://www.who.int/water_sanitation_health/dwq/arsenicun6.pdf		
2	https://www.schandpublishing.com/books/tech-professional/applied-science chemistry/9788121941129/#.XdZ214MzY2w	/a-textbook-polymer-	
3	https://www.elsevier.com/books/nanochemistry/klabunde/978-0-444-59397	-9	

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										TÜVRheinland CERTIFIED	D 901 2015			
Prog	ramme		B.E.				Prog	ramm	e Co	ode	102	Reg	ulatio	n	201	9
Depa	artment	ELI EN	ECTRI GINEF	CAL &	& ELE	CTRO	NICS					Se	meste	er	I	
Course	Code		Cou	irse Na	me	I	Period L	s Per T	Wee P	k (Credit C	(Ma CA	ximun ES	Mark E	s Total
U19C	S101	Pro Pro	gram blem (ning f Solvin	or g		3	0	0		3		60	40)	100
Course Objectiv	e	Th • • •	Learn the fundamentals of computers and acquire problem solving skills Understand C programming concepts Write the programs using arrays and strings Write the programs using functions Write the programs using structures.													
Course Outcome	e	At t CO CO CO CO	At the end of the course, the student should be able to,Knowle LeveCO1:Write the algorithms and to draw flowcharts for solving problems.K3CO2: Analyze the basics of C programming language.K4CO3: Implement the C programs using arrays and strings.K4CO4: Develop C programs using the functions and pointers.K3										wledge evel 3 4 4 3			
		CO	5: Solv	e the re	al time	proble	ems us	ing S	truct	ures a	and uni	on			K	3
					CO/PO) Man	ning								CO/PS	0
	(3/2	/1 indic	cates stro	ength of	correla	tion) 3 -	Strong	, 2 - 1	Mediu	ım, 1	- Weak			I	Mappir	ng
COs]	Program	me Ou	tcomes	(POs)						PSOs	0
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	D(18	PO 0	PO	РО	РО	PSO	PSO	PSO
CO 1	2	2	2	104	2	100	107		,	2	10	2	12	1	2	3
CO1	3	3	3		2			-	2	3	3	3	$\frac{2}{2}$	3		
CO 3	3	3	3		2				3	3	3	3	2	3		
CO 4	3	3	3	2	2				3	3	3	3	2	3		
CO 5	3	3	3	3	2			(3	3	3	3	2	3	3	
Course A	ssessm	ent M	ethods													
Direct																
1. Co	ontinuou	is Asse	ssment	Test I,	II & III											
2. As	signme	nt														
3. En	d-Seme	ster ex	aminati	ons												
Indirect	t															
1.	Course	- end	survey													
a · · ·	0.47															
Content	Content of the syllabus															
Unit Desis	-1 	tion	INTR(LIVI S			J	Per	10ds	- 1- 20	9	
Basic O	rgan1za	uon (rithm	$- \mathbf{R} \mathbf{u} \mathbf{u} \mathbf{u}$	iputer	- Prog	$\Delta \log 1$	ing L vithm		ages∙	• FIC mic^{-1}	owchar	l - h	seudo	JCOde	- COl Strata	npiles for
Developi	ng Alg	orithm	- DUIIO	etrativo	DUKS OI	AIg01	ind M	- Alg	m	unc i alua i	from 1	n SOL st of a	vilig-2	mpie	Strate	Integer
Develop	Developing Algorithms - Illustrative Problems: Find Minimum value from list of elements, Guess an Integer															

Number in a Range, Factorial of a given number.

Unit -	II C PROGRAMMING	Periods	9								
Introductio	on to C – Features - Data Types – Constants – Variables - I/O S	atement - Opera	tors – Expressions -								
Decision N	Making and Branching – Looping Statements - Break, Goto, Cor	tinue.									
Unit –	III ARRAYS AND POINTERS	Periods	9								
Arrays: Co	oncepts – Need – one dimensional array – array declaration – f	eatures – array in	nitialization - Two-								
Dimension	nal Arrays- Multidimensional Arrays.	2									
Pointers: Introduction, pointer declaration-accessing variable through pointer-pointers and Arrays, Pointers											
and strings	s - Pointers structures-pointer Arithmetic - Array of Pointers - d	ynamic memory	allocation.								
Unit - I	IV FUNCTIONS AND STRINGS	Periods	9								
Function:	Introduction, function declaration, defining and accessing the	unctions, User-	defined Functions-								
storage cla	asses-function prototypes-parameter passing methods-recursion.										
Strings: C	oncepts - Strings manipulation - String Input / Output Func	tions- Strings st	andard functions -								
Arrays of S	Strings.	1	ſ								
Unit –	V STRUCTURES AND UNIONS	Periods	9								
Structures-	-Introduction- nested structures- Arrays of Structures - Structures	tures and Func	tions - Pointers to								
Structures	- Unions- Type Definition - Bitfields- Enumerated Types.	Structures – Unions- Type Definition – Bitfields- Enumerated Types.									
Total Periods 45											
		Total Periods	45								
Text Book	۲S	Total Periods	45								
Text Book	cs Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015.	Total Periods age", 2nd Editio	45 n, Prentice Hall of								
Text Book 1. 2.	Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc	Total Periods age", 2nd Editio Graw Hill, 2016.	45 n, Prentice Hall of								
Text Book 1. 2. References	 Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc 	Total Periods age", 2nd Editio Graw Hill, 2016.	45 n, Prentice Hall of								
Text Book 1. 2. References 1.	 Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc S Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 	Total Periods age", 2nd Editio Graw Hill, 2016. th Edition	45 n, Prentice Hall of								
Text Book 1. 2. References 1. 2.	 Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc G S Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, G 	Total Periods age", 2nd Editio Graw Hill, 2016. h Edition Computer Pro	45 n, Prentice Hall of gramming", VRB								
Text Book 1. 2. References 1. 2. 3.	 Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc of s Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, Publishers Pvt.Ltd, E. Balagurusamy, Programming in ANSI C, Seventh Edition, 	Total Periods age", 2nd Editio Graw Hill, 2016. h Edition Computer Pro Mc Graw Hill, 2	45 n, Prentice Hall of gramming", VRB								
Text Book 1. 2. References 1. 2. 3. E-Resource	 Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc G Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, 9 Publishers Pvt.Ltd, E. Balagurusamy, Programming in ANSI C, Seventh Edition, 3 	Total Periods age", 2nd Editio Graw Hill, 2016. Th Edition Computer Pro Mc Graw Hill, 20	45 n, Prentice Hall of gramming", VRB								
Text Book 1. 2. References 1. 2. 3. E-Resourc 1.	Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc of s Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, Publishers Pvt.Ltd, E. Balagurusamy, Programming in ANSI C, Seventh Edition, res https://www.geeksforgeeks.org/c-language-set-1-introduction/	Total Periods age", 2nd Editio Graw Hill, 2016. Th Edition Computer Pro Mc Graw Hill, 20	45 n, Prentice Hall of gramming", VRB 017.								
Text Book 1. 2. References 1. 2. 3. E-Resourc 1. 2.	Ks Kernighan BW and Ritchie DM, "The C Programming Langu India, 2015. E. Balagurusamy, Computer Programming, First Edition, Mc (s Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4 Dr.V.Rameshbabu, Dr.R.Samyutha, M.Muni Rathnan, " Publishers Pvt.Ltd, E. Balagurusamy, Programming in ANSI C, Seventh Edition, res <u>https://www.geeksforgeeks.org/c-language-set-1-introduction/</u> https://www.programiz.com/c-programming	Total Periods age", 2nd Editio Graw Hill, 2016. Th Edition Computer Pro Mc Graw Hill, 20	45 n, Prentice Hall of gramming", VRB 017.								

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205												N.	NO 4001 2016 EXAMPLE TUPReture CONDEN U Processor U Processor					
Progra	mme		B.E.				Р	rogran	nme C	ode	10	2	Reg	nılati	on		2019			
Depar	tment		ELEC	TRI	CAL &	& ELI	ECTR		CS				Ser	neste	er		I			
.1			ENGI	NEE	RING		_								_					
Course	e Cod	e	Cours	e Nai	me				Per	iods]	Perw	veek		Cre	dit	Max	kimum	Marks		
11100	TE101		Encin		~ Crea		*			,	1	2 2		2		CA	ESE 40	1 otal		
0190	JE101		Engin The st	udont		Id mo	da to		2	r -	0	3		3		00	40	100		
 Course Objective Develop skills to enhance their ability to know the concept of engineerin to draw the points kept in various positions, lines and planes. Project the drawing of various solids. Sketch sectioned views of solids. Draw the development of surfaces. Draw the isometric and orthographic projections for any given object standard. 										ineerin bbject t	g graph	ics and equired								
	At the end of the course, the student should be able to												K	nowled Level	lge					
Cou	rea		CO1: plane	CO1: Construct plane curves and develop projection of points , lines and K2 plane surfaces																
Outee	mes		CO2: Construct projection of solids with various conditions.													K4	-			
Oute	JIIIC 5		CO3: Design the section of solids and analyze the true shape of the section											1	K3					
			CO4: Design and develop the different solid surfaces.												K2	2				
			CO5:	Cons	truct is	somet	ric and	l ortho	graph	ic pro	jectio	on of	differ	ent s	olids.		K1			
Pre -re	quisit	tes	Nil																	
	(3/2	2/1 in	dicates	streng	CO / th of co	PO M orrelat Weal	apping ion) 3- c	g Strong	, 2 – M	edium	n, 1 -			CO)/PSO	Mappi	ng			
					Pr	ogram	me Ou	tcomes	s (POs)							PSOs				
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PC) P	PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
CO 1	3	3	3	3	3				-					3	2	-				
CO 2	3	3	2	2	2	<u> </u>				<u> </u>	1			2	-					
CO 3	3	2	2	2	3									2	2					
CO 4	3	2	3	3	2									3	2					
CO 5	3	3	2	3	3									2	2	2				
Cours	e Ass	essn	nent N	letho	ods															
Di	rect						TT 0 1													
$\begin{vmatrix} 1 \\ 2 \end{vmatrix}$	Con	tinu	ous As	sessi	ment [l'est I	, 11 &]	11												
3.	End	-Sen	nester	exam	ninatio	on														
In	direc	t																		
1.	С	ours	e - en	d sur	vey															

Conten	t of the	Syllabus											
Conce Conver (Not Examin	pts & ntions t for nation)	Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.	Periods	1									
Unit	-I	PROJECTION OF POINTS, LINES AND PLANESURFACES	Periods	3+8									
Introduc	tion to P	lane curves, Orthographic projection – principles – projection of points, s	traight lines										
(only fir	st angle	projections) and plane surfaces (polygonal and circular).											
Unit	- II	PROJECTION OF SOLIDS	Periods	3+8									
Projection plane.	ons of si	mple solids like prisms, pyramids, cylinder and cone when the axis is	inclined to	one referen	nce								
Unit ·	· III	SECTION OF SOLIDS	Periods	3+8									
Sectioni one refe	ng of sol rence pla	lids - prisms, pyramids, cylinder and cone in simple vertical position by one and perpendicular to the other - Obtaining true shape of section.	cutting pla	ne sinclined	l to								
Unit	- IV	DEVELOPMENT OF SURFACES	Periods	3+8									
Develop simple tr	ment of runcated	lateral surfaces of simple solids like prisms, pyramids, cylinders and solids involving prisms, pyramids, cylinders andcones.	cones – de	velopment o	of								
Unit	- V	Periods	5+10										
Isometri Isometri views fr	ic Proje c scale - om picto	ction and Introduction to AutoCAD / Solid Edge: Principles of isometric Isometric projections of simple solids like prisms, pyramids, cylinders rial views.	ic projection and cones o	1 - & orthograph	hic								
demonst	ration of	their use.	to dratting	packages and	a								
		Tota	l Periods	60									
Text Bo	ook:		4										
1. B	asant A	grawal and C.M Agrawal ,"Engineering Drawing ",Tata McGraw H	Iill ,Third I	Edition,201	9								
2 Ja	ain and	Gautam , "Engineering Graphics & Design ", Khanna Publishing Ho	use, 2018										
Referen	ice Boo	k :											
1. ^D	r.P.Kan	nan and Dr.J.Bensam Raj, "Engineering Graphics", JBR Tri Sea Pu	blishers P	/t. Ltd,2018	3.								
2. K	.V Nata	rajan, "Engineering Drawing and Graphics", M/s. N.Dhanalakshmi	, Chennai,2	2014.									
3. K	.Venug	opal and V. Prabhu Raja, "Engineering Graphics"New Age Internat	tional Publ	ishers,2011.	•								
4. N	I.S Parth	hasarathy and Velamurali, "Engineering Graphics", Oxford University	sity, New I)elhi,2015									
5. ^B	hatt N.I	D and Panchal V.M, "Engineering Drawing", Charotar Publishing H	louse,50 ^m l	Edition,2010	0								
E-Reso	urces:												
1. h	ttp://npt	el.ac.in/courses/105104148, "Engineering Graphics" - Dr. Nihar Ra	njan Patra	, IIT Kanpu	ur								
2. h	ttp://cfd	.annauniv.edu/webcontent.htm, "Engineering Graphics" - Dr.Velan	nurali										
3. <u>h</u>	ttp://linl	<u>k.springer.com/</u> "Engineering Graphics"-Springer Nature.		http://link.springer.com/"Engineering Graphics"-Springer Nature.									

MORAL PROMISE	VIVEKANAND (Autonomous Ela	TVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205									
Programme	B.E.	Program	ne Co	de 10)2	Regulation		2019			
Department	ELECTRICAL	& ELECTRONIC	S ENG	INEE	RING	Semester		Ι			
Course Code	Course Name		Pe	riods l Week	Per	Credit	Maxi	imum Marks			
			L	Т	Р	С	CA	CA ESE To			
U19CH106	CHEMISTRY	LABORATORY	0	0	4	2	60	40	100		
Course Objective	 Gather babase. Learn pH Study the Quote iro Gather k estimatio Collect da Understation 	 Ine students should made to Gather basic simple acid-base reactions and study the mechanism of acid mixture with base. Learn pH and potential of hydrogen in a sample solution. Study the redox reaction through potential difference. Quote iron forms complex with thiocyanate. Gather knowledge on hardness producing salts and removal of hardness through estimation. Collect data required for dissolved oxygen present in water sample. 									
	At the end of the	Knowledge Level									
	CO1: Infer know base and identify	ŀ	٢3								
Course Outcomes	CO2: Spot the co and redox reaction	ncentration of sampl n.	e solut	ion thr	ough po	otential of hydr	ogen	ŀ	ζ3		
	CO3: Estimate Ir	on by complexation	reactio	n spect	rometr	ically.		ŀ	ζ5		
	CO4: Determine supply.	CO4: Determine hardness and dissolved oxygen present in domestic water supply.									
	CO5: Identify all	alinity and available	chlori	ne pres	ent in t	he given sampl	e.	ŀ	ζ5		
Pre-requisites	Nil	Vil									

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping					
COs	Programme Outcomes (POs)								Programme Outcomes (POs)									
	PO PO<									PSO 2	PSO 3	PSO 4						
CO 1	3	3		2	2	1	1					2	2	2				
CO 2	3	3		2	1							1	2	2				
CO 3	3	3		2	1								1	1				
CO 4	3	3	1	2	2	2	2					2	2	2				
CO 5	2	3	1	2	2	2	2					2	1	1				

LIST OF EXPERIMENTS

Г

1. Estimation of HCL using NaOH by Conductometric titration	CO1
2. Estimation of Mixture of acid using NaOH by Conductometric titration.	CO1
3. Estimation of Barium chloride using sodium sulphate by Conductometric precipitation titration	CO1
4. Estimation of ferrous iron by Potentiometric titration	CO2
5. Determination of HCL using NaOH by pH metry	CO1
6.Estimation of Ferric ion by Spectrophotometry	CO3
7. Determination of Total, temporary and permanent hardness of water by EDTA method.	CO4
8. Estimation of Dissolved Oxygen content in water by Winkler's method	CO4
9. Estimation of alkalinity in water sample.	CO5
10. Estimation of available chlorine in bleaching powder.	CO5
Total Periods	45

Lab	Lab Manuals suggested:									
1.	Chemistry laboratory I & II by Dr.A.Ravikrishnan,Sri Krishna Pub,Revised Edition-2017									
2.	Chemistry laboratory Manual by Dr. Veeraiyan, Revised Edition-2017									

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205																
Pr	ogramm	e	B.E.				Pro	gramm	e Code	102	F	Regula	ation		2019				
De	epartmei	it E	ELECT: ENGINI	RICAI EERIN	L & EL G	ECTR	ONICS	5				Sem	ester		Ι				
Cour	rse Code			Cou	rse Nai	me		Perio	ods Per	Week	Cr	edit	M	aximur	ximum Marks				
								L	Т	P		С	CA	ESE	ESE Total				
U19	CS102	(Comput	er Pra	ctices I	Labora	tory	0	0	4		2	60	40 100					
Cour: Objec	 Course Make the students to learn the programming language Understand the basic programming constructs and articulate how they are used Develop a program with a desired runtime execution flow Articulate where computer programs fit in the provision of computer based solutions to real world problems 												to						
	At the end of the course, the student should be able to,													Know Lev	ledge vel				
			CO1: P	repare	docume	ent usin	g word	proces	sor						K3				
Cours Outco	se ome		CO2: S and flov	ketch fl vcharts	low of e	executi	on of C	progra	ms usir	ng algo	orithn	1			К3				
			CO3: W	Vrite the	e simpl	e C Pro	grams ı	using d	ecision	and lo	oping	g state	ements	5	K3				
			CO4: D and poin	emons	trate co	de reus	ability	with the	e help o	of user	defir	ned fu	nction	.8	K4				
			CO5: W	Vrite pr	ograms	that pe	erform o	peratic	ns usin	g deri	ved d	ata ty	pes.		K3				
	(3/2/	l indi	cates str	ength of	CO / PO	D Mapp tion) 3-5	ing Strong, 2	2 – Med	ium, 1 -	Weak			C	O/PSO	Mappi	ng			
]	Program	nme Out	comes (I	POs)						F	SOs				
Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
CO 1	3	3	3	1				3	3	3	3	3	3	1					
CO 2	3	3	3	1				3	3	3	3	3	3	1					
CO 4	3	3	3	3				3	3	3	3	3	3	1					
CO 5	3	3	3	3				3	3	3	3	3	3	1					
Cours	Course Assessment Methods																		
Dire	ect																		
	1. Pre lab and post lab test 2. End Semester examinations																		
Indi	rect		erst ont																
	1. Course –end survey																		

1.	SUGGESTED LIST OF EXPERIMENTS 1. Designanalgorithmandflowchartusingwordprocessorthatreadsthecustomernumberandpo werconsumedandprintstheamounttobepaidbythecustomer.Anelectricpowerdistributionc ompanychargesitsdomesticconsumersas follows Consumption Units Rate of Charge									
2.	0-200Rs.0.50per unit201-400Rs.100plus Rs.0.65 per unit excess 200401-600Rs.230plus Rs.0.80 per unit excess of 400Designanalgorithmandflowchartforasimplecalculatorprogramusingwordprocessorforperformingvarious arithmetic operations such as	CO1								
	"+" -Addition "-" - Subtraction "*" -	CO2								
2	Multiplication "/" -Division "%" -Modulus									
3.	Design and develop a C program to accept a number from the user and check whether it is a Palindrome or not.	CO3								
	Palindromenumber:(anumberisaPalindromewhichwhenreadinreverseorderissam easreadin the right order) Example: Palindrome :11, 101, 151NotaPalindrome:1 23,100									
4.	DevelopaCprogramtofindthesumofthedigitsofanintegerandthenumberofdigitsintheinteg erthat is given as input by the user. Test Case: SampleInput :15390Samp leOutput: Sum of the	CO3								
5.	 digits=18No. ofdigits =5 For an incorrect choice ,an appropriate error message should be displayed. Develop a program to perform the following operations using two dimensional or multi-dimensional matrices: a. Addition of two matrices(3x3) b. Subtraction of two matrices(2x2) 	CO3								
6.	c. Multiplication of two matrices using dynamic memory allocation. Write a program to find the maximum and minimum element in a set of inputs using one dimensional array.	CO3								
7.	Write a program to count the total number of vowels and consonants in a string. For example Input string:Iam proud to be an Indian Output:Totalvowels–10 andTotalconsonants–10	CO4								

8.	Develop a program to perform the following string manipulations without using string functions:		
	 d. String copy e. String Concatenate f. String length g. String Compare 	со	4
9.	The Fibonacci numbers are defined recursivelyasfollows:F1=1 F2=1 Fn=Fn-1+Fn-2,n>2 Write a function that will generate and print the first n Eibenseei	со	4
10.	write a function that will generate and print the first n Fibonacci numbers. Test the function for n=5,10,15 . Write a function using pointers to exchange the values to redin two locations in the memory. TestCase: Input:A=10,B=-5 Output: A=-5, B=10	CO	4
11.	Develop a program to build a database of students with the following attribute: Roll no, Name ,Course, Stream, Percentage, and Division. Take input for each student in all fields except division. Calculate division of each student such that those students having percentage >=60% arebelongstofirstdivision.Similarly,forsecondandthirddivisionstudentshavingcon ditions 50% <=percentage<60% and35% <=percentage<50% respectively.Ifanystudenthaspercent age less than 35% then write "fail" in division field. After building the database display the database of the students. Hint: create database using structure.	CO.	5
	Total Pe	riods	45
E-R	Resources		
1.	https://www.programiz.com/c-programming		
2.	https://www.cprogramming.com/		
3.	https://beginnersbook.com/2015/02/simple-c-programs/		

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	100	102 *	~
	A STATEMENT	C	

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VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205



Programme	B.E.		Regulation		2019					
Department	ELECT ENGIN	RICAL & ELECTR EERING	RONIC	S		2	Seme	ster		II
Course Code		⁷ ourse Name	Perio	ds Per	Week	Cre	dit	M	aximum	Marks
Course Code			CA	ESE	Total					
U19MA202	Linear Ordina Equation	Algebra and ry Differential ons *	40	60	100					
Course Objective	The stud	lents should made to Understand Eigen val Proficiently understan Demonstrate vector in Know about Cartesia Identify the Laplace t	lues and nd the v ntegral n and F transfor	d Eiger vector o calcult Polar co rm of d	n vector differen us. o-ordina erivativ	rs and ntial c ates a ves ar	l its r alcul nd al nd int	role in the sylus. so transforr tegrals.	ystem of nations.	equations.
	At the en	nd of the course, the st	udent sl	nould b	e able t	0,			Knowle	dge level
G	CO1: A	nalyze the Reduction	of a qu	adratic	form.				K	.3, K4
Course	CO2: Id	entify vector different	ial calcu	ılus.	-				K	2, K3
Outcome	CO3: A	pply Green's , Stoke's	and G	auss D	ivergen	ce th	eorer	ns	K	.1, K5
	CO4: Id	entifying the analytic	function	ons					K	2, K5
	CO5: R f	ecognize the Laplace unctions.	transfo	rm of ı	ınit stej	p and	unit	impulse	K	5, K3
Pre-requisites	-									

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping			
				I	Program	me Out	comes (POs)						PS	Os	
COs	PO 1	PO2	PO 3	PO 4	PO 11	PO 12	PS O 1	PSO 2	PSO 3	PSO 4						
CO 1	3	3											2			
CO 2	3	3											2			
CO 3	3	3											2			
CO 4	3	3											2			
CO 5	3	3											2			
Course .	Assessr	nent N	lethod	S												
Direct																
1.	Conti	nuous	Assessi	nent Te	st I, II d	&III										
2.	Assig	nment.														
3.	End-S	emeste	er exan	nination	S											
Indire	ct															
1.	Cours	se – en	d surve	у												
Content	of the	Syllab	ous													
Un	it – I	Ν	IATR	ICES								Per	iods		12	

Characteristic equation - Eigen values and Eigenvectors of a real matrix- Properties of Eigen values and

eigenvectors – Cayley-Hamilton theorem(excluding proof) – Diagonalization of matrices – Reduction of a quadratic form to canonical form by orthogonal transformation – Nature of quadratic forms. Simple application in encoding message using 2×2 matrix.

Unit - I	I VECTOR DIFFERENTIAL CALCULUS	Periods	12
Vector Diffe	rentiation: Vector and Scalar Functions- Derivatives- Curves, Gra	dient of a Scal	ar Field-Directional
Derivative -	Divergence of a Vector Field - Curl of a Vector Field – Tangents a	nd Normals	
Unit – I	II VECTOR INTEGRAL CALCULUS	Periods	12
Line, Surf	ace and Volume integrals, Green's theorem in a plane(excl	uding proof),	Gauss Divergence
theorem(ex	cluding proof), Stokes theorem (Excluding proof) - simple a	pplications in	volving rectangular
parallelepi	beds and spheres.		
Unit - l	V ANALYTIC FUNCTIONS	Periods	12
Analytic fu	nctions - Necessary and sufficient conditions for analyticity in Ca	rtesian and po	lar coordinates -
Properties	- Harmonic conjugates - Construction of analytic function - C	onformal map	ping – Mapping by
functions c	+z, cz, l/z and Bilinear transformation.	D • 1	10
Unit –	V LAPLACE TRANSFORMS	Periods	12
Existence of	conditions – Transforms of elementary functions – Transform of up	hit step function	on and unit impulse
Initial and	Basic properties – Shifting theorems(excluding proof) - I ransform	ns of derivativ	hear (avaluding
$\frac{11111a1}{proof} = T_1$	ansform of periodic functions – Application to solution of linear s	cond order or	dinary differential
equations y	with constant coefficients		uniary unicicilitat
equations	, 111 CONStant COOTICION(S)	Fotal Periods	60
Text Book	S		
1.	T.Veerarajan, Engineering Mathematics, Tata McGraw Hill Educ	cation Pvt. Ltd	-2012
2.	Ravish R Sing , Mukul Bhatt, "Engineering Mathematics", Mc G 2018	raw Hill Educ	ation Pvt. Ltd-
Reference	8		
1.	Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathema Education Pvt. Ltd, 6th Edition, New Delhi, 2012.	tics", Tata Mc	Graw Hill
2.	Kreyszig, E., Advanced Engineering Mathematics (10th Edition)	, John Wiley (2015).
3.	Alan Jefferis, Advanced Engineering Mathematics, Academic Providence Providen	ess- New Dell	ni-2003
4.	Yunus A.Cengel, William J.Palm III," Differential equations for McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.	Engineers & S	cientists", Tata
5.	John Bird, Higher Engineering Mathematics, Anuradha Agencies	(2004)	
E-Resourc	es		
1.	https://en.wikipedia.org > wiki > Ordinary_differential_equation		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 B F Programme code 102 Regulation												
Programme	B.E.	Progra	ımme	code	102	Regu	lation		2019				
Department	ELECTRICAL & ELEC ENGINEERING	TRONICS				Ser	nester		II				
Course code	Course name		P	eriods weel	per c	Credit	Ν	/laximu	ım Marks				
	L T P C CA ESE												
U19EN202	English for Communication - II30034060												
Course Objective	 Provide suitable liste Inculcate channelized Improvelearners"voca Assist students in the may engage in life-lo professional writing 	ning tasks to develop comm I reading to make learners pubularyandgrammartosupple development of intellectuationg learning .Identify and b and speaking	nunica profic ement al flex egin t	tive ab ent in t theirlar ibility, o apply	ility for the chose guageus creativit the lang	academic a en professio eatprofessi y, and cultu guage featur	and protonal wr onal co aral lite res of a	fessiona iting co ntexts racy so cademic	l progress ntexts. that they c and				
	At the end of the course,	the student should be able	e to,						Knowledge Level				
	CO1: Acquire sufficien context through of	t command over languag continuous exposure to si	e to s mila	peak a listen	t an aca ing task	demic or j s.	profess	sional	K2				
Course	CO2: Write technically readings.	well at a professional co	ntext	s throu	igh expo	osing them	n to sin	nilar	К3				
Outcome	CO3: Use language at le enrichment of voc	ength at technical and pro abulary and strengthenin	ofessi g of g	onal si gramm	tuations atical k	through t nowledge.	he		К3				
	CO4: Students should be information from	e able to ethically gather, a variety of written and e	, unde electr	erstand	l, evalua ources.	ate and syr	othesiz	e	K2				
	CO5: Students should b	e proficient in oral comr	nunic	ation a	and writ	ing.			K4				
Pre-	Nil												
requisites													

((3/2/1 in	ndicate	s streng	C th of c	O / PC) Map tion) 3-	ping -Strong	g, 2 – N	Mediur	n, 1 - W	'eak		C	CO/PSO	Марріі	ıg
	Programme Outcomes (POs)												PSOs			
COs	PO 1	PO 2	РО 3	PO 4	РО 5	PO 6	РО 7	PO 8	PO 9	PO 10	P 0 11	P 0 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1						2			3	3		3	3			
CO 2						2			3	3		3	3			
CO 3						2			3	3		3	3			
CO 4						2			3	3		3	3			
CO 5						2			3	3		3	3			

Course Assessment Methods

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment: Simulation using tool
- 3. End-Semester examinations

Indirect

1.Course - end survey

Conte	ent of the syllabus		
Uni	t - I	Periods	9
Lister Speak Readin Inform Comp	ning- Listening for Cultural Awareness, Listening to Professional Conversations, ing- Developing Confidence to get rid of Fear on the Dias, Discussion at a Co ng, Reading Short Messages and Technical Articles, Writing- Introduction to nal Letters, Thanking Letters, Letters Calling for Quotations, Letters Placing an Q laint, Focus on Language –Adjectives and Degrees of Comparisons	Talks, Interviews and Le rporate Context. Readi Detter Writing, Writin Order, Seeking clarifica	ectures ng – Inferential ng Formal and tion, Letters of
Uni	t - II	Periods	9
Lister Expre Readi trainin Transt	ting- Listening to specific information relating to technical content, Listening signal pointions, Formal Discussions, Describing Role Play at Business Contexing Technical Articlesin Journals and Comparing Articles. Writing- Letter see and to undertake project work. Focus on Language– Simple, compformation of Sentences.	for statistical informati t and Consolidating Ide king permission to und ound and complex s	on Speaking - eas. Reading - lergo practical sentences and
Unit	- III	Periods	9
Lister	ing-Listening to understand the overall meaning, Listening to Interviews and	Presentations. Speaking	ng- Giving
Instru	ctions and Showing Directions and Rephrasing Instructions. Reading- Ski	mming and Scanning	Reading Job
Adver	tisements. Writing- Applying for a Job, Writing a CV.Focus on Language-	Pronouns, Phrasal ver	bs, Restrictive
and N		Dorioda	0
Listor	ing ListeningandratriavingInformation Sneaking -DevelopingfluencyandCoh	rence AccentNeutraliz	ation
Voice Writi Focus Contra	Modulation, and Intonation, Improving Voice Quality. Reading –Reading ng- Letters to the Editor, Letter of Complaint, Various kinds of Reports, Pe on Language– Countable, Uncountable nouns, Recommendations, Disco astive Connectives, Imperatives.	and understanding Ad ermission to go for I purse Markers and Co	vertisements. ndustrial visits. omparative and
Unit -	V	Periods	9
Lister	ing- Listening to Fragmented Texts and Filling in the Blanks. Speaking-Mind	1 Mapping, Developing	Coherence
and S	elf-Expression, Making presentations, Paralinguistic and Extra linguistic F	eatures (body languag	ge), Reading-
Predic	ting content, Interpreting Reports. Writing- Writing Proposals, Agenda,	Minutes of the Meeti	ng. Focus on
Lang	uage-British and American Vocabulary, Editing, Error Detection, and Punctu	ation.	
		Total Periods	45
Text l	pooks	D I 1 0 044	
1.	Sumant.S, Pereira Joyce, English for Communication, Vijay Nicole Imprints	Pvt.Ltd., 2014.	
<i>Z</i> .	Sokkaalingam, S.R.M., The Art Of Speaking English versatile Publishing Ho	use,2018.	
Refer	ence books		
1.	Norman Whitby - Business Benchmark Pre-Intermediate to Intermediate, Stu Press, 2008. , 1997.	idents Book, Cambridg	e University
2.	Dutt, Rajeevan, Prakash .A Course in Communication Skills (Anna Universi University Press India Pvt.Ltd, 2007.	ty, Coimbatore edition)	:. Cambridge
3.	Meenakshi Raman and Sangeeta Sharma-'Technical Communication English University Press, 2008.	Skills for Engineers';	Oxford
4.	S.P. Dhanavel, English and Communication Skills for Students of Science ar BlackswanPvt, Ltd, 2009.	nd Engineering, Orient	
5.	Technical English – I & II, Sonaversity, Sona College of Technology, Salem	, First Edition, 2012.	
E-Res	sources	·	
1	http://www.kalevleetaru.com/Publish/Book Review Who Moved My Che	ese.pdf	
2	http://www.bookbrowse.com/reviews/index.cfm/book_number/304/who-mov	ved-my-cheese	
3	http://www.imdb.com/title/tt0482629/plotsummary		

the second se			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205 Image:													
P	rogram	me	B.E.				Prog	gramme	e Code		102	Reg	ulation		2019	
D	epartm	ent]	ELECI	FRICA	L & EI	LECTR	CONICS	S ENG	INEEF	RING		S	Semeste	er	II	
Cour	rse Cod	٩		Course	Name		Perio	ds Per '	Week	Cred	it		Max	imum l	Marks	
Cou		ic		course	Ivanic		L	Т	Р	((CA	ESE	T I	'otal
U19	9PH20	7]	ENGIN PHYSI	IEERIN CS ^{\$}	NG		3	0	0	3	3		40	60	100	
C Ob	ourse ojective	•	 The student should be made to, Understand the basic concepts of properties of matter Gain knowledge about the conduction properties of metals Identify the different types of crystal structures and crystal grow the chniques Study the production and applications of ultrasonics. Correlate better understanding the carrier concentration and its variations with temperature in a semiconductor. Study the properties of modern engineering materials and itsuses Categorize the types of laser and fiberoptics 													
			At the e	nd of th	e course	e, the stu	ident wi	ill be at	ole to					Kno	wledge	e
			C O1: L	Jndersta	and the	elastic 1	properti	es of th	ne mate	rials				LUN	K2	
C	ourse		CO2: (Gain kno	owledge	e about	the con	duction	proper	ties of	meta	ls			K3	
Οι	ıtcome		C O3: D di er	etermin fferent igineeri	e packi types ng, mec	ing fact of c lical ap	or for v crystal plicatio	various imper ns.	unit co fections	ells an 5 and	d und l lea	lerstan rn th	nd ne		K 1	
		•	C O4: D fu	iscuss t	he basic	c idea o ern engi	f semic neering	onduct	ing mat als	erials	and re	ealize t	the		K1	
		(C O5: Le	earn the	optical p	propertie	es of mat	erials a	nd its us	es					K3	
Pre-r	eauisit	es -														
	(3/2	2/1 indi	cates st	rength o	CO / PO	O Mapp tion) 3-S	ing Strong, 2	2 – Med	ium, 1 -	Weak			СС)/PSO I	Mappi	ng
	, , , , , , , , , , , , , , , , , , ,			<u> </u>	Program	nme Out	comes (l	POs)	,					PS	Os	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	2	3	1	2									2	-	-
CO 2	3	2	3	3	1									2		
CO 3	3	5	2	1	1								3	2		
CO 5	3			1	2	2								2		
CO 5 3 1 2 2 Course Assessment Methods Direct 1.Continuous Assessment Test I, II & III 2 End-Semester examinations																
Indi	rect															
	1.C	ourse -	end sur	rvey]

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Content of the	e syllabus			
Unit – I	PROPERTIES OF MATTER		Periods	9
Elasticity: 7 determination Viscosity: Co	Types of moduli of elasticity - Stress - Strain Diagr by non-uniform bending - Twisting couple on a wire p-efficient of viscosity - Poiseuilles' formula - Experim	am – uses. Y – Application nental determi	oung's modu n: Torsional p ination – uses	ulus: Experimental pendulum.
Unit - II	ELECTRONS IN SOLID		Periods	9
Classical the Conductivity Quantum the (Qualitative) (Qualitative).	ory: Classical free electron theory of metals- Express of metals – Wiedemann-Franz law (Qualitative) - Suc ory: de Broglie's hypothesis - Schrodinger's time ind - Particle in a one-dimensional box - Fermi – I	sions for electers and failuters and failuters and failuters and birac Statisti	trical conductures. time dependent cs - Density	tivity and Thermal ent wave equations of energy states
Unit – III	CRYSTAL PHYSICS AND ULTRASONIC	S	Periods	9
Crystallograp spacing in cu Packing Fact Ultrasonics: Navigation at	hy - Unit cell - Crystal systems - Bravais lattices- I bic lattice- Calculation of number of atoms per unit or for HCP structures. Introduction – Magnetostriction and Piezoelectric and Ranging (SONAR), Non – Destructive Testing (NI	Lattice planes cell- Atomic Oscillator m DT) and Sonog	- Miller indi radius – Coc ethods – Ap gram.	ices - Inter-planar ordination number- oplications: Sound
Unit - IV	SEMICONDUCTING & MODERN ENGIN MATERIALS	NEERING	Periods	9
Band gap c semiconducto Metallic glas	letermination. Extrinsic semiconductors: Carrier correction (Qualitative) – Variation of Fermi level with temper ses: preparation, properties and applications - Shape	oncentration ature. memory allo	in n – typ	p = and p - type Characteristics and
applications of	of N111 alloy.			
unit – V	LASER AND FIBER OPTICS		Periods	9
applications of Unit – V Laser: Chara Semiconduct Optical fiber: (Qualitative) Medical endo	LASER AND FIBER OPTICS acteristics of laser –Derivation of Einstein's A an or laser: Homo junction - Applications. Principle of propagation of light through optical fibers -Types of optical fibers -Fiber optical communications	d B coeffici er - Numerica ation system T	Periods ents. Types: aperture and (block diago otal Periods	9 Nd-YAG laser - d acceptance angle cam) -Application: 45
applications of Unit – V Laser: Chara Semiconduct Optical fiber: (Qualitative) Medical endor Text Books	LASER AND FIBER OPTICS acteristics of laser –Derivation of Einstein's A an or laser: Homo junction - Applications. Principle of propagation of light through optical fibers -Types of optical fibers -Fiber optical communications	d B coeffici er - Numerica ation system T	Periods ents. Types: al aperture and (block diago otal Periods	9 Nd-YAG laser - d acceptance angle ram) -Application: 45
applications of Unit – V Laser: Chara Semiconduct Optical fiber: (Qualitative) Medical endo Text Books 1.	LASER AND FIBER OPTICS acteristics of laser –Derivation of Einstein's A an or laser: Homo junction - Applications. Principle of propagation of light through optical fibers -Types of optical fibers -Fiber optical communications Principle of propagation of Light through optical fibers -Types of optical fibers -Fiber optical communications R.K. Gaur and Gupta. S.L, Engineering Physics, Dhala	d B coeffici er - Numerica ation system T unpat Rai Pub	Periods ents. Types: aperture and (block diago otal Periods lishers, 2017.	9 Nd-YAG laser - d acceptance angle cam) -Application: 45
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		CO3:]	Implem	ent fun	iction p	rototyp	es and	strin	g func	tions	5.				ŀ	K3,K4
		CO4: 4	Apply f	files and	d modu	les and	perfo	rm op	eratio	ns on	n CSV	files	5.		ŀ	K3,K4
		CO5: P	erform	data vi	isualiza	tion an	d appl	y Pyt	hon pa	ackag	ges				ŀ	K3,K4
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Unit	- II	LISTS, TUPLES, SETS ANDDICTIONARIES	Periods	12
Lists: list parameter operation	operation rs; Tuples and met	ns, list slices, list methods, list loop, mutability, aliasing, clonir s: tuple assignment, tuple as return value; Sets: methods and op thods.	ng lists, list perators, Diction	naries:
Illustrati operation	ve progr is on sets	ams : find minimum in a list, list operations, create and insert e and tuples.	elements in a Di	ctionary,
Unit -	– III	FUNCTIONS AND STRINGS	Periods	12
Functions function module, r	s definition prototype regular ex	on, declaration, arguments, parameters – formal and local, pes, recursion; Strings: string slices, immutability, string fur pressions.	parameter passi nctions and m	ng methods - ethods, string
Illustrati longest of	ive progr ne, counti	ams : String manipulations, function that takes a list of words ing the vowels and consonants in a given string, exchanging o	and returns the f two values us	e length of the ing recursion.
Unit	- IV	FILES AND MODULES	Periods	12
Files and errors and Illustrati	exception d exception ive progr	n: Text files, reading and writing files, format operator; comma ons, handling exceptions, modules, accessing CSV file. ams: Word count, file copy, file operations: accessing a CSV f	and line argume	ents, e reports.
Unit	$-\mathbf{V}$	PACKAGES AND DATA VISUALIZATION	Periods	12
Text proc – vector,	essing, N data fram	umerical processing: numpy package – mean, medium and mo e, data visualization: matplotlib, Time operations.	ode, pandas pac	kage
Illustrati Pandas, C	ve progr Create a 3	ams : Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy.	from a diction	ary input using
Illustrati Pandas, C	ive progr Create a 3	ams : Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy.	from a dictionary from a dictionary from a dictionary from the second se	ary input using
Illustrati Pandas, C Text Boo	ive progr Create a 3 oks	rams : Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy.	from a dictionary Total Periods	ary input using 60
Illustrati Pandas, C Text Boo 1.	ive progr Create a 3 oks Anurag Librari	ams: Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy. Gupta,G.P BISWAS ," Python Programming – Problem es, Edition 1, Tata McGraw Hill, 2018	from a dictionary Total Periods solving, packa	ary input using 60 ages and
Illustrati Pandas, CText Boo1.2.	bks Anurag Librari E Balag Hill, 20	ams: Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy. Gupta,G.P BISWAS ," Python Programming – Problem es, Edition 1, Tata McGraw Hill, 2018 gurusamy, "Problem Solving and Python Programming", 018	from a dictionary Total Periods solving, packar Edition1 , Tat	ary input using 60 ages and aMcGraw
Illustrati Pandas, CText Boo1.2.3.	ve progr Create a 3 bks Anurag Librari E Balag Hill, 20 Reema Univer	ams: Bar chart, Pie Chart, Create and display a data frame x3 matrix with values from 2 to 10 using numpy. Gupta,G.P BISWAS ," Python Programming – Problem es, Edition 1, Tata McGraw Hill, 2018 gurusamy, "Problem Solving and Python Programming", 018 Thareja, "Python Programming using Problem Solving A sity Press, 2017.	from a dictionary Total Periods solving, packar Edition1 , Tat pproach", OX	ary input using 60 ages and aMcGraw FORD
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A COLOR MEMORY	17 HERE	VI	VEKA	NANI (Auton)HA (omous E	C OLL Institu layamp	EGE C tion, Aff alayam,)F EN filiated Tiruch	GINE to Anna engode	E RIN(a Unive – 637 2	G FOR rsity ,Cł 205	WOM aennai)	EN		TÜVRheinler	150 9001/2015				
Program	me	B.E					Progr	amme	e Code	•	102	Regu	ilation			2019				
Departm	ent	ELF	ECTR	ICAL	& E	LECI	ron	ICS E	NGIN	IEER	ING	Seme	ester			II				
Course C	Code	Cou	rse Na	me					Pe	riods l Week	Per	C	redit	N	Aaxim	um Ma	arks			
									L	Т	Р		С	C	CA	ESE	Total			
U19GE	202	Basic Civil and Mechanical Engineering*300340													40	60	100			
Cour Object	-se tive	The	 The student should be made to, Familiarize the materials and measurements used in Civil Engineering. Provide the exposure on the fundamental elements of civil engineering comstructures. Impart basic knowledge of power plants, pumps &boilers. Study the various types of IC engines and understand the features of IC eng Enable the students to distinguish the components and working principle of and air conditioning system 														s and ration			
		At t	he end	l of th	e cou	rse, th	e stude	ent sho	ould b	e able	to					Knov Le	vledge evel			
		CO of p	1: Exp	olain t n surv	he us eving	age of	civil e	engine	ering	materi	als and	l meası	ire the	locatio	on	n K2				
Cour	se	CO Qua	2: Iden lities.	ntify t	he na	ture o	f build	ing co	ompon	ents, s	tructur	es and	mater	ial		ŀ	K1			
Outcol	mes	CO	3: Cla	ssify t	he va	rious	types o	of pow	ver pla	nt, pu	mp, tui	bine &	boile	r		ŀ	K2			
		CO strol	4: Cor ke engi	npare ine.	spark	c ignit	ion and	d com	pressio	on igni	ition of	f two st	troke a	nd fou	r	ŀ	K2			
		CO syste	5: Ela em.	borate	the v	workir	ıg prin	ciple o	of refr	igerati	on and	air co	nditior	ning		ŀ	K3			
Pre requis	- ites	Nil																		
		(3/2/1	indicat	tes stre	ength	CO / of corr	PO Materia PO Atoria PO Atori	apping 3-Stro	g ong, 2-	– Medi	um, 1 -	Weak		C	O/PS() Mapp	oing			
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	COs	PO 1	2 PO	PO 3	4 PO	PO 5	6 PO	РО 7	8 8	9 9	10 PO	PO 11	12 PO	1	2	PS0 3	4			
	CO 1	3	3	3	2	3								3	2					
	CO 2 CO 3	3	<u> </u>	5 2	2	2 2								$\frac{3}{2}$	2					
	CO 4	3	3	2		2								2	5					
	CO 5	3	2	2		2								2						
Course	Assess	ment	Meth	ods																
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Indi	rect																			
1. Co	ourse -	end s	urvey													55				

Conte	ent of the	Syllabus		
Ur	nit – I	CIVIL ENGINEERING MATERIALS AND SURVEYING	Periods	9
Civil E	ngineering	g Materials: Bricks – Stones – Sand – Cement – Concrete – Steel sections	j.	
Surve	ying: Intro	oduction to Surveying & Leveling.		
Un	nit - II	BUILDING COMPONENTS AND STRUCTURES	Periods	9
Founda	tions: Site	e selection, Foundation – Types – Requirement of good foundations.		
Super	structure:	Brick masonry – Stone masonry – Beams – Columns – Lintels – Roofing	g – Flooring - F	Plastering.
Un	it - III	POWER PLANT ENGINEERING	Periods	9
Introd Electr recipr	uction, Cl ic, Solar, ocating pu	assification of Power Plants – Boiler - Working principle of steam , Gas , Wind and Nuclear Power plants – Merits and Demerits – Pumps and turb imps (single acting and double acting) – Centrifugal Pump.	, Diesel , Hydr ines – Workin	o- g principle of
Un	it - IV	IC ENGINES	Periods	9
Introd stroke	uction to cycles –	Electric vehicles- Internal combustion engines as automotive power plant Working of SI and CI engines - Comparison of four stroke and two stroke	– Four stroke e engines.	and two
Un	nit - V	REFRIGERATION AND AIR CONDITIONING SYSTEM	Periods	9
		То	tal Periods	45
Text	Book:			
1.	Dr.P.H	Kannan, "Basic Mechanical Engineering", JBR Tri Sea Publishers F	Pvt. Ltd., 201	9.
2.	Pravir	Kumar, "Basic Mechanical Engineering", Pearson Publishers, New	w Delhi, 2013	3.
Refe	rences			
1.	Dr.S.R	amachandaran, "Basic Civil and Mechanical Engineering" Air Wa	alk Publicatio	on,2016
2.	R.Gupt	a, "Basic Civil Engineering", RPH Publication, 2016.		
3.	Mrs.V. Publish	Valarmathi, Mr.K.Rajasekar & Mr.T.Satheeskumar, "Basic Civil Eners Pvt. Ltd., 2017.	ngineering", .	IBR Tri Sea
4.	G.Shar Hill Pu	mugam and M.S Palanichamy, "Basic Civil and Mechanical Engin blishing Company Limited, New Delhi,2014	eering ",Tata	McGraw
5.	S.Seeth	haraman, "Basic Civil Engineering", Anuradha Agencies, 2005		
E-Re	sources:			
1.	https://n	ptel.ac.in/downloads/105105104/		
2.	https://n	ptel.ac.in/courses/112107216/		
3.	http://lin	k.springer.com/"Basic Civil and Mechanical Engineering"-Springe	er Nature.	

	VIVE	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Colspan="2">Image: Colspan="2" B.E. Programme Code 102 Regulation 2019													
Programme	B.E.	TDIC	AT A	ND F	TECT	Progr	amme	Code	102	Regu	lation		2019		
Department	ELEC	NEER	ING							Sen	nester		II		
Course Code		Cour	se N	ame		Pe	riods Week	Per	Credit		Max	imum N	larks		
						L	Т	Р	C	C.	A	ESE	Total		
U19EE202	Electr	ic Ci	rcuit	Theo	ory	3	0	0	3	4	0	60	100		
Course Objective	The stu	 The students should made to Impart knowledge on solving circuit equations using network theorems Learn the phenomenon of resonance and coupled circuits. Learn the transient response of circuits. Learn the three phase system and two port networks 													
	At the end of the course, the student should be able to,														
	CO1: solving	CO1: Understand the basic laws, mesh current, nodal voltage methods for solving circuit problems.													
Course	Course CO2: Understand the basic network theorems used for solving networks with both DC and AC inputs.											K2			
Outcome	resona	Under nce c	rstanc ircuit	$\frac{1}{5}$ and $\frac{1}{1}$ the $\frac{1}{5}$	time r	ts and espons	termir e of ci	rcuit p	arameter	series & s.	rouite r	el vith	K2		
	star ar measu	nd de	ta contract	nnec hree	ted loaphase of	ads an	d the	concej	pt of pov	ver and	power	r factor	K2		
	CO5:	Under	stand	the t	wo-por	t netwo	orks an	d its in	terconnec	tions.			K2		
Pre-requisites	-														
(3/2/1 indic	ates stren	gth of	CO/I	PO M lation	apping	g ong, 2 –	Mediu	m, 1 -	Weak		CO/PS	О Марр	ing		
]	Progra	amme	Outcor	nes (PC	Ds)	,			I	PSOs			
COs PO P 1	O PO 2 3	PO 4	РО 5	PO 6	PO 7	РО 8	PO 9	PO 1 10	PO PO 11 12	PSO 1	PSO 2	PSO 3	PSO 4		
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CO 3 3 3	3 2								2	3	2	3			
$\begin{array}{c ccccc} \mathbf{CO4} & 3 & 2 \\ \hline \mathbf{CO5} & 3 & 2 \end{array}$	2	2							2	3		2			
Course Assessme	ent Meth	ods													
Direct 1. Continuous Assessment Test I, II &III 2. Assignment 3. End-Semester examinations Indirect 1. Course – end Survey															

Content o	f the sy	llahus		
Unit -	– I	DC AND AC STEADY STATE ANALYSIS	Periods	9
Definition	nofVolt	age,Current,Power,Energy,Powerfactor,Circuitparameters,-0	Dhmslaw–Kircl	noff [*] slaw- Concept
of DC circ	cuits - C	Concepts of AC Circuits- RMS value, Average value, Form	and Peak factor	S
– Mesh, N	Node an	d Loop analysis - Concept of real and reactive power.	Dorioda	0
Unit -		NETWORK THEOREMS	rerious	9
Thevenin" and ac cire	source sandNo cuits, S	- current source transformations, various Network theo orton sTheorem–MaximumPowerTransferTheorem–Reciproc tar-Delta transformations.	cityTheoreman	d applications to dc
Unit –	III	RESONANCE AND COUPLED CIRCUIT	Periods	9
Resonance	e in ser n- Self	ies and parallel circuits - Analysis of coupled circuits - Coef and Mutual induction.	ficient of coupl	ing - Dot
Unit -	IV	THREE PHASE SYSTEMS	Periods	9
Generatio symmetric	n of thr cal com	ee phase systems – Three phase star and delta circuits with l ponents – Measurement of Power and Power factor in three	balanced and un phase systems	balanced loads - - Problems.
Unit –	- V	TWO PORT NETWORK AND TRANSIENT RESPONSE	Periods	9
response of	of RL, I	RC and RLC circuits for step input.	Total Periods	45
Text Boo	ks			
1.	C. K Educ	Alexander and M. N. O. Sadiku, "Fundamental of Electric ation, 4 th edition. 2004	Circuits", McG	raw Hill
2.	W. H Educ	I. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis" eation, 2013.	, McGraw Hill	
Reference	es			
1.	Robi	ns & Miller, "Circuit Analysis Theory and Practice", Delma	r Publishers, 5t	h Edition, 2012.
2.	K. V	. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Ja	ico Publishers,	1999.
3.	D. R 1998	oy Choudhury, "Networks and Systems", New Age Internat.	ional Publicatio	ons,
4.	Theo Editi	dore F.Bogart, "Electric Circuits", McGraw Hill Electricity on, Glencoe.Publishers, 1992	and Electronic	services,2 nd
5.	Mah	mood Nahvi and Joseph Edminister, "Electric circuits", McC	Graw Hill ,5th I	Edition.2010
E-Resour	ces			
1.	https	://nptel.ac.in/courses/117106108/		
2.	http:/	//www.ee.iitm.ac.in/videolectures/doku.php?id=ec1010_201	4nk:start	
3.	https elect	://ocw.mit.edu/courses/electrical-engineering-and-computer ronics-spring-2007/lecture-notes/	-science/6-002-	circuits-and-

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Programme	B.E/B.TECH	Programme cod	e	10)2	Regulation	ı	2019							
Department	ELECTRICAL AN ENGINEERING	ID ELECTRONICS			Se	mester]	II						
			Per	iods p	er week	Credit	Max	imum I	Marks						
Course code	Cou	irse name	L	Т	Р	С	CA	ESE	Total						
U19TN201	தமிழர்மரபு/Herit	தமிழர்மரபு/Heritage of Tamils 2 0 0 1 40													
	Content of the syllabus														
அலகு 1	அலகு 1 மொழி மற்றும் இலக்கியம் Periods														
இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொடி															
 செவ்விலக்கி	பங்கள் - சங்ச	5 இலக்கியக்கின் ச	iou i ž	சார்ப	ா கன்	லை – ச	ங்க 🖻	~ லக்கிய	பக்கில்						
பகிர்கல் வ	பட்ட கிருக்குமளி	ில் மேலாண்மைக் ப	கை கருக்க	പ്പം	ு துறிற்க பிற்கு	ை காப்பிய	 ங்கள்	ക്വറിനം	- <u>அறை</u> கக்கில்						
சமண பௌச	ந்த சமயங்களில் நக சமயங்களில்	ன் காக்கம் - பக்கி	இல்க்	தியாற்.	ചാബ്ബ്	் கள் மும்று கள் மும்ற	வம் நா	ுன்றா பன்றா	கள் -						
சிம்மிலக்கியா	ந்த <u>ை</u> உடியான நகள் - கமிமி	ல் நவீன இலக்கியுக	து. க்கின்	ചബ് ഖണ്	ाउंठी - ८	கமிம் இல	ு <u>அ</u> க்கிய	வளர்க்	ச்சியில்						
பாரகியார் மர்	தான் பாரகிகாச	ன் ஆகியோரின் பங்க	ளிப்ப			<u> </u>									
		പിലങ്ങന് ഗാടർ ടരീത	പ	ங்கள்	പ <i>ര</i> ന										
அலகு 2 மரபு — பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை — Periods சிற்பக் கலை															
தயாரிக்கும்	തക്ഖിത <u>െ</u> പ് പെ	ாரு ட் கள், பொம்மைக	ണ് -	தோ்	செய்யும்	ക്കെ -	சுடும்	ன் சிற்	பங்கள்						
் நாட்டுப்புறத	த் தெய்வங்கள்	- குமரிமுனையில	ல் தி	நவள்	ளுவர் சி	സെ - ഉ	சைக்	கருவி	கள் -						
மிருதங்கம்,	പണ്ടെ, ഖീഞ്ഞെ.	யாழ், நாதஸ்வரம்	- Ę	நமிழர்	களின் ச	மூக பொ	ருளாத	ார வ	ாழ்வில்						
கோவல்களின்	ா பங்கு.														
<u> </u>	நாட்டுப்புறக் க	லைகள் மற்றும் வீர	ഖിതെ	ாயாட்	டுகள்:	I	Periods		3						
தெருக்கூத்து, சிலம்பாட்டம்	கரகாட்டம், வளரி பலியா	வில்லுப்பாட்டு, கணி பம் தமிமர்களின் வ	யான் 1ளைப	கூத்த பாட்டு	து, ஒயி கள்	லாட்டம், (தோல்ட	ாவைக்	கூத்து,						
<u>ച</u> ാന് 4	கமிமர்களின் க	<u>– உல், தமழாணான</u> கிணைக் கோட்பாடுக	<u>л:</u>		2011.	ŀ	Periods		3						
<u>க</u> மிமகக்கின்	<u>தாலாங்க</u> ளும்.	<u></u> விலங்குளும் - கெ	ால்கா	ப்பியப்	ណ់ពេរសំល ៤	சங்க இ	லக்கிய	பக்கில்	அகம்						
மர்றும் பிரக்	கோட்பாடுகள்	- தமிழர்கள் போற்றிய	ப அா	க்கோ	ட்பாடு -	சங்ககால	லத்தில்	தமிழக	 கத்தில்						
எழுத்தறிவும்,	கல்வியும் - ச	ங்ககால நகரங்களு	ம் துல	ົ ກິ <u>ທີ</u> (L	<u>ற</u> கங்களு	ம் - சங்க	<u>க</u> ாலத்த	தில் ஏ	ந்றுமதி						
மந்நும் இருக்	குமகி – கடல்ச	கடந்த நாடுகளில் சோ	ாமர்க	നിത് (ിഖന്നി.				0.						
			<u> </u>	_	C										
<u> </u>	இந்திய தேசிய	I இயக்கம் மற்றும் இ 	லந்தாட ஆந்தாட	J		I	Periods		3						
	பண்பாட்டிந்குத	, தமழாகளான பங்கள	πіцц:												
இந்திய வி(<u>ந</u> ிலைப்போரில்	தமிழர்களின் பங்	க	- 0	ந்தியாவி	<u>ன்</u> பிறப்ப	குதிக	ளில்	தமிழ்ப்						
பண்பாட்டின்	தாக்கம் - சுய	மரியாதை இயக்கம்	- @	ந்திய	மருத்துவ	பத்தில், சி	த்த ம	ருத்துவ	பத்தின்						
பங்கு – கல்	வெட்டுகள், கை	யெழுத்துப்படிகள் - த	தமிழ்ப்	ப புத்த	நகங்களி	ள் அச்சு வ	பரலாறு								
						Total Pe	riods	1	5						

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Programme	B.E/B.TECH	Programme cod	e	10	2	Regula	tion		2019						
Department	ELECTRIC H	AL AND ELECTRONICS	3		Se	emester		II							
			Perio	ds per	r week	Credit	Maxii	mum	Marks						
Course code	Cou	rse name	L	T	Р	С	CA	ESE	Total						
U19TN201	தமிழர்மரபு/ Herit	40	60	100											
	Content of the syllabus														
UNIT I	JNIT I LANGUAGE AND LITERATURE Periods 3														
Language Families in India-Dravidian Languages–Tamil as a Classical Language-															
ClassicalLitera	tureinTamil Secu	larNatureofSangamLite	erature	-Dist	ributive.	Justicein	Sangan	nLitera	ature-						
Management H	Classical Literature in Lamii Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural-Tamil Epics and Impact of Buddhism & Jainismin Tamil I and														
Bakthi Literatu	Bakthi Literature Azhwars and Navanmars-Forms of minor Poetry-Development of Modern literaturein														
Tamil-Contribution of Bharathiyar and Bharathidhasan.															
UNIT II	JNIT II HERITAGE-ROCK ART PAINTINGS TO MODERN ART-														
SCULPTURE Periods 3															
Herostonetomo	Herostonetomodernsculpture-Bronzeicons-Tribes and their handicrafts- Art of temple carmaking—														
Massive Terra	cotta sculptures '	Village deities, Thiruvall	uvar S	tatue	at Kany	akumari,l	Making	of m	usical						
instruments-Mr	idhangam,ParaiVe	enai,Yazhand Nadhasw	varam-1	Role o	of Temp	les in So	cial and	d Ecoi	nomic						
Life of Tamils.															
UNIT III	FOLK AND MA	RTIAL ARTS					Period	ls	3						
Therukoothu, H Tiger dance-Sp	Karagattam, Villu orts and Games of	Pattu, Kaniyan Koothu Tamik.	,Oyil	lattam,	Leathe	rpuppetry	,Silaml	battam	,Valari,						
UNI IV	THINAI CONCE	PT OF TAMILS					Period	ls	3						
Flora and Faun Aram Concept	a of Tamils & A of Tamils- Edu	hamand Puram Conce cation and Literacy du	pt from tring S	n Tho angan	lkappiya 1Age-Ar	m and S cient Ci	angam ties and	Litera d Port	ture- s of						
Sangam Age-E	xport and Import of	luring Sangam Age- Ove	erseas	Conqu	est of Ch	nolas.									
UNI V	UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL Periods 3														
Contribution or parts of India- Inscriptions & 2	f a mils to India Self-RespectMov Manuscripts–Prir	n Freedom Struggle-Tl ement-Role of Siddha it History of Tamil Boo	he Cul Medic oks.	tural I inein	nfluence Indigene	e of Tam ous Syste	ils ove ems of	er the Medi	other cine_						

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Text c	um-Reference Books
1	தமிழக வரலாறு — மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருநை -ஆற்றங்கரை நகரிகம்.(தொல்லியல் துறை வெயளியீடு)
5	Social Life of Tamik (Dr.K.K.Pillay) Ajoint public at 1 on of TNTB & ESC and RMRL
6	Life of the Tamik-The Classical Period (Dr.S.Singaravelu) (Published by : hternational Institute of Tamil Studies.
7	Historical Heritage of the Tamik (Dr.S.V.Subatamarnan,Dr.K.D.Thirunavukkarasu)(Publishedby:International Institute Of Tamil Studies}.
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmath1)(Publishedby.InternationalInstituteofTamilStudies)
9	Keeladi- 'Sangam City Civilization on the bank sof river Vaigai' (Joitly Pubhshedby:DepartmentofArchaeology&TamilNaduTextBookandEducationalService s Corporation, TamilNadu) .
10	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.P1llay) (Publishedby:The Author).
11	Porunai Civilization (Jointly Published by: Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, TamilNadu)
12	JourneyofCivilizationIndustoVaigai(R.Balakrishnan)(Publishedby:RMRL)- Reference Book.

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P	rogrami	me	B.E.	.]	Program	nme Co	ode			1	02	Regul	ation		2019		
D	epartme	ent E	LECTI	RICAL	AND E	LECTR	RONICS	S ENGI	NEERII	NG	Se	emeste	r		II		
Cour	rse Cod	e	Course Name				Peri	ods Per	Week	Cre	dit		Maxi	Aaximum Marks			
Cour		C		course	i vuine		L	Т	Р	C	1	C	A	ESE	То	tal	
U19	PH208	3	PHYSI	CS LAE	BORAT	ORY ^{\$}	0	0	4	2		6	0	40	10	00	
Cours Objec	se stive	Т	he main	n objec Unders Predict Gain kr To Iden Observ Unders • To lea	tive of t tand ela viscous nowledg ntify wa e heat c tand the arn about	this countries that the second	irse is t havior o in liqui easurin ths of p ion in b ple of i haracte	o: of Mate ds. g the lo romine ad con- nterfero ristics o	erials west th nt lines ductor ometer of Lase	icknes using	ss ma poly	terials chrom	atic la	mp			
	The students who complete this course successfully are expected to													Knowledge Level			
		C	C O1: Ca	lculate	young"s	modulu	softher	naterial	s.					K	2		
		C	CO2: Calculate Coefficient of viscosity of liquid. K2														
Cours	20	C	C O3: Ca	alculate		K	1										
Outco	ome	C S	CO4: Observe and measure different wavelengths of mercury K1														
		C	CO5: Illustrate the conductivity of bad conductors K2														
		C li	CO6: To know how to determine the velocity of ultrasonic waves in K1 liquid														
		C 0	C O7: To rdinary	o under light	stand th	ne impo	ortance	of laser	beam o	compa	red t	0	K2				
Pre-re	equisite	es	-														
													-				
GG	(3/2	2/1 indi	cates str	ength of	CO / PO) Mapp tion) 3-	oing Strong, 2	2 - Med	ium, 1 -	Weak			C	O/PSO	Mappi	ng	
COs	DO 1	DC 2	DO 2	DO 4	Program	me Out	comes (POs)	DO A	DO.	PO	PO	DCO	PS	Os	DCO	
		PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	11 PO	PO 12	PS0 1	2 PSO	PS0 3	4 PSO	
CO 1	3	-	3										1		2		
CO 2 CO 3	3	<u> </u>	$\frac{1}{2}$												3		
CO 4	3	3	2												3		
CO 5	3	-	1												1		
				-													
Cours Diree 1 2	Direct 1. Pre lab and post lab test 2. End-Semester examinations																

Indirect

1. Course – end survey

CONTENT OF THE SYLLABUS

C N		00							
S.No.	Experiments	CO							
1.	Determination of Young's modulus of the material - Uniform bending method	CO1							
2.	Determination of Young's modulus of the material - Non uniform bending method	CO1							
3.	Determination of Rigidity modulus – Torsion pendulum	CO1							
4.	Determination of Coefficient of viscosity of a liquid – Poiseuille's method	CO2							
5.	Determination of thickness of a thin material – Air wedge method	CO2							
6.	Determination of wavelength of mercury spectrum – spectrometer grating	CO3							
7.	Determination of Dispersive power of a prism – Spectrometer	CO3							
8.	Determination of thermal conductivity of metallic glass using Lee's Disc Method	CO4							
9.	9. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer								
10.	Determination of Wavelength and particle size using Laser	CO5							
	Total Periods	45							
Lab Manua	1								
1.	R. Jayaraman, Engineering Physics Laboratory Manual ,Pearson Pub,Edition-2018.								
2. A.K. Katiyar &C.K. PandeyEngineering Physics: Theory and Practical, Wiley Pub, 2 nd Edition.									



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EWDOME													
Programme	B.Tech	Program	ne Coc	le 1	05	Regulation	1	2019					
Department	Electrical & Ele	ectronics Engineer	ing			Semester		II					
Course Code	Course Name		Per	iods l Week	Per	Credit	Maxi	mum Marks					
			L	Т	Р	С	CA	ESE	Total				
U19GE203	Engineering Pra Laboratory	actices	0	0	4	2	50	50	100				
Course Objective	The main objecti The students sho • Know the • Weld lap • Learn the • Learn the • Learn the • Learn the	 The main objective of this course is to. The students should made to Know the plumbing line assemblies. Weld lap joint, butt joint and T-joint. Learn the assembling and dismantling methodology of home appliances. Learn the resistor value identification through colors coated on resistor. Learn the basics of signal generation in CRO. Learn the soldering techniques in PCB board for designing the projects 											
	At the end of the c	Knov Le	vledge evel										
	CO1: Perform requirements and	ŀ	\$2										
Course	CO2: Make vari carpentry.	ious joints such as	cross l	ap jo	int and	l Tee lap jo	int in the	K2					
Outcomes	CO3: Understa measurements of	nd the basics of basic electrical qu	f hous antities	se wi s.	iring	techniques	and the	e K2					
	CO4 : Understan resistor.	d the resistor value	identi	ficatio	on thro	ough colors	coated on	on K2					
	CO5: Understar projects.	ŀ	٢2										
re -requisites	Nil												
							CO/D	50	-				

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping		
co	Programme Outcomes (POs)											PSOs				
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	РО 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	
CO 1	3	2	3	2	2	-	-	-	2	-	-	-	2	2	-	
CO 2	3	2	3	2	2	_	-	-	2	-	_	-	3	2	-	
CO 3	3	2	2	3	2	2	-	-	2	-	_	-	2	-	-	
CO 4	3	2	2	3	2	2	-	-	2	-	_	-	2	-	-	
CO 5	3	2	3	3	2	2	-	-	2	-	-	-	3	3	-	

Course Assessment Methods

Direct

1.Pre lab and Post lab test

2. Record mark

3.End- Semester Examinations

Indirect

1.Course –End survey

Content of the Syllabus

<u>GROUP A</u> (CIVIL & MECHANICAL ENGINEERING) (CIVIL ENGINEERING PRACTICE)

Plumbing :	000
1. Study of pipeline joints, its location and functions: valves, taps, couplings, unions,	002
reducers and elbows in household fittings.	
2. Hands-on-exercise. Basic pipe connections – wixed pipe material connection – Tipe connections with different joining components	CO2
connections with different joining components	
Carpentry:	CO2
3. Study of the joints in roofs, doors, windows and furniture.	
4. Hands-on-exercise: Wood work, joints by sawing, planning and cutting.	CO2
MECHANICAL ENGINEERING PRACTICE	
Welding:	001
5. Preparation of arc welding of butt joints, lap joints and tee joints.	COI
6 Con multiple prosting	001
6. Gas welding practice	COI
Basic Machining:	CO1
7. Turning and Facing.	001
8.Drilling Practice	CO1
Sheet Metal Work:	CO1
9. Forming & Bending	
10. Model making – Tray and Basket.	CO1
4.Demonstration on:	
(a) Foundry operations like mould preparation for gear and step cone pulley.	
(b) Fitting – Exercises – Preparation of square fitting and vee – fitting models.	
5. Study of Air Conditioner & Centrifugal Pump.	
<u>GROUP B</u> (ELECTRICAL & ELECTRONICS ENGINEERING)	
III. <u>ELECTRICAL ENGINEERING PRACTICE</u>	
1 Residential house wiring and stair case wiring using switches fuse indicator & lamp	CO3
1. Residential house withing and stan case withing using switches, fuse, indicator & famp.	003
2. Fluorescent lamp wiring.	CO3
3. Measurement of voltage, current, power & power factor using R-Load.	CO3
4. Measurement of energy using single phase meter.	CO3
5. Measurement of resistance to earth of electrical equipment.	CO3

6. M	leasurement of illumination to earth of electrical equipment.	CO3
7. St	udy of batteries.	CO3
IV.	ELECTRONICS ENGINEERING PRACTICE	
1. St	udy of Electronic components and equipments – Resistor, colour coding.	CO4
2. St	tudy of logic gates AND, OR, NOR, NAND and NOT.	CO4
3. G	eneration of Clock Signal.	CO4
4. Se	oldering practice – Components Devices and Circuits – Using general purpose PCB	CO5
Refe	Total Periods	45
Refe R1.	Total Periods erence Book : Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laborate Manual. First Edition, 2017.	45
Refe R1. R2.	Total Periods Total Periods erence Book : Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laborate Manual. First Edition, 2017. Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vika Publishing House Pvt Ltd, 2017.	45 Dry" as
Refe R1. R2.	Total Periods rence Book : Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laborate Manual. First Edition, 2017. Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vika Publishing House Pvt Ltd, 2017.	45 Dry" as
Refe R1. R2.	Total Periods rence Book : Dr.P.Kannan, Mr.T.Satheeskumar & Mr.K.Rajasekar, "Engineering Practices Laborato Manual. First Edition, 2017. Mr.T.Jeyapoovan, Mr.M.Saravana Pandian, "Engineering Practices Lab" Manual, Vika Publishing House Pvt Ltd, 2017.	45 Dry" as

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Pro	gramme	B.E	•						Progra	mme c	ode]	Regu	lation		2019
Dep	artment	ELI	ECTRI	CAL A	ND EI	LECTI	RONIC	S ENG	GINEE	RING				Sei	mester		II
Cours	se code				Co	urse				Pe	riods week	per	Cre	dit	Μ	laximu	m Marks
					na	me				L	Т	Р	C	1	CA	ESE	Total
U19N	ICFY1	Env	vironm	ental S	Scienc	e and	Engin	eering	g	3	0	0	0)	100	-	100
Obj	bjective The students should be made to • Familiarize basics of ecosystem and creating environmental awareness. • Congregate quality and standards requirement of water. • Contrast water management procedures. • Acquire knowledge on air pollution and its control. • Summarize Solid waste and its prevention methods.																
		At t	he end	of the c	course,	the st	udent s	hould	be able	to,							Knowledg e Level
		CO	1:Disti	nguish	the ty	pes of	Ecosy	vstem a	und im	plicit t	he kn	owled	ge.				K1
Outco	mes		2:Reco	ognize (quality	, stan	dard an	nd con	trol str	ategies	s of p	olluted	l wate	r.			K3 K3
			4 : Aco	uire K	nowlea	doe ah	$\frac{1}{0}$ out Ra	dioact	ive po	llution	and d	lisnos	al met	hod			K3 K3
		CO	5:Awe	raness	about	popul	ation 2	rowth	huma	n right	s and	Envir	onmei	nt			K2
Pre-re	quisites	Nil				1 1		· · ·									
	(3/	2/1 ind	icates st	C trength	O / PC of corr W) Map elation Veak	p ing) 3-Stro	ong, 2 -	- Mediu	ım, 1 -			0	CO/P	SO Ma	pping	
COs				Pr	ogram	me Ou	tcomes	(POs)							PSO		
005	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO	PO 12	PS O1	PS O2	PSO	PSC)
CO 1	3		1				1				1	2	01	02	5		
CO 2	1	$\frac{2}{2}$	2			2	3				1	3			1		
CO 3	1	1	1			2	3				1	2					
CO 5	1	2	1			2	2				1	3					
Course Direct 1 2 3 Indir 1	Assessn . Conti . Assig . End-: ect . Cour	nent M inuous gnment Semest se – en	Assess Assess : Simul er exar d surve	ment T ation u ninatio	est I, I sing ns	I &III tool											
				-													

Content	of the syllabus		
Unit	- I INTRODUCTION TO ENVIRONMENTAL SCIENCE AND ENGINEERING	Periods	9
Nature a problem Biodiver sustainal	nd scope of environmental education- Natural Resources – (Forest, Water, Forest, Ecosystem and Biodiversity- Ecosystem-Structure, Characteristics and fur sity – Definition – Conservation of Biodiversity (in-situ and Ex-situ) ble development	ood, Energy &Land Reso actions of ecosystem (in Environmental aware	ources) general)- eness and
Unit	II WATER POLLUTION AND WASTE WATER TREATMENT PROCESS.	Periods	9
Water po Primary, quality s	ollution-causes, effects and control measures of water pollution- case study Secondary, Tertiary and desalination -Water quality parameters- Hardness, tandard- WHO and BIS.	- Waste water treatmen Alkalinity, DO, COD, B	t process- OD-Water
Unit -	III AIR POLLUTION AND ITS CONTROL	Periods	9
Air Poll effect, C chamber	ation – Types of Air pollutants-CO2,SO2, NO2, PAN etc Sources- causes zone layer depletion and global warming)- control measures (Electro static Baghouse filter, Wet Scrubber and cyclone separator).	s, effects (Acid rain, G precipitator, Gravitation	reen house nal settling
Unit -	IV RADIOACTIVE POLLUTION AND SOLID WASTE MANAGEMENT	Periods	9
Light was study- so Significa Unit	tter nuclear power plant- Diagram- illustration- working – pollution- impa blid waste-definition-Types of solid waste- Disposal method and its proble nce for prevention of hazardous waste management • V HUMAN POPULATION AND THE ENVIRONMENT	nets-and control measur m in solid waste mana	es- case gement-
Populati and Chi System (on growth, Human rights, Value education, environment and Human health, d welfare, Role of information technology in environment – Satellite, Dat GIA), Environmental impact Analysis (EIA) and Human health	Family welfare Program a base, Geographical I	m, Women nformation
		Total Periods	45
Text bo	Dr.S. Vairam, "Environment Science and Engineering" Gems r	publication. Edition	2018
2.	Gilbert.M.Masters-"Environmental Science"-Pearson education. Edition-2-2	2013	
Referen	ce books		
1. 2. 3. 4.	Linda Williams- "Environmental Science"-Tata McGRAW – Hill Edition. H T.G.Miller Jr-"Environmental Science"-Wadsworth publishing Co. Edition William P. Cunningham, Barbara Woodworth Saigo- Tata McGraw Hill.Ed NPTEL Course Notes	Edition-I-2008 -10-2004 ition-4-2011	
5.	Cunnighum and cooper-"Environmental Science"-Jaico Publ, House Edition	n-4-2007	
E-Resou	rses		
1.	https://libraries.ou.edu/		
2.	https://libguides.reading.ac.uk/		
3.	https://libguides.reading.ac.uk/		

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Pr	noramr	ne	BE				Pro	oramm	e Code	102	R	eoula	tion		2019	
	orgiann									102		Same	atan		1	
De	epartme		LLEC I ENGIN	KICAI EERIN	l and IG	ELEC	IKON	ICS				Seme	ster		I	
~	~ .						Period	ls Per V	Week	Credi	t]	Maxir	num M	arks	
Cour	se Code	e	C	Course I	Name		L	Т	Р	С		CA		ESE	To	tal
			Indian	Consti	itution	and										
U19N	MCFY2	2	Univers	sal Hur	nan Va	alues	3	0	0	0		100		0	10	0
Cour Objec	rse tive	 The students should be made to know about Indian constitution. know about central and state government functionalities in India know about Indian society. 														
		A	At the end of the course, the student should be able to, Knowledge level												e	
		(CO 1:Ur	ndersta	nd the f	unction	ns of the	e India	ı gover	mment					K1	
		(CO2: Ur	ndersta	nd and	abide tl	he rules	of the	Indian	constit	ution	l			K1	
Ou	itcome	C	CO3: Ur	nderstai	nd and	appreci	iate diff	erent c	ulture a	among	the p	eople			K1	
C	Course	t	CO4:Un he mate	derstan rial	dinghu	manbe	ingasac	o-existe	enceoft	hesenti	ent,,I	and			K1,K2	2
		t A f	he prof Ability (riendly	Tessiona to ident Produc	al comp tify the tion system	scope	e for a and ch	ugment naracter	ing un	niversal	hun ble-fri	nan o iendly	rder and	and eco	K2	
Pre-re	equisite	s -														
	•															
	(2)	/1 • 1•		.1 .(CO/PO) Mapp	oing		r 1	XX 7 1			C	O/PSO	Маррі	ng
	(3/2/	1 indi	cates stro	ength of	Program	me Out	comes ($\frac{2 - \text{Med}}{\text{POs}}$	num, 1	- weak				PS	SOs	0
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1						3		3	2	10	11	12	1	2	5	-
CO 2						3		3	3							
CO 3						3		3	2							
CO 4						3		3	3							
												I				
Course	e Assess	sment	Metho	ds												
Direc	• 1															
1	. Cont	inuou	s Assess	sment T	est I, II	&III										
2	. Assi	gnmei	nt: Simu	lation u	ising too	ol										
3	End-	Seme	ster exa	minatio	ns											
1 Indir	Com	'se _ e	and surve	ev												
	. Cou	e		C y											(0)	

Content of	the syllabus		
Unit –	I INTRODUCTION	Periods	9
Historical	Background – Constituent Assembly of India – Fundamental Rig	nts – Citizenship	o – Constitutional
Remedies	for citizens		
Unit -	II STRUCTURE AND FUNCTION OF CENTRAL	Periods	9
Union Go	vernment - Structures of the Union Government and Functi	ons – Presiden	t – Vice President
– Prime M	Inister – Cabinet – Parliament – Supreme Court of India		
Unit – I	II STRUCTURE AND FUCTION OF STATE	Periods	9
State Gov	ernment - Structure and Functions - Governor - Chief Min	ister – Cabinet	– State
Legislatu	e – Judicial System in States – High Courts and other Subo	dinate Courts	
Unit - I	V Universal Human Values	Periods	9
Course In	troduction - Need, Basic Guidelines, Content and Process f	or Value Educa	ation
I luit	OPTOEL Universal Human Values - Professional	Dariada	0
Unit –	V Ethics ECTRONICS	renous	9
Understor	ding Harmony in the Human Baing Harmony in Myself a	ad acciety	
Understan	ang harmony in the human being - harmony in Mysen a	id society.	
		Total Periods	45
Text Book	S		
	Durga Das Basu, "Introduction to the Constitution of India	", Prentice Ha	all of India, New
1.	Delhi.		
2	Tanushukla, Human Values and professional Ethics, Cenga	ge publication	s.
2.		0 1	
Reference		1.0	
1.	R.C.Agarwal, (1997) "Indian Political System", S.Chand a	ind Company,	New Delhi
2.	Indian polity, M.Laksmikanth, Tatamchrawhill publication	s	
3	R R Gaur, R Sangal, G P Bagaria, A foundation course in	Human Value	s and professional
	Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46	5781-2	
E-Resourc	es		
1.	https://mhrd.gov.in/		
2.	https://niti.gov.in/content/niti-aayog-library		
3.	www.drishtiias.com/		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205									TV/Harbert CENTER B TRONENS		
Programme	B.E.		Pro	gramm	e Code	102	Regulat	tion	2019			
Department	ELECTRICAL	AND ELECTRONICS ENGINEERING Semester								III		
Course Code	Cour	se Name	Period	ls Per	Week	Credit	Ν	Maxir	kimum Marks			
		50 Tume	L	Т	Р	С	CA		ESE	Total		
U19MA303	Transforms and Differential Equ	l Partial uations	3	1	0	4	40		60	100		
Course Objective	The students sho Introduce Solve bo Acquaint various si A acquain Introduce that mode systems.	e the basic concepts o undary value problem the student with Fou tuations. In the student with Fou the effective mather el several physical pro	f PDE f ns by us rier seri urier tra matical ocesses	for solv ing For es tech nsforn tools f and to	ving star urier se nniques n techni for the develop	ndard pa ries. in solvir ques use solution p Z trans	rtial differ ng heat flo ed in wide s of partis	rentia ow pr e vario al dif hniqu	al equat oblems ety of s fferenti es for o	tions s used in situations. al equations discrete time		
Course Outcome	At the end of the CO1 Solve diffe vital role in engi CO2: Understan CO3: Appreciate solving one and wave equations.	course, the student sho erential equations usi neering applications. d how to solve the giv e the physical signific two dimensional heat	ven stan cance of flow pi	dard p f Fouri	ries ana artial di er serie s and o	alysis wh afferentia s technic ne dimer	nich plays Il equation ques in hsional	s a ns	K K K	2,K4 3,K4 3,K5		
	wave equations.CO4: Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.K2,K5CO5: Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete timeK1,K3									2,K5 11,K3		
Pre-requisites	- systems.											
(3/2/1 indicates strer	CO / PO Mappin agth of correlation) 3-St	1g rong, 2 -	- Mediu	ım, 1 - V	Weak		CO/P	SO Ma	apping		

	(3/2	2/1 indi	cates str	ength of	CO / Po f correla	O Mapp tion) 3-	oing Strong,	2 – Mec	lium, 1 ·	- Weak	Ξ		CO/PS	SO Map	ping
COs					Progran	nme Out	comes ((POs)					PSOs		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3											2		
CO 2	3	3											2		
CO 3	3	3											2		
CO 4	3	3											2		
CO 5	3	3											2		

Course As	sessment Methods															
Direct																
1. C	Continuous Assessment Test I, II &III															
2. A	ssignment: Simulation using tool															
J. E. Indirect	nd-Semester examinations															
	urse - end survey															
Content of	f the svllabus															
Unit –	I FOURIER SERIES	Periods	12													
Dirichlet"so	conditions-GeneralFourierseries-Changeofinterval-Oddandevenfunctions-	-HalfrangeSine	series													
– Half rang	ge Cosine series – Harmonic analysis.	1														
Unit - I	II PARTIAL DIFFERENTIAL EQUATIONS	Periods	12													
Formation	of partial differential equations by elimination of arbitrary constants and a	rbitrary functio	ns – Singular													
integral - S	olution of Standard types of first order partial differential equations -Lagra	ange"s linear eo	quation – Solution													
of homoge	neous linear partial differential equations of higher order with constant coefficients of the second s	efficients.														
Unit – I	III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS	Periods	12													
Classificat	ion of second order quasi linear partial differential equations - Solutions o	f one dimension	nal wave equation													
– One dim	ensional heat equation – Steady state solution of two dimensional heat equ	ation (excludin	g insulatededges).													
Unit - I	V FOURIER TRANSFORM	Periods	12													
Fourier Int	egral theorem (without proof) – Fourier transform pair – Properties (witho	ut proof) – Tra	nsforms of simple													
functions -	- Fourier Sine and Cosine transforms – Properties (without proof) – Co	onvolution theo	orem and Parseval's													
Identity (Si	tatement and applications only).	Dariada	10													
Definition	V Z-IKANSFORM	7 transformer I														
Definition method F	- Z-transform of some basic functions - Elementary properties - Inverse	Z-transform: F	artial fraction													
Solution of		applications of														
Solution of	difference equations.															
	difference equations.	Total Periods	60													
Text Book	s difference equations.	Total Periods	60													
Text Book	s Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F	Total Periods	60 ni, 2014.													
Text Book	s Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro	Total Periods Publishers, Dell blems.(8 th Editi	60 ni, 2014. non), McGraw-													
Text Book	<i>s</i> Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011.	Total Periods Publishers, Dell blems.(8 th Editi	60 ni, 2014. ton), McGraw-													
Text Book 1. 2. Reference	s Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s	Total Periods Publishers, Delh blems.(8 th Editi	60 ni, 2014. non), McGraw-													
Text Book 1. 2. Reference 1.	s Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013.	Total Periods Publishers, Dell blems.(8 th Editi	60 ni, 2014. non), McGraw-													
Text Book 1. 2. Reference 1. 2.	 difference equations. s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V 	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015).	60 ni, 2014. on), McGraw-													
Text Book 1. 2. Reference 1. 2.	 difference equations. s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John W Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill I 	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015). Publishing Con	60 ni, 2014. on), McGraw-													
Text Book 1. 2. Reference 1. 2. 3.	 s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. 	Total Periods Publishers, Delh blems.(8 th Editi Viley (2015). Publishing Con	60 hi, 2014. Ion), McGraw-													
Text Book 1. 2. Reference 1. 2. 3. 4.	s Grewal B.S., "Higher Engineering Mathematics", 43 rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mar 1999.	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015). Publishing Con gham Publishe	60 hi, 2014. fon), McGraw- npany Limited, rs, 2 nd Edition,													
Text Book 1. 2. Reference 1. 2. 3. 4. 5.	 s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mar 1999. Ray Wylie. C and Barrett.C, "Advanced Engineering Mathematics "Tat Ltd, Sixth Edition ,New Delhi 2012. 	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015). Publishing Con gham Publishe a Mc Graw Hil	60 hi, 2014. fon), McGraw- npany Limited, rs, 2 nd Edition, l Education Pvt													
Text Book 1. 2. Reference 1. 2. 3. 4. 5. E-Resource	 s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mat 1999. Ray Wylie. C and Barrett.C, "Advanced Engineering Mathematics "Tat Ltd, Sixth Edition ,New Delhi 2012. 	Total Periods Publishers, Delh blems.(8 th Editi Viley (2015). Publishing Con gham Publishe a Mc Graw Hil	60 hi, 2014. ion), McGraw- npany Limited, rs, 2 nd Edition, l Education Pvt													
Text Book 1. 2. Reference 1. 2. 3. 4. 5. E-Resource 1	 s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mar 1999. Ray Wylie. C and Barrett.C, "Advanced Engineering Mathematics "Tat Ltd, Sixth Edition ,New Delhi 2012. 	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015). Publishing Con gham Publishe a Mc Graw Hil	60 hi, 2014. hon), McGraw- hpany Limited, rs, 2 nd Edition, 1 Education Pvt													
Text Book 1. 2. Reference 1. 2. 3. 4. 5. E-Resource 1. 2.	 difference equations. <i>s</i> Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. <i>s</i> Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mar 1999. Ray Wylie. C and Barrett.C, "Advanced Engineering Mathematics "Tat Ltd, Sixth Edition ,New Delhi 2012. <i>ses</i> https://learnengineering.in www.learnersty.com/Free-engineering-Video-lectures 	Total Periods Publishers, Dell blems.(8 th Editi Viley (2015). Publishing Con gham Publishe a Mc Graw Hil	60 hi, 2014. Ion), McGraw- npany Limited, rs, 2 nd Edition, 1 Education Pvt													
Text Book 1. 2. Reference 1. 2. 3. 4. 5. E-Resource 1. 2. 3.	 Gifference equations. s Grewal B.S., "Higher Engineering Mathematics", 43rd Edition, Khanna F Churchill, R.V. and Brown, J. W., Fourier series and boundary value pro Hill,2011. s Veerarajan T, Engineering Mathematics, McGraw Hill Education, 2013. Kreyszig, E., Advanced Engineering Mathematics (10th Edition), John V Ramana.B.V., "Higher Engineering Mathematics", Tata Mc Graw Hill 1 New Delhi, 2008. P.R.Vittal, "Differential equations Fourier and Laplce Transforms", Mar 1999. Ray Wylie. C and Barrett.C, "Advanced Engineering Mathematics "Tat Ltd, Sixth Edition ,New Delhi 2012. res https://learnengineering.in www.learnerstv.com/Free-engineering-Video-lectures www.nptel.ac.in 	Total Periods Publishers, Delf blems.(8 th Editi Viley (2015). Publishing Con gham Publishe a Mc Graw Hil	60 hi, 2014. Ion), McGraw- npany Limited, rs, 2 nd Edition, l Education Pvt													
			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205												Kheinand Brittebo	
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Pro	gramn	ne l	B.E.			Progra	mme	Code			102	Regula	ation		2019	
Dep	partme	nt E	LECT NGIN	RICA EERI	L AN NG	D ELE	CTR	ONICS	5			Seme	ester		III	
Course	. Cada			Course	Nom		F	Periods	Per W	'eek	Credit		Maxi	mum M	Iarks	
Cours				Course		e		L	Т	Р	С	CA		ESE	To	otal
U19E	E303	А	nalog	Electr	onics			3	0	0	3	40		60	1	00
Cor Obje	Course Objective The student should be made to, • Understand the electronic semiconductor devices & circuits giving importance to the various aspects of design & analysis. • Understand the different types of filter & oscillator circuits and their design. • Learn the concept of small signal and large signal amplifiers. • Familiarize the students with feedback amplifiers and its applications															
		А	At the end of the course, the student should be able to,													ledge
		С	CO1:Design biasing scheme for transistor circuits													2
Со	urse	C	CO2: Choose the proper signal amplifier for electronic circuit applications												K	4
Out	come	C	:03: Ui	ndersta	nd the	operat	ion of	feedba	ick am	plifie	rs and its v	various a	pplica	tions	K4	
		C	2 04: Cl	100se t	he osc	illator f	for spe	ecific a	pplicat	tions.					K2	
		C	2 05: C	hoose	the filt	ter and	regula	tor for	specif	ïc app	lications.				К3	
Pre-req	uisites	5 -														
	(3/2	2/1 ind	icates s	strength	CO of cor	/ PO Marelation)	apping) 3-Stro	g ong, 2 –	- Mediu	ım, 1 -	Weak		C	O/PSO	Mappi	ing
					Prog	gramme	Outco	mes (P	Os)					PS	SOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	3											3	2			
CO 2	3	2			2							3	3	2	3	
CO 3	2	2	1		2							3	3	2	3	
CO 4	2		2									3	3			
CO 5	1 2 2 3 3 2													3		
Course Direct Indirec	Direct 1. Continuous Assessment Test I, II &III 2. Assignment 3. End-Semester examinations Indirect 1.Course - end survey															

Content	of the syllabus		
Unit –	I SEMICONDUCTOR DEVICES	Periods	9
Review of	Diodes, transistor, FET, UJT- characteristics. Biasing of BJT-AC	analysis of BJT	and FET.
Unit -	II SIGNAL AMPLIFIERS	Periods	9
Small sign	al amplifiers(CE,CB,CC configuration) -Large signal amplifiers -	class A and class	B power amplifiers,
class C and	l class D amplifiers -Tuned amplifiers.	1	1
Unit – I	III FEEDBACK AMPLIFIERS	Periods	9
Concept of E	feedback, Classification of feedback amplifiers, General characte	ristics of negativ	e feedback amplifiers,
shunt feed	back amplifiers with discrete components and their analysis	e shunt, current	series, and current
Unit -	V OSCILLATORS	Periods	9
RCoscillat	ors(RCPhaseshiftoscillatorandWeinBridgeoscillator)–LCoscillator	s(HartleyandCol	pitt [®] s)-
Derivation	of frequency of oscillation for the above mentioned oscillators- C	rystal oscillator	
Unit –	V FILTERS AND REGULATORS	Periods	9
Introductio	on of Filter and it types (Inductor filter, Capacitor filter, L-section f	filter, P- section	filter, Multiple L-
section and	I Multiple P-section filter), Simple circuit of a regulator using zene	er diode, Series a	and Shunt voltage
regulators.			4 7
T t D 1		Total Periods	45
1 ext Book		·	1: 0000
1.	David A.Bell, "Electronic Devices and Circuits", 3rd Edition, Pr	entice Hall of In	dia, 2008.
2.	Robet.L.Boylestad, "Electronic Circuits and Circuit Theory", Per	arson, 10th Editi	on, 2009.
Reference			D 1::: 0 010
1.	Millman and Halkias, "Electronic Devices and Circuits", Tata M	cGraw Hill 3rd	Edition, 2010.
2.	Gayakwad.R.A, "Op-amps and Linear Integrated Circuits", Pren Edition, 2002.	tice Hall of India	a, New Delhi, 4th
3.	Roy Choudhery.D and Sheil B. Jain, "Linear Integrated Circuits' 2011.	', New Age Publ	ishers, 2nd Edition,
4.	Boylestad R. L. and L. Nashelsky, Electronic Devices and Circui India, 2009.	t Theory, 10/e, I	Pearson Education
5.	Sedra Smith, "Microelectronic Circuits", Oxford university Press	s, 6th Edition, 20	013.
E-Resource	es		
1.	http://www.electronics-tutorials.ws/diode/diode_3.html		
2.	http://www.electronics-tutorials.ws/transistor/tran_4.html		
3.	http://www.electronics-tutorials.ws/opamp/opamp_4.html		
4.	http://www.electronics-tutorials.ws/waveforms/555_timer.html		

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Pro	ogramn	ne]	B.E.					Progr	Regu	lation		20	19			
De	epartme	ent E	LECT NGIN	TRICA	L ANI NG) ELE(CTRO	NICS				Semest	er		III	
(Course			701100	Nomo		Pe	eriods	Per W	eek	Credit		Maxi	mum Ma	rks	
	Code		,	Course	Iname		L	Г		Р	С	CA	ES	SE	Тс	tal
U	19EE3(04 D	Digital	Logic (Circuit	ts	3	C)	0	3	40	6	0	1(00
0	Course • Acquire the basic knowledge of digital logic levels and application Objective • Understand the knowledge about digital electronics circuits. • Analysis of various digital electronic circuits															
		А	At the end of the course, the student should be able to, Knowledge Level													
	~	C at	CO1: Understand different number systems and various logic families K1 and their uses in digital electronics.													
	Course	C	CO2: Design and Implement the Combinational Circuits K2													
0	outcom	e C	CO3: A	nalyzet	he sim	plificati	on of	synchr	onous	sequen	tial circui	its			K1	
		C	CO4: A	nalyze	the sin	nplifica	tion of	f async	chrono	us sequ	ential cire	cuits			K4	
		C	2 05: Io	lentify	the log	ic famil	lies an	d men	nory de	evices					K4	
re	Pre- equisite	es -														
	(3	/2/1 in	dicates	strength	CO / of corr	PO Ma relation)	pping 3-Stro	ng, 2 –	Mediu	m, 1– W	/eak			CO/PSO	Mappi	ng
			T	Γ	Prog	amme C	Dutcom	nes (PO	s)	I	- 1			PS	Os	
DS	PO1	PO2	PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO 9 PO 10 PO 11 PO12 PS01 PS0 2 PS03 PS												PSO 4	
1	3												2			
2	3	3	3											2		
3	3	3	3											2		
4																
, C			nont N	/other										T		
))irect	ssessi	nent N	retiloa	3											
	muu															

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

1. Course - end survey

Conter	nt of 1	the syllabus		
Unit –	Ι	BOOLEAN ALGEBRA AND MINIMIZATION		0
		TECHNIQUES	Periods	9
Introdu Boolea a Boole Form to Map - conditi	iction in Alg ean E o stan Four ons	to number systems, binary codes, error detection and correct gebra - Reducing Boolean - Expressions – Boolean Functions an Expression in SOP Form to the standard - SOP Form- Expansion dard POS Form - Minimization of Switching Functions: Two V Variable K Map – Implementation of Logic Functions-Quin	ction codes. A d their represe n of a Boolea ariable K Map e McCluskey	axioms and Laws of ntation-Expansion of n Expression in POS - Three Variable K Method: Don,,t care
Unit -	- II	COMBINATIONAL LOGIC DESIGN	Periods	9
Design	Proc	edure: Adders - Subtractors. Code converters: Binary to Gray - (Grav to Binary	- BCD to Excess 3 -
BCD to	o Gra	y. Encoders: Octal to Binary Encoder - Decoders: 3 Line to 8 Li	ne Decoder - 2	Line to 4 Line
Decode	er wit	h NAND Gates- Multiplexers – Demultiplexers.		
Unit –	- III	SYNCHRONOUS SEQUENTIAL CIRCUITS	Periods	9
Sequen	ntial lo	ogic- SR, JK, D and T flip flops - level triggering and edge trigg	ering - counter	s – asynchronous
and syr	nchro	nous type – Modulo counters - Shift registers – Ring counters.		
Unit –	- IV	ASYNCHRONOUS SEQUENTIAL CIRCUITS	Periods	9
Synchr	onou	s Sequential Logic circuits-state table and excitation tables	state diagram	s-Moore and Mealy
models	s-desig	gn of counters-analysis of synchronous sequential logic	circuits-state	reduction and state
assignr	ment.			
Unit -	- V	LOGIC FAMILIES AND MEMORY	Periods	9
charact operati (ROM) design	teristi on -)-ROM using	cs of digital logic family - comparison of different logic fa Semiconductor RAMs: Static RAMs (SRAMs)- Dynamic RA M organization – Types of ROMs- Programmable ROM (PROM Verilog.	milies. Memo Ms(DRAMs).) Introductio	ry Organization and Read-Only Memory on to digital system
T (D		Total Periods		45
Text B	ooks		D (* 11.11	61 1: 0012
1.	Ana	nd Kumar A., _Fundamentals of Digital Circuits,,, 2nd Edition,	Prentice Hall c	of India, 2013
2.	Mor 2013	ris Mano M., Digital Design with an Introduction to the Verilog 3.	", 5th Edition,	Pearson Education,
Refere	ences			
1.	Sali	vahanan, S and Arivazhagan, —Digital Circuits and Design ^I , 4th	edition, Vika	s Publishing House
	Pvt.	Ltd., New Delhi, 2012		
2.	Don	ald Leach, Albert Malvino and GoutamSaha, —Digital Principle	es and Applica	tions ^I , 8th Edition,
	Tata	McGraw Hill Publishing Company, New Delhi, 2014.		· ~
3.	Cha	rlesH.Roth,JrandLizyKurianJohn,—DigitalSystemDesignusing	HDLI,2ndEdi	tion,Cengage
	Lea	rning, 2012.		
E-Reso	ource	S		
1.	http	://web.iitd.ac.in/~shouri/eel201/lectures.php		
2.	http	://www.nptel.ac.in/courses/106108099//Digital%20Systems.pdf		

	VIVEI	KANANDHA COLI (Autonomous Instit Elayam	VOMEN nnai)	TÜFFacture EETIFEED B stoarts							
Programme	B.E.		Pro	gramm	e Code	102	Regulation		2019		
Department	ELECT ENGIN	RICAL AND EL	ECTRO	DNICS	5		Semester		III		
Course Code	C	ourse Neme	Perio	ds Per	Week	Credit	Max	kimum N	num Marks		
Course Coue		ourse maine	L	Т	Р	С	CA	ESE	Total		
U19EE305 Electromagnetic Fields 4 0 0 3 40 60											
Course Objective	• Und app • Und pote • Fara and	lications. lerstand the Conce ential and its applic aday's laws, induce pointing vector.	pts of m pts of m ations. d emf a	nd thei	statics, ere statics, r applica	magnetic f	lux density, sca	alar and ectroma	vector gnetic waves		
	At the e	nd of the course, th	e stude	nt shou	uld be ab	le to,			Knowledge Level		
Course	CO1 : U	nderstand about the	e scalar	and ve	ector field	ds ,co-ordii	nate systems		K2		
Outcome	CO2:A	nalyze about electro	ostatics	and th	e various	s laws asso	ciated with it.		K3		
	CO3:U	nderstand about the	e basics	of mag	gneto sta	tics			K4		
	CO4: U	Inderstand about th	e Electr	odynai	mics Fiel	lds and Ele	ctromagnetic fi	ields.	K6		
CO5: Apply the application of electromagnetic waves with pointing vector.											
Pre-requisites	-										
CO / PO Mapping CO/PSO Ma											

	(3/2	2/1 indic	cates st	rength o	of corre	PO Ma lation)	pping 3-Stron	ng, 2 – 1	Mediur	n, 1 - V	Veak			CO/PSO	марри	ng
					Progra	mme O	utcome	s (POs)					PS	SOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO 11	PO12	PSO1	PSO 2	PSO 3	PSO4
CO 1	3	3	3		1			1			2	2	2	1	1	1
CO 2	3	2	3		2			1			2	2	2	1	1	1
CO 3	3	3	3		2			1			2	3	2	1	1	1
CO 4	3	2	3		1			1			2	3	2	1	1	1
CO 5	3	3	3		1			1			2	3	2	1	1	1

Direct

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

In Direct 1. Course - end survey

Content of	f the syllabus		
Unit –	I INTRODUCTION	Periods	12
Scalar and	Vector fields – Different co-ordinate systems- vector calculus	gradient, divergence an	nd curl, Laplacian
operator. V	/olume and line integrals, surface integrals, Divergence and St	oke ^w s theorem.	
Unit - I	II ELECTROSTATICS	Periods	12
Coulomb"s	s Law and concept of Electric Field -Divergence Theorem and	Gauss" Law -Concept of	of Electrostatic
Potential, F	Poisson's Equation -Energy in the Field, Capacitance -capacita	nce of common two-pla	ate capacitors,
including t	wo-wire capacitors- Dielectrics, dielectric boundary conditions	S. Deute te	10
	III MAGNETOSTATICS	Periods	12
of Magneti materials, r	ic Field for simple coil configurations-Ampere's Law -Magnet magnetic boundary conditions -Force on a dipole	s-Biot-Savart ic flux, Stokes theorem	- Magnetic
Unit - I	IV ELECTRODYNAMIC FIELDS	Periods	12
Emf,electro long soleno	omagneticinduction,Faraday [*] slawforacircuit,interpretationofFar oid, coaxial cylinders, parallel cylinders; mutual inductance; tra	aday ["] semf;self-inductar ansformers; magnetic en	nce, inductance of nergy density.
Unit –	V ELECTROMAGNETIC WAVES	Periods	12
waves -Wa of lumped	ave propagation in vacuum and lossy dielectrics-Skin depth and elements-The Poynting vector.Poynting theorem. Impedance n	atching.	60
Text Book	ΧS		
1	William H. Hayt, Jr. Engineering Electromagnetics - Fifth Ec	lition. TMH.1999	
2.	Joseph.A.Edminister, "Schaum"sOutlineofElectromagnetics, Th Series), McGraw Hill, 2010.	nirdEdition(Schaum'sOu	ıtline
References	is second s		
1.	KA.Gangadhar,,,ElectromagenticfieldTheory",KhannaPublis	hers;ighthReprint:2015	
2.	KrausandFleish,,,ElectromagneticswithApplications",McGra Edition, 2010.	wHillInternationalEditi	ons,Fifth
3.	J.R.Reitz, F.J.Milford and R.W.Christie, "Foundations of Elec (2008).	etromagnetic Theory", A	Addison Wesley
4.	S.Subhasri, Electromagnetic fields, New age international pu	blications.	
5.	R.Gowri., Electromagnetic fields and waves. S.K.Kataria and Computer book.	l sons, Publisher of Eng	ineering and
E-Resourc	ces		
1.	http://www.nptelvideos.in/		
2.	https://ocw.mit.edu/index.htm		



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205



		-											1			
Program	mme	B.	E.						Progra	imme Co	ode	102	Reg	ulation		2019
Depart	ment	ELI	ECTR	ICAL	AND I	ELEC	FRON	ICS E	NGINI	EERIN	G		Se	emester		III
Course	o Codo			Course	Nomo			Peri	iods Pe	r Week		Credit		Maxim	um M	arks
Course	eCode		,	Course	Name			L	Т	Р		С	(CA	ESE	Total
U19EF	E 306	Mea Inst	asuren rumei	nents a ntatior	und 1			3	0	0		3		40	60	100
Cou Obje	urse ective	The	 stude Ui Ui Ui Mi Let 	nt shou ndersta ndersta ndersta easure earn the	Id be r nd the nd the nd the R, L ar e princi	nade to basic c operati operati nd C el ple and	o, concept ion of ion of ement d work	ts of m various various s using ing of	easurin s analog s digital g DC an various	g instru g instrum l instrum d AC bi g transdu	ments nents. nents. ridges. ncers.					
		At t	At the end of the course, the student should be able to, Knowledge Level Knowledge													
C		CO	CO1:Analyze the static and dynamic behavior of a measurement system and compare k2 K2													
Outo	irse come	CO2:Apply the concept of Faradays Law in various types of Analog Instruments and determine the types of errors associated with them.													К3	
		CO.	3:Anal	yze the	e chara	cteristi	cs and	perfor	mance	paramet	ers of	Digital i	nstrume	ents.		K2
		CO	4:Desi and C	gn a su Capacit	itable l ance.	oridge	for the	measu	irement	of unkr	nown r	esistance	e, Induc	ctance		K3
		CO	5:Anal	yze the	e variou	is type	s of tra	ansduce	ers to m	neasure t	the phy	ysical qu	antities			K4
Pr	re-	-														
requ	isites															
	(3/	'2/1 ind	licates	strength	CO / of corr	PO M relation	apping) 3-Stro	ong, 2 –	Mediur	n, 1– We	ak			CO/PSC) Map	ping
Cos			1	1	Prog	amme	Outcon	nes (PO	s)		1	-		Р	SOs	
Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO 2	PSO3	PSO 4
CO 1	2	1	2	3	2	1						2	3	1	2	1
CO 2	3	2	1	2	3	2						1	2		2	
CO 3	2	1	2	2	1		2				1	1	2	1	3	1
CO 4	2	3	1	2	2	2	1				1	2	1	2	2	
CO 5	2	1	3	2	1	2	1				2	1	2		2	
Course	e Asses	sment	Meth	ods												
Direc	et															
1 2	1. Continuous Assessment Test I, II &III 2. Assignment															

3. End-Semester examinations

Indirect

1. Course - end survey

Content	t of th	e syllabus		
Unit	– I	INTRODUCTION	Periods	9
Units a measure Classific	nd di ment, cation,	mensions, Functional elements of an instruments, Static and of Statistical evaluation of measurement data, Standards and calibration Absolute and secondary instruments, indicating instruments.	dynamic characteris n. Measuring Instrum	tics, Errors in nents:
Unit –	- II	ANALOG INSTRUMENTS	Periods	9
Moving instrume electrod	coil i ents- T ynamo	nstruments: Permanent magnet moving coil instruments, Moving i orque equations and errors, Single and Three phase watt meters and ometer power factor meter.	ron: Attraction and Energy meters, Sing	repulsion type le phase
Unit –	III	DIGITALINSTRUMENTS	Periods	9
Digital N Oscillos	Multi-1 cope (meter, Digital Voltmeter and its types-Digital Phase meter, Digital Ex DSO), True RMS meters, Clamp meters, Power quality analyzer.	nergy meter, Digital	Storage
Unit –	IV	MEASUREMENT OF ELECTRICAL AND NON- ELECTRICAL QUANTITIES	Periods	9
Measure Maxwel Radiatio	ement landSo on and	of Resistance: Kelvin double bridge, Wheatstone bridge, Measurem cheringbridge, EarthResistanceTester, Wagner searthingdevice. Measur Optical pyrometer.	ent of inductance an rementofTemperature	d capacitance:
Unit –	- V	TRANSDUCERS	Periods	9
Selection Differen	n of ti itial Ti	ransducer, Classification of transducers: Strain Gauges, Thermistor ransformer (LVDT), Capacitive Transducers, Peizo-Electric transduc	rs, Thermocouples, l ers, Optical Transdu	Linear Variable cer, Inductive
torque u	ansuu	Total Pe	riods 4	45
Text Bo	oks			
1.	Davi	d A Bell, "Electronic Instrumentation and Measurements", Oxford P	ublisher 2017	
2.	E. O. Com	Doebelin, Measurement Systems Application and Design, Tata McC pany, 2007.	Graw Hill Publishing	
Referen	ices			
1.	A. K. Sons	. Sawhney, A Course in Electrical & Electronic Measurements & Ins 2017.	trumentation, Dhanp	atRai and
2.	Rang Chen	an C.S., Sharma G.R., Mani V.S., "Instrumentation Devices and Sysnai 2017.	tems", McGraw Hill	Education,
3.	Alber Pears	rt D, Helfrick, William D Cooper, Modern Electronic Instrumentatio son Education. New Delhi 2016.	n and Measurement	Techniques,
4.	J. B.	Gupta, A Course in Electronic and Electrical Measurements, S. K. K	ataria& Sons, New I	Delhi,
E Dege	2008	•		
E-Kesot	httpa	//online.courses antel as in/nos10 as44		
1.	https	//www.alassoontrol.com/course/cweyer alastrical massyrement or	l alastronis instrum	onto 14022
2. 3	https	//www.objectivebooks.com/2018/04/measurement.and instrumented	ion html	<u>1118-14032</u>
<u></u> . Л	https	// www.objectivebooks.com/2016/04/measurement-and-mstrumental	nts instrumentation	
4.	mps	.//graueup.co/practice/quiz/erecurcar-engineering-exams/measureme	ms-msuumentation	



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

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													Γ		r	
Program	mme	В.	Е.						Progra	imme Co	de	102	Reg	ulation		2019
Depart	ment	ELI	ECTR	ICAL	AND I	ELEC	ΓRON	ICS E	NGIN	EERING	÷		Se	emester		III
Course	Code				Nomo			Peri	iods Pe	r Week	(Credit		Maxim	um Ma	arks
Course	Coue		,	Jourse	Maine			L	Т	Р		С	(CA	ESE	Total
U19E	E307	DC TR	MAC ANSF	HINES ORMF	S AND ERS)		2	1	0		3		40	60	100
		The	e stude	nt shou	ld be r	nade to),									
Cou	ırse	•	Under	stand t	he func	lament	als of	energy	conver	sion and	Magne	etic-circ	uit ana	lysis.		
Obje	ective	•	Acqui	re the k	nowle	dge in	workiı	ng prin	ciples of	of DC Ge	enerator					
		•	Acqui	re the k	nowle	dge in	workii	ng prin	ciples of	of DC M	otor.					
		•	Discus	ss the c	onstru	ctional	details	s, princ	iple of	operation	n and p	redictio	on of pe	erformar	ice, in	the
		 transformers. Acquire the knowledge in various testing of D.C. Machines and Transformers. 														
		-	Acquire the knowledge in various testing of D.C. Machines and Transformers. Knowledge													
		At t	At the end of the course, the student should be able to, Level													
G		CO	CO1: Understand the principle of electromagnetic energy conversion. K2													
Cou	irse	CO	CO2: Explain the performance characteristics of various DC Generators.													
Outo	come	CO	CO3: Describe the performance characteristics of various DC Motors.													K3
		CO	4: Des	cribe tl	ne equi	valent	circuit	of trai	nsforme	ers and d	etermin	e its reg	gulatio	n.		K2
		CO	5: Und per	lerstano formar	d the di ice cha	ifferen racteri	t types stics of	of test f DC n	ing me nachine	thods use s and Tra	ed to de ansforn	termine hers.	e the		K2	
Pr requi	re- isites	Elec	etrical	Circuit	Analy	sis										
	(3	$\frac{1}{2}$ /1 ind	licates	strength	CO/	PO M	apping	mg 2_	Mediur	n 1 - We	ak			CO/PSC) Map	ping
	(5	/ 2/ 1 1110	neutes	Juengen	Prog	amme	Outcon	nes (PO	s)	ii, i vvet	411			P	SOs	
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO 2	PSO3	PSO 4
CO 1		1	2					1	2			1	2		2	
CO 2	2		2	2	1				2				2			
CO 3			3	2	1			2				1	3	1		
CO 4	2	3		1				1			1		3		2	
CO 5														1	1	
Course	e Asses	ssment	Meth	ods												
Direc	1	1 Continuous Assessment Test I. II. & III														
	1. 2	 Continuous Assessment Test I, II &III Assignment 														
	2. 3.	End-Se	emeste	r exam	ination	IS										
Indir	ect															
	1.	Cours	e – enc	l surve	у											

Conten	t of the syllabus	
Unit	- I BASIC CONCEPTS OF ROTATING MACHINES	Periods 9
Princip	es of electromechanical energy conversion – Force and Torque equations in ma	agnetic fields – Energy and
Force in	single and multiple excited systems – MMF of distributed windings – Rotating	g magnetic field –Generated
voltage	Torque in Wound rotor machine.	
Unit	- II DC GENERATORS	Periods 9
DC Ger excited	erator - construction, principle of operation - EMF equation – Methods of exci generators - Characteristics - Commutation - Armature reaction	tation – self and separately
Unit -	III DC MOTORS	Periods 9
Introdu	tion-Principle of operation –Torque equation – Characteristics and application	n of series, shunt and
compou	nd motors - Types of starters - Speed control of dc shunt and series motors - I	Braking of dc shunt motor.
Unit -	IV TRANSFORMERS	Periods 9
Constru	ctional details of core and shell type transformers- Types of winding- Principl	le of operation- EMF equation
Transfe	rmation ratio- Transformer on no-load- Parameters referred to HV/LV	windings- Equivalent circuit
Transfe	rmer on load- Regulation- Parallel operation of single and three phase transform	ners- Auto transformer- Three
phase ti	ansformers.	
Unit	- V TESTING OF DC MACHINES AND TRANSFORMERS	Periods 9
Losses Hopkin	on stest-testing of transformers-loadtest, opencircuitand short circuittests-Sumpro	ake test, Swinburne's test and er"stest-Allday efficiency.
	Total Period	ls 45
Text B	oks	
1.	Dr.P.S.Bimbhra,"ElectricalMachinery", KhannaPublishers, 7 th Edison, 2013.	
2.	I. J. Nagrath, D.P. Kothari, Electric Machines, 4 th Edition, TMH, New Delhi,	2014.
Refere	ices	
1.	AbhijithChakrabarti, SudiptaDebnath, Electrical Machines, McGraw Hill Edu	cation, New Delhi 2015.
2.	Stephen J. Chapman, "Electric Machinery Fundamentals"4th edition, McGrav 2010.	w HillEducation Pvt. Ltd,
3.	Deshpande M. V., Electrical Machines, Prentice Hall India, New Delhi, 2011	
4.	J.B.Gupta, ``, Theory and performance of Electrical Machines", S.K. Kataria and sons, ``, S.K. Katar	2002.
5.	Irving L. Kosow 'Electric Machinery and Transformers' PHI, New Delhi, 199	1.
E-Reso	urces	
1.	http://www.nptelvideos.in/2012/11/electrical-machines-i.html	
2.	http://www.electrical4u.com/electrical-power-transformer-definition-and-type	es-of-transformer/
3.	https://nptel.ac.in/courses/108102146/	

Programme	(Autonomous Institution Affiliated to Anna University Chennai) Elayampalayam, Tiruchengode – 637 205																	
	B.E/B.TECH	Programme cod	le			Regula	tion	20	19									
Department	ELECTRIC	II	Ι															
Course code	Cou	imum Marks																
		CA	ESE	Total														
U19TA302	தமிழரும் தி TAMILS AND TEO	ழல்நுட்பமும்; / CHNOLOGY	2	0	0	1	40	60	100									
Content of the sy	llabus																	
ച്ച லகு 1	நெசவு மற்றுட	ம் பானை தொழில்ந	நுட்பப்	נ			Periods		8									
சங்ககாலத்தில் பாண்டங்களில்	ல் நெசவுத்தொடி ல் கீறல் குறியீடுக	ழில் – பானை தொ கள்	ாழில்ந	ரட்பம்	-	கருப்பு சி	வப்பு ப	ாண்டங்	கள் –									
ച്ച லகு 2	வடிவமைப்பு	மற்றும் கட்டிடத் தெ	தாழில	ல்நுட்	பம்		Periods	3	3									
சங்ககாலத்தில்	் வடிவமைப்பு	மற்றும் கட்டுமான	ங்கள்	& ቻ	ங்ககா	ாலத்தில்	வீட்டுப்	பொருப	்களில்									
வடிவமைப்பு	- சங்ககாலத்	தில் கட்டுமான பெ	பாருட்	களுப்	ப ந(டுகல்லும்	– சில	லப்பதிகா	ரத்தில்									
ഥേപെച്ചവെല്	ப்பு பற்றிய விவ	ரங்கள் - மாமல்லபுர	சிற்பங்	களுட	Ь, С	காவில்களு	ரம் – சே	சாழர் க	ாலத்து									
பெருங்கோவி	ல்கள் மற்றும் ப	பிற வழிபாட்டுத் தல	ங்கள்	– நா	யக்க	ர் கால சே	காவில்க	ள் -	மாதிரி									
கட்டமைப்புகள்	ii பற்றி அறித	் , மதுரை மீனாட்சி ,	அம்மல	ज ्	<mark>ஆ</mark> லய	ம் மற்றுப்	் திரும	லை நா	யக்கர்									
மஹால் - ெ	சட்டிநாட்டு வீடு)கள் – பிரிட்டிஷ் கால	லத்தில்	் செ	ன்னை	ாயில் இ ந்	தோ -	சாரோச்	செனிக்									
கட்டிடக்கலை									ചാച്ചാൽ - അല്പ്പ്വാല് മന്ത്രണ് – വന്ലപ്പുള്ളത്ത് അത്തെത്തലൽ പ്രത്തെത്ത് എത്തെ പ്രത്തിന്ത്ത്തെ ക് പ്രക്കത്തല്									
ച്ച லகு 3	உற்பத்தித் தொ	ாழில் நுட்பம்					Periods											
கப்பல் கட்டும்	கலை – உலே	ாகவியல் – இரும்புத்	தொழி	ற்சாக	തல -	துல்கு நிறையில் குறையில் குறை												
வரலாற்றுச்சா	ன்றுகளாக செம்	ைபல கட்டும் கலை – உல்லால்வாமல் – குரும்புத் வற்பியற்றாலால் – குருமலாம் உருக்குதல், எல்கு – வாலாற்றுச்சான்றுகளாக செற்ப பற்றுற் கங்க நாண்யங்கள் – நாண்யங்கள் அச்சடிக்கல்– மணி																
உருவாக்கும் (உருவாக்கும் கொடிற்சாலைகள் – கல்மணிகள் கண்ணாடி மணிகள் – சுடிமண் மணிகள் – சங்க																	
		பு மறறும தஙக ந ள் – கல்மணிகள், க	ாணய ன்ணா	ங்கள் 1டி ம	– ந ணிக	– இருமன ாணயங்கள ள் – சுடும	ப உருக் ள் அச்ச லண் மல	்குதல் , டித்தல்– னிகள் –	எஃகு – ∙ மணி • சங்கு									
மணிகள் – எலு	ுதா தூற்சாலைக]ம்புத்துண்டுகள்	பு மற்றும் தங்க ந ள் – கல்மணிகள், க – தொல்லியல் சான்று	ாணய ண்ணா கள் – க	ங்கள் 1டி ம சிலப்ப	– ந ணிகல பதிகா	– இருமன ாணயங்கள ள் – சுடும ரத்தில் மவ	ப உருக் ள் அச்ச ஸ் மல ணிகளில்	்குதல் , டித்தல்– னிகள் – எ வகைச	எ∴கு – ் மணி ் சங்கு எா்									
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மணிகள் – எலு அலகு 4 அணை, ஏரி, பராமரிப்பு – வேளாண்மை தல் – பெருங்க அலகு 5	நாழ்ந்தாண்டுகள் மௌாண்மை நுட்பம் குளங்கள் , மதர கால்நடைகளுக் சார்ந்த செயல் டல் மற்றும் பன அறிவியல் தமி	பு மற்றும் தங்க ந ள் – கல்மணிகள், க – தொல்லியல் சான்று மற்றும் நீர்ப்பாசனத் த – சோழர்காலக் கு காக வடிவமைக்கப்ப பாடுகள் – கடல்சார் ச ன்டைய அறிவு – அறில பிழ் மற்றும் கணித்தமி	ாணயா ண்ணா <u>கள் – ச</u> தொழி முழித் ட்ட கி அறிவு - வுசார் பிழ்	ங்கள் ஈடி ம சிலப்ப ல தூம் னறு – மீன் சமூச	– ந ணிக பதிகா பின் கள் வளப் கம்.	– இருமன ாணயங்கள ரத்தில் மன முக்கி – வே – பூத்து	ப உருக் ள் அச்ச ண் மல னிகளில் Periods பற்றும் Periods	்குதல் , டித்தல்– னிகள் – எ வகைச ப வகைச ப – காச நம ட முத் துச	எஃகு – ட மணி ூ சங்கு 6 ல்நடை மற்றும் க்குளித்									
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Signature of the BOS Chairman, EEE

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						Total Period	ls	1	5

Tex	at cum-Reference Books
1	தமிழக வரலாறு — மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2	கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4	பொருநை -ஆற்றங்கரை நாகரிகம்.(தொல்லியல் துறை வெயளியீடு)
5	Social Life of Tamils (Dr.K.K.Pillay) Ajoint publicat10nof TNTB & ESC and RMRL
6	Life of the Tamik- The Classical Period (Dr.S.Singaravelu) (Published by:hternational Institute of Tamil Studies.
7	Historical Heritage of the Tamils (Dr.S.V.Subatamarnan, Dr.K.D.Thirunavukkarasu)(Publishedby:International Institute of Tamil Studies}.
8	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmath1)(Publishedby.InternationalInstituteofTamilStudies.)
9	Keeladi- 'Sangam City Civilization on the banks of river Vaigai' (Joitly Pubhshedby: Department of Archaeology & TamilNadu Text Book and EducationalS ervices Corporation,TamilNadu) .
10	Studies in the History of India with Special Reference toTamilNadu (Dr.K.K.P1llay) (Publishedby:TheAuthor)
11	Porunai Civilization (JointlyPublishedby:Department of Archaeology & TamilNadu Text Book and Educational Services Corporation, TamilNadu)
12	Journey of Civilization Indus to Vaigai (R.Balakrishnan)(Publishedby:RMRL)– Reference Book.

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Constraint of Constraints																
Program	mme		B.E.					Prog	ramm	e Code	102	2	Regul	ation		2019	
Depart	ment	EI EI	LECT LECT	RICA RONI	L AN ICS E	D NGIN	EERI	NG					Sem	nester		III	
Cour	se			Cou	rse Na	ime		I	Period We	s Per ek	Cred	lit		Maxim	um Ma	rks	
Cou	e							L	Т	Р	C		CA		ESE	Total	
U19EE	2308	Ar Ele	Analog and Digital Electronics Laboratory00426040											40	100		
Cour Objec	CourseThe students should made toCourse• Analyze the basic characteristics of electronic devicessuch as diode, BJT,SCR.Objective• Analyze the oscillator, filter and Amplifierperformance.• Understand and analyze different applications of logic gates in digitalcircuits.																
At the end of the course, the student should be able to, Knowledge Level																	
Cour	se	CO)1: Ch	loose t	he ele	ctronio	c devi	ce for	specif	ic appli	cation.					K3	
Outco	ome	CO	D2: De	esign tl	he filte	er circ	uits fo	r spec	ific ap	plicatio	n.					К3	
		CO)3: Ch	loose	the os	cillat	or and	l amp	lifier	for spe	cific ap	plicati	on.			K3	
		CO)4: Ve	erify th	e flip-	flop a	nd cou	inter c	perati	on in di	gital ci	rcuits.				K4	
		CO	D5: Ve	erify th	e mul	tiplexe	er and	encod	er ope	eration.						K2	
Pre- requisit	tes																
	(2/2/1	india	too ota	an ath a	CO/	PO Ma	apping	5	Mad		Waala			COM		!	
	(3/2/1	marca	ates str	ength	Prog		0.00000000000000000000000000000000000	$\frac{1}{1}$ mes (P	$-$ Mean $\frac{1}{208}$	lum, 1–	weak			CO/P	SU Maj		
C.					Tiog		Juico	ines (1	03)		1	1					
Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO 1	PSO 2	PSO3	PSO4	
CO 1	3	2	2		1	1			1		1	1	3	2			
CO 2	3	2	2		1	1			1		1	1	3	2			
CO 3	3	2	2		1	1			1		1	1	3	2			
CO 4	3	2	2		1	1			1		1	1	3	2			
CO 5	3	2	2		1	1			1		1		3	2			

Direct

Prelab and post labtest
 Record mark
 End-Semester examinations

Indirect

1.Course - end surveyContent of the syllabus

S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome		
1.	To learn the characteristics of basic electronic devices such as Diode, BJT,SCR.	CO1	PO1,PO2, PO9, PSO1		
2.	Frequency Response of CE Amplifier.	CO2	PO1,PO2, PO4,PO9,PSO1		
3.	Measurement of H-Parameters of CSFET Configuration	CO1, CO2	PO1,PO2, PO9,PSO1		
4.	Bridge Rectifier with and Without Filter.	C01	PO1,PO2, PO9,PSO1		
5.	Study of RC Phase Shift Oscillator.	CO3	PO1,PO2, PO9,PSO1		
6.	Implementation of the given Boolean function using logic gates in both SOP and POS forms.	CO4	PO1,PO2, PO9,PSO1		
7.	Verification of state tables of RS, JK, T and D flip-flops using NAND & NOR gates.	CO4	PO1,PO2, PO9,PSO1		
8.	Design and verify the 4-bit synchronous counter	CO4	PO1,PO2, PO9,PSO1		
9.	Design and verify the 4-bit asynchronous counter	CO4	PO1,PO2, PO9,PSO1		
10.	Implementation and verification of decoder/de-multiplexer and encoder using logic gates	CO5	PO1,PO2,PO3 PO9,PSO1		

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205



Program	me	B.	B.E. Programme Code 102 Regula											Regulat	tion 2019			
Tiogram		EL.	ECTI	RICA	LAN	DEI	ECTR	RONI(TS			10		toguiu		-		
Departm	nent	EN	GINE	EERI	NG	DEL							Se	mester		III		
Course Coo	le		C	ourse	Name	`	Peri	ods Pe	er Wee	ek	(Credit		Ν	laximur	n Marks		
Course Co			C	ourse	1 vanie		L		Т		Р	C	(CA	ESE	Fotal		
U19EE309	•	DC Tra	Mac Insfor	hines rmers	and Labo	orator	y 0		0		4	2		60	40	100		
Course Objective	Course • Expose the operation of D.C. machines and transformers and give them experimental skill. • Insight into the constructional details of the dc machines and transform of better understanding of their working principles. • Evaluate the performance of various dc machines and single-phase transform conducting appropriate experiments. At the end of the course, the student should be able to, CO1: Interpret the constructional details of the DC machines and													n ners with nsforme Kno 1 K	h a view rs by wledge evel			
Course Outcome		C0 C0 C0 C0	2: Es co ex 3:Ana 4: De im tra 5:Co	timate mpou perim alyze velop plemo nsfor nnect	ons of or tea and) an aents a the va simu enting mers f	and and f three st the nd sin und rep rious lation g any c for va phase	phase perform gle-pha port the speed model control rious a e transi	transf mance ase tran e result contro s and p techni pplicat	ormer of any nsform ts. 1 and 1 prototy que u ions s for t	y DC y DC prakin ype m pon d	machi y cond <u>ng tech</u> odules c moto	ne (shur lucting s niques s in view ors and	rent nt, seri suitable for dc : v of single- on and	es or motors phase phase	K K K	K2 K2 K2		
D			coi	nversi	on													
	(3/2/1	indic	ates st	rength	CO/P	PO Ma	pping on)3-Sto	orng,2-1	Mediu	m,1-W	/eek			CO/PO	Mappir	ıg		
COs				1	Prog	ramme	outcom	nes(POs	5)	1				Р	SO s			
	PO1	M1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12 PS01 POS2								POS2	POS3	POS4						
CO1	3	2	3	-	1	2	-	-	2	1	2	2	2	1	1	-		
CO2	3	2	3	1	1	-	-	-	1	-	2	1	1	1	2	-		
CO3	3	2	3	-	1	2	1	-	2	-	1	2	1	1	2	-		
CO4	3	3	3	1	1	-	-	-	2	-	1	1	2	1	1	-		
CO5	3	3	3	2	2	1	-	-	1	2	1	2	1	1	1	-		

Course Assessment Methods Direct

- 1. Prelab and post labtest
- 2. Record mark
- 3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Open circuit and load characteristics of separately and self excited DC shunt generators.	CO2	PO1,PO2,PO9, PSO1
2.	Load characteristics of DC compound generator with differential and cumulative connection.	CO2	PO1,PO2,PO9, PSO1
3.	Load characteristics of DC shunt and compound motor.	CO2	PO1,PO2,PO9, PSO1
4.	Load characteristics of DC series motor.	CO2	PO1,PO2,PO9, PSO1
5.	Swinburne's test and speed control of DC shunt motor	CO3	PO1,PO2,PO9, PSO1
6.	Hopkinson's test on DC motor – generator set.	CO4	PO1,PO2,PO9, PSO1
7.	Load test on single-phase transformer and three phase transformer connections.	CO1	PO1,PO2,PO9, PSO1
8.	Open circuit and short circuit tests on single phase Transformer.	CO1	PO1,PO2,PO9, PSO1
9.	Sumpner ^s stest on transformers	CO5	PO1,PO2,PO9, PSO1
10.	Separation of no-load losses in single phase transformer.	CO5	PO1,PO2,PO9, PSO1

	Total Periods 60	
Lab Ma	anual	
1.	DEPARTMENT OF EEE Aurora's Technological and Research Institute Parvathapur, Uppal, Hyderabad	
2.	Annauniversity-EEE-SEM-ElectricalMachines-Laboratory	
E-Resou	urces	
1.	https://studentsfocus.com/notes/anna_university/EEE/4SEM/EE6411-Electrical%20Machines- I%20Laboratory.pdf	

Service and Servic	HAL PARTIE		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode–637 205													0 9001:2015		
Prog	gramn	ne	B.E.						Progr	amme	Code	; 1	102			Reg	gulation	2019
Dep	artme	nt F	ELEC	ГRIC	CAL	AND	EL	ECTI	RONI	CS EN	GIN	EER	ING			Se	emester	III
Cours	e Cod	e		Co	ourse	Nar	ne			Perio W	ds Po eek	er	Cr	edit	Maximum Ma			arks
										L	Т	Р	(С	CA		ESE	Total
U19M	CSY3	N	IUME	RIC	ALA	BIL	ITY			3	0	0		0	100		-	100
Objecti	ive		 Develop skill to meet the competitive examinations for better job opportunity Accommodate fundamental, mathematical aspects to instill confidence among students Expand their knowledge and to develop their logical reasoning thinking ability 															
		A	At the	end o	of th	e coi	irse,	the s	tuden	t will	be at	ole to):					V 2
Co	urse			velop	b a pr	oper	unde		ing of			syst	em					кэ КЭ
Out	come		CO2: Explain the meaning of ratio, proportion and percentage													K2		
			03:50	Ive co	Jmpi	ex pr	oblei	ns inv	volvin	g spee	1, dis	tance	and t	inne.				<u>кэ</u>
		C fa	04: U	nders	tand	the r	elatic	onship	betw	een co	mpou	nd ir	nterest	and it	ts influ	encii	ng	K 2
		C	05: So	olve s	urfac	e are	a and	d volu	ime of	rectar	gular	-pris	m pro	blems	with r	eal o	bjects	K3
Pre-re	quisit	es	-															
	I	(3/2/	lindicate	sstreng	CC th of c	D/PO N orrelati	(appin ion)3-S	ng Strong,2	– Mediu	m,1-Wea	ık					C M	O/PSO apping	
			Programme Outcomes(POs) PSOs															
COs	COs PO1 P		PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO		2012	PSO	1 1	PSO2	PSO3	PSO4
CO 1	3	3												2				
CO 2	3	3												2				
CO_3	3	3												2				
CO 5	3	3																

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Content o	f the syllabus		
Unit–I	NUMBERSYSTEMS	Periods	6
Number Pr	roperties-HCF-LCM-Square root-Cube root -Simplification -Averages.		
Unit-II	DIRECTPROPORTIONALPROBLEMS	Periods	8
Percentage	e-Profit & LossRatio & Proportions-Mixture & Allegations-Problem on Ag	es	
Unit–III	INDIRECTPROPORTIONALPROBLEMS	Periods	8
Time & W	ork–Pipes & Cisterns-Time,Speed & Distance–Boats & Streams–Races & C	ames of Skills.	
Unit-IV	7 BANKER'SPROBLEMS	Periods	4
Simple Int	erest –Compound Interest – Logarithms–Partnership-Discounts.		
Unit–V	MISCELLANEOUSPROBLEMS	Periods	4
Mensuration	on : Area & perimeter – Volume & Surface Area–Geometry-Trigonometry.		
		Total Periods	30
Text Book	ίs		
1.	DineshKhattar-The Pearson guide to Quantitative Aptitude for Competitive	Examinations 3 rd ed	lition.
Reference	s		
1.	R.S.Aggarwal –Quantitative Aptitude for Competitive Examinations		

		VIV	EKAN (Auto	NANDI nomou Ela	HA CO s Institu ayampa	LLEG ition, A layam,	E OF Affiliat Tirucl	EN(ed to nengo	GINEI Anna ode – 6	E RI I Uni 537 2	NG F versit 205	OR V y ,Che	OMP ennai)	EN	KO 50012015 TÜVRichland CERTITED	
Prog	ramme	B.I	E.				Progr	amm	e Cod	e	102	Reg	ulation	1	201	.9
Depa	rtment	ELI ENC	ECTRI GINEF	CAL A	AND E	LECT	RONI	CS				Se	emeste	r	IV	7
Course	Code		Cor	urse Na	me	P	eriods	Per	Week	C	redit		Max	kimum	n Mark	S
Course	Couc		COL	1150 144	inc		L	Т	Р		С	(CA	ES	E	Total
U19M A	\406	Nun	nerical	Metho	ods		3	1	0		4	40		60)	100
Course Objective	e	The	 Ine main Objective of the course is to Understand appropriate numerical methods to approximate function Recognize appropriate numerical methods to solve a differential function Provide information about appropriate numerical methods to evaluate a derivative at a value Introduce appropriate numerical methods to calculate a definite integral Proficiently understand boundary value problems 													
		At th	ne end o	of the co	ourse, th	ne stude	ent sho	uld b	e able	to,				Kno	wledge	e level
		CO1 math	At the end of the course, the student should be able to,Knowledge levelCO1: Apply numerical methods to obtain approximate solutions to mathematical problemsK3,K5													
Course Outcome	•	CO2 and perf	2: Deriv tasks s orm an	ve num uch as i error a	erical n interpol malysis	nethods ation, o	s for va differe	ariou: ntiati	s math on , in	ema itegr	tical of ation	operat and	ions		K1,K	3
		CO3 integ	3: Anal gral me	yze and thods	l evalua	ate the	accura	cy of	comn	non	numer	rical			K2,K	5
		CO ₂ appr	1: Dete opriate	rmine S e numei	Solutior	ns of Di ethods	ifferen	tial E	Equation	ons u	ising a	an			K3,K	4
		COS	5: Desi	gn bou	ndary v	alue pr	oblem	5.							K3,K	4
Pre-requ	isites	-												1		
	(3/2	/1 indic	ates stro	ength of	CO / PO correlat) Mapp tion) 3-5	ing Strong,	2 – N	/ledium	n, 1 -	Weak			CO/F Map	PSO ping	
COs]]	Program	me Out	comes	(POs))			1		PSOs		1
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO	8 PC	ענ	PO 10	РО 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3			2									2		
CO 2	3	3			2									2		
CO 4	3	3												2		
CO 5	3	3			2									2		
Course A	ssessm	ent Mo	ethods													
Direct																
	1. 2. 3.	Conti Assig End-S	inuous gnment Semest	Assess : Simul er exar	ment T ation u ninatio	est I, II sing too ns	ðl ðl									

1.

Course - end survey

90

Content O	Of the	Syllabus								
Unit –	I	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	Periods	12						
Solutionof	equation	pn-Fixed point iteration: x=g(x) method-Newton "smethod-Solution Solution	utionoflinearsy	stemby						
Gauss-Jord	lon me	thod - Iterative method – Gauss Jacobi and Seidel methods	- Inverse of a 1	natrix by Gauss						
Jordon met	thoa – 11	Ligen values of a matrix by power method and by Jacobi m	Periods	12						
L ograngiar	II n Intor	Divided differences Newton's divided differences	renous	nterpolating						
with a cubi	ic spli	Newton's forward and backward difference formula	nce Iomuna -n	interpolating						
	ic spin									
Unit – I	III	INTEGRATION	Periods	12						
Differentia	ation u	sing interpolation formulae –Numerical integration by trapez	zoidal and Sim	pson"s 1/3						
and3/8rule	s–Ron	berg"smethod-TwoandThreepointGaussianquadratureformu	lae–Double int	egral						
susingtrape	ezoida	andSimpsons"srules								
Unit - I	IV	INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS	Periods	12						
Single step –Kuttamet	o methe hodfor nethod	ods: Taylor series method – Euler method for first order equ solvingfirstandsecondorderequations–Multistepmethods:Mi s	ation – Fourth lne"sandAdam"	order Runge s predictor and						
Unit –	Unit - VBOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONSPeriods12									
Finite diffe	erence al heat	solution of second order ordinary differential equations – Fi equation by explicit and implicit methods – One dimension	nite difference al wave equation	solution of one on and two						
dimension	ui Dup	, , , , , , , , , , , , , , , , , , ,	Total Periods	60						
Text Book	KS									
1	Veer Tata	arjan.T and Ramachandran.T, Numerical methods with prog McGraw-Hill Publishing. Co. Ltd, 2007.	gramming in C,	Second Edition,						
2	Grev Sixth	val.B.S and Grewal.J.S, Numerical methods in Engineering a Edition, Khanna Publishers, New Delhi, 2004	and Science,							
Reference	s									
1.	Gera New	ld.C.F and Wheatley.P.O, Applied Numerical Analysis, 7th Delhi, 2009.	Edition, Pearso	on Education Asia,						
2.	Sank India	ara Rao K, Numerical Methods for Scientists and Engineers Private Ltd, New Delhi, 2012.	, Third Edition	, Prentice Hall of						
3.	Burd	en R, L. and Faires J.D., Numerical Analysis, Cengage Lear	ming, 10 th Edit	ion, 2015.						
4.	M.K	Jain, Numerical Methods for Scientific and Engineering Co	mputations, Ne	ew Age Publishers						
5.	Steve Publ	en C.Chara Raymond P.Canale, "Numerical Methods for Erishers, rd Edition, 2000.	ngineering", Ta	ta McGraw Hill						
E-Resourc	ces									
1	https	://www.academia.edu > Numerical_Methods_for_Engineers	•							
2	www	learnerstv.com/Free-engineering-Video-lectures								
3	www.nptel.ac.in									

		V	VIVER (A	KANA Lutonor	NDHA nous I Elaya	COL nstituti ampala	LEGI on, Af yam, T	E OF 1 ffiliate Firuche	ENGI d to A engodo	NEE nna ¹ e – 6	RIN Univ 37 2	G FOF versity ,0 05	R WOM Chennai	EN)	TÜVRHei	60 9001-2015	
Prog	ramme	B.]	E.		Р	rogram	me C	ode			1	102	Regula	ation		2019	1
Depa	rtment	ELI EN	ECTR GINE	RICAL ERIN	AND G	ELEC	TRO	NICS					Sem	ester		IV	
Course	Codo		C	ourso	Nomo		Pe	riods I	Per We	eek	Cı	redit		Max	imum 1	Marks	
	Coue		C		vanie			L	Т	Р		C	CA		ESE		Total
U19EE	410	Lin	ear In	tegrat	ed Ci	rcuits		3	0	0		3	40		60		100
Cour Object	se tive	The	 stude L U U A 	nts sho earn th indersta indersta nalyze	ould m the char and the and the the fu	ade to acterist e applic e conce nction	ics of cations of tof t of spe	operat s of op timers cial IC	ional eration and vo	ampl nal ar oltage	ifier mpli e reg	s fiers, gulators				Kn	owledge
	At the end of the course, the student should be able to, Intervention CO1: Describe the various ideal and practical characteristics of an OPAMP K2													Level			
	 CO1: Describe the various ideal and practical characteristics of an OPAMP CO2: Develop simple OPAMP based circuits 													K2			
Cour Outco	se me	CO2: Develop simple OPAMP based circuits CO3: Implement various signal generating circuits.													K4		
		CO3: Implement various signal generating circuits.													K3		
			4: Ana	alyze a			ious t	ypes o				ACS	55 times				K3
Pre-requ	isites	U19	DEE30	$\frac{1}{3}$ - Anal	log Ele	ctronic	s s	is appl			uns	using J					K5
	(3/2	2/1 indi	icates s	strength	CO of cor	/ PO M	apping) 3-Stro	g ong, 2 -	- Medi	um, 1	- W	/eak		C	O/PSO) Mapp	ing
COm				1	Prog	gramme	Outco	mes (P	Os)	T			1		P	SOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	РО	10	PO 11	PO 12	PSO1	PSO2	PSO 3	PSO 4
CO 1	3												3	2			
CO 2	3	2			2								3	3	2	3	
CO 3	2	2	1		2								3	3	2	3	
CO 4	2		2										3	3			
CO 5	1	2	2										3	2			3
Course ADirect1.2.3.Indirect1. C	Direct 1. Continuous Assessment Test I, II &III 2. Assignment 3. End-Semester examinations Indirect 1. Course - end survey																

Content o	of the S	yllabus		
Unit -	- I	OPERATIONAL AMPLIFIER CHARACTERISTICS	Periods	9
Functiona schematic compensa rate. Tran	ll Block cof μA tion tec sfer cha	Diagram – Symbol, Characteristics of an ideal operational amp 741, Open loop gain, CMRR-input bias and offset currents, in hniques. Frequency response, characteristics – stability, limitatio tracteristics.	olifier, transfer put and output ns, frequency c	characteristics, Circuit offset voltages, offset compensation, slew
Unit -	II	LINEAR APPLICATIONS OF OPERATIONAL AMPLIFIERS	Periods	9
Inverting amplifier. converters	and No Integra s, Phase	n-inverting amplifiers – Voltage follower, Summing amplifier, D tor and Differentiator – Practical considerations. Voltage to Curr changers.	ifferential amp ent and Curren	lifier, Instrumentation t to Voltage
Unit -	III	NON-LINEAR APPLICATIONS OF OPAMP AND SINGLE POWER SUPPLY OPAMPS	Periods	9
Comparat diode, Ha operationa	or – Re lf and F al ampli	generative comparator, Zero crossing detector, Window detector, full wave rectifiers, Active peak detector, Clipper and Clamper, N fiers – LM324, AC Inverting and Non-Inverting amplifiers	, Sample and he leed for single	old circuit, Precision power supply
Unit -	IV	VOLTAGE REGULATORS & A-D and D-A CONVERTERS	Periods	9
IC VOLT Current 1 regulators Binary w approxima	AGE F imiting A-D a eighted ation, S	REGULATORS: Block diagram of 723 general purpose voltag schemes, Output current boosting, Fixed and adjustable th nd D-A CONVERTERS: DAC/ADC performance characteristics and R-2R Ladder types – Analog to digital converters: Co ingle slope, Dual slope and Flash Type.	e regulator – hree terminal s – Digital to A ntinuous, Cour	Circuit configurations, regulators, Switching nalog Converters: nter ramp, Successive
Unit -	V	SPECIAL FUNCTION ICs	Periods	<u>9</u>
Controlled Building b and FM de	r Funct d Oscill blocks o etectior	lator, Analog Multiplier, Comparator ICs. PLL Functional Blo of PLL, Characteristics, Derivations of expressions for Lock and a, Motor speed control.	operation, App ck diagram – 1 Capture ranges	Principle of operation, , Applications: AM
Torrt Dool	Ira	lota	Periods	45
1 ext B00		Sadra Kannath C. Smith Miaraalaatrania Ciravita Outard Un	iversity Drage	Now Dalle: 2010
2.	Roy	Choudhury and Shail Jain, "Linear Integrated Circuits", 4th Editi shers,2010	on, New Age I	nternational
Reference	es			
1.	Mich Delh	ael Jacob J, —Applications and Design with Analog Integrated C i, 2010.	Circuits ^{II} , Prenti	ce Hall of India, New
2.	. Gaya	kwad A R, OP-Amps and Linear Integrated circuits, Prentice H	all India, New	Delhi, 2010
3.	Coug New	hlinFR,andDriscollFF,—OperationalAmplifiersandLinearIntegra	atedCircuits ,Pr	enticeHallof India,
4.	Sergi Editi	oFranco, "DesignwithoperationalamplifiersandAnalogIntegrated on, 2002.	vircuits",TataM	cGrawHill,3 rd
E-Resour	ces			
1.	https:/	/www.tutorialspoint.com/linear integrated circuits applications/	/index.htm	
2.	https:/	/www.eeeguide.com/linear-integrated-circuits-and-applications/		
3.	https:/	/www.electrical4u.com		

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C Ob	Course jective	S	•	 Learn the Construction and performance of salient and non – salient type synchronous generators and motors. Learn the Construction, principle of operation and performance of induction machines. Learn the Construction, principle of operation and performance of single-phase induction motors and special machines. Analyze the Starting and speed control of three-phase induction motors. Analyze the efficiency of the AC machines. At the end of the course, the student should be able to, 													
			At the end of the course, the student should be able to,Knowledge LevelCO1: Acquire knowledge about the constructional details and principle of operation of elternatorsK3														Level
			opera	tion c	of alte	rnator	s.	oour i		istiucti	onar a		la princi	pie or		ł	ζ3
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Cours	e oute	ome	CO2: Analyze the performance characteristics of synchronous motorK4CO3: Acquire knowledge on Construction, principle of operation and performance of induction machines.K3												ζ3		
			CO4	: Acq	uire k	nowle	dge al	bout S	Startin	g and s	peed c	ontrol o	of three l	Phase		ŀ	ζ3
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			perfo	ormano	ce of s	single	phase	indu	ction 1	motors	and sp	ecial m	achines.				
Prer	requisit	tes	U19E	EE307	- DC	Mach	ines a	nd Tr	ansfo	rmers							
					CO /	PO N	Iappi	ng									
(3/	/2/1 in	dicate	s strer	ngth o	f corre	elatior	n) 3-St	trong,	2 - N	<i>l</i> edium	, 1 - W	⁷ eak		CO/PS	O Ma	pping	í.
COa				Р	rogra	mme (Outco	mes (POs)					I	PSOs		
COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS	03	PSO4
CO1	3	3	2	1	2	3	2	-	-	-	-	2	3	-		3	2
CO2	3	2	2	1	1	3	2	-	-	-	-	2	3	-		2	2
CO3	3	2	2	1	1	2	1	-	-	-	-	2	3	-		2	2
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Dire 1 2 3 1 1 1 1 1 1 1 1	Direct 1. Continuous Assessment Test I, II&III 2. Assignment. 3. End-Semester examinations Indirect																
	1. Co	ourse -	– End	Surve	ey.	_		_	_			_					

Content	of the syllabus.		
Uni	- I ALTERNATOR	Periods	9
Construct Regulatio	ional Details – Types of Rotors – EMF Equation – Synchronous Re n – EMF, MMF and ZPF Methods – Synchronizing and Parallel O mations - Change of Excitation and Mechanical Input	eactance – Armatu peration – Synchro	re Reaction –Voltage onizing Power - Power
Unit	- II SYNCHRONOUS MOTOR	Periods	9
Principle	of Operation – Torque Equation – Starting Methods - Operation or	Infinite Busbars	– V and Inverted V
Curves –	Input and Output Power Equations – Power/Power Angle Relations	s – Hunting - Sync	hronous Condenser
Unit - I	II THREE PHASE INDUCTION MOTOR	Periods	9
Construct	ional Details – Types of Rotors – Squirrel Cage and Slip Ring – Pr	inciple of Operation	on-Slip-Torque
Character Separation	stics – Losses and Efficiency – Load Test - No Load and Blon of No Load Losses – Crawling and Cogging – Double Cage Roto	ocked Rotor Tests rs – Induction Ger	s - Equivalent Circuit- nerator.
Unit - I	V STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR	Periods	9
Need for Stor	Starters – Types of Starters – Stator Resistance, Rotor Resistance, A	Autotransformer, S	Star-Delta Starters and
Scheme	ters - Speed Control by Varying Voltage, Frequency, Foles and Ko	tor Resistance – S	iip Fower Recovery
Unit	- V SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES	Period	9
Construct phase ind Switched	ional Details – Double Revolving Field Theory – Equivalent Circu action motors-Applications- Special machines: Servo Motor, Stepp Reluctance Motor and Linear Induction Motor.	it – Starting Metho per Motor and Uni	ods – Types of single versal Motor and
		Total Periods	45
Text Book	8	·	
1.	Dr. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers,7	th edition, 2011.	
2.	Nagrath, I.J. and Kothari, D.P., "Electrical Machines", Tata McGraw H Publishing Company Ltd., 4th Edition, 2010	illEducationPrivat	eLimited
3.	Rajput R.K., -Electrical MachinesI, 5th Edition, Laxmi Publica	tions, New Delhi,	2008.
4.	GuptaJ.B.,—ElectricalMachines(AC&DCMachines) ,4thEdition	,SKKataria&Sons	,New
References			
1.	A.E.Fitzgerald, Charles Kingsley, Stephen.D.Umans, "Electric M Hill, 2013, New Delhi.	achinery", 7 th Ed	ition, Tata Mcgraw
2.	Paul C. Krause, Oleg Wasynczuk, Scott D. Sudhoff: "Analysis of IEEE Press, 2002.	Electric Machiner	ry & Drive systems" -
3.	Jingde Gao, Xiangheng Wang, AC Machine Systems: Mathematic System Performance, Springer, 2011	cal Model and Para	ameters, Analysis, and
4.	EG. Janardanan, Special Electrical Machines, PHI Learning PVT	LTD., (2014)	
5.	M.N.Bandyopadhyay, Electrical Machines Theory and Practice, F Delhi, 2009.	PHI Learning PVT	LTD., New
E-Resour	rces		
1.	https://nptel.ac.in/courses/108105131/#		
2.	https://www.electrical4u.com/electrical-engineering-articles/elec	tric-motor/	
3.	https://ocw.mit.edu/courses/electrical-engineering-and-computer- 2013/	science/6-685-ele	ctric-machines-fall-

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Co Obj	ourse ective	 understand the importance and the functioning of transmission line parameters. Obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency. Understand the concepts of Lines and Insulators. Understand the mechanical design of transmission lines. Understand the Structure and distribution systems, types of substations, methods of grounding, EHVAC, HVDC and FACTS. At the end of the course, the student should be able to, 														
Co Out	ourse tcome	At CO CO eff CO CO	At the end of the course, the student should be able to,Knowledge LevelCO1: Develop expressions for the computation of transmission line parameters.K2CO2: Acquire knowledge on the performance of Transmission lines.K4CO3: Analyze the voltage distribution in insulator strings to improve the efficiency.K4CO4: Familiar in the mechanical design aspectsK4													viedge xvel X2 X4 X4 X4 X4 X4 X4 X4
Pre-re	quisite	an s U	d Dist 19EE2	tributio 202 - El	n levels lectric (s of po Circuit	wer sy t Analy	ystem ysis								
	(3/2	2/1 indic	ates st	rength o	CO / P	O Ma ation)	pping 3-Stror	ng, 2 –	Mediur	n, 1 - V	Veak			CO/PSO	Mappi	ng
					Progran	nme O	utcome	es (POs)					P.	SOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO1	PSO 2	PSO 3	PSO 4
CO 1	2												2			2
CO 2	3	3	1	2	2					2			3	2	1	2
CO 3	3	3	1	2	2								3	2		3
CO 4	3												2			
Course Direct 1. 2. 3. Indirect	Direct 1. Continuous Assessment Test I, II &III 2. Assignment 3. End-Semester examinations Indirect															
	. Cours	e - end	surve	у												

Content of t	he syllabus		
Unit – l	TRANSMISSION LINE PARAMETERS	Periods	9
Transmissio transmissio wire, three Transmissio Application	on line conductors – Solid, Stranded and bundled conductors – n lines – Resistance of a transmission line – Flux linkage – Indu phase – symmetrical and unsymmetrical space (single and on line conductors – Concept of self-GMD and mutual–GM s – Electrical potential – Capacitance calculation, Single phase t	Parameters of sir ctance calculatior l double circuit) D (single and g wo-wire, three ph	ngle and three phase a, single phase two – – Transposition of roup of conductor), ase symmetrical
and unsym	netrical spacing – Skin and proximity effects –Interference with	neighboring com	nunication circuits.
Unit - I	TRANSMISSION LINES	Periods	9
Performan attenuation reactive po Ferranti ef	ce of Transmission lines- short line, medium line and long line constant, phase constant, surge impedance; transmission effici wer flow in lines, Power - circle diagrams, surge impedance loa cect. Formation of Corona – Critical Voltages – Effect on Line P	- equivalent circu ency and voltage ling, methods of v erformance	its, phasor diagram, regulation, real and roltage control;
Unit – Il	I INSULATORS AND CABLES	Periods	9
Main comp insulators efficiency. Calculation the cable.	oonents of overhead lines – conductor materials – line support - Voltage distribution in insulator string – Calculation of Strin Underground cables – Classification of Cable – Constructio of capacitance and dielectric stress of a single core cable – Gra	s. Insulators: Prop g efficiency – Im- nal features of L ding of cables – T	perties and Types of provement of String T and HT cables – Thermal resistance of
Unit - IV	MECHANICAL DESIGN OF LINES AND GROUNDING	Periods	9
Mechanica and tension	l design of transmission line–Line Supports –Types of towers - ' calculations for different weather conditions, Methods of grour	Tower spotting, T ding.	ypes of towers, sag
Unit – V	DISTRIBUTION OF POWER SYSTEM AND SUSTATION	Periods	9
Types of A Transmissi	C and DC distributors – distributed and concentrated loads – int on and Distribution: EHVAC, HVDC, Types of HVDC system-	erconnection – Tr Substation Layou	ends in t (AIS, GIS),
		Total Periods	45
Text Book	S		
1.	D.P.Kothari,I.J.Nagarath,,,PowerSystemEngineering [®] ,McGraw-F Company limited, New Delhi, Second Edition, 2008.	illPublishing	
2.	C.L.Wadhwa, "Electrical Power Systems", New Academic Scie	nce Ltd, 2009.	
3.	S.N. Singh, "Electric Power Generation, Transmission and Distr Ltd, New Delhi, Second Edition, 2011.	ibution", Prentice	Hall of India Pvt.
Reference	3		
1.	B.R.Gupta, "Power System Analysis and Design" S. Chand, Ne	w Delhi, Fifth Edi	tion, 2008.
2.	LucesM.Fualken berry, Walter Coffer, "Electrical Power Distrib Education, 2007	ution and Transm	ission", Pearson
3.	ArunIngole, "power transmission and distribution" Pearson Edu	cation, 2017	
4.	J.Brian,HardyandColinR.Bayliss,,TransmissionandDistributionir Newnes; Fourth Edition, 2012.	ElectricalEnginee	ring",
5.	V.K.Mehta,RohitMehta,"Principlesofpowersystem",S.Chand&Co	mpanyLtd,NewD	elhi,2013.
E-Resourc	es		
1.	https://www.electricaleasy.com/		
2.	https://www.sciencedirect.com/topics/engineering/electric-powe	r-distribution	
3.	https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/te	xt/108102047/lec	l0.pdf

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		Δt	the end	l of the	course	the str	ident sh	ould be	able to		.10115.		K	nowled	loe lev	e1
		C	CO1: Identify various components of the control system.K1K3													
Co	ourse	C	CO1: Identify various components of the control system.K3CO2: Analyze various steady state errors for the continuous system.K4													
Out	tcome	C	CO2: Analyze various steady state errors for the continuous system.K4CO3: Estimate the time and frequency response of the system.K2													
		C	04: Est	imate t	he stab	ility of	the sys	tem.							K2	
		C	35: An:	alyze tł	ne syste	em per	formand	e usin	g state	variable	e appr	oach	ı.		K4	
Pre-re	quisite	s -				-			-							
					CO/P	O Map	ping						C		Monn	ing
	(3/2	2/1 indic	ates stre	ength of	correla	tion) 3-	Strong,	2 – Me	dium, 1	- Weak			C	0/150	Mapp	ing
Cos		T		P	rogram	me Out	comes (POs)	1	- <u>,</u>				PS	SOs	
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	3	2	1	-	-	-	-	-	-	-	3	3	-	3	-
CO 2	3	2	2	2	-	-	-	-	-	-	-	3	3	2	2	-
CO 3	3	2	2	2	-	-	-	-	-	-	-	3	3	2	2	-
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Content o	f the syllabus		
Unit –	I SYSTEMS AND THEIR REPRESENTATION	Periods	9
Basic elem	nents in control systems – Open and closed loop systems – Electr	ical analogy of med	chanical and
thermal sy	stems – Transfer function – Synchros – AC and DC servomotors	 Block diagram reasonable 	eduction
Unit -	I TIME PESPONSE	Periods	9
Time resp	onse – Time domain specifications – Types of test input – I and I	order system resp	onse –Error
coefficient modes of f	ts – Generalized error series – Steady state error – Root locus con feedback control – Time response analysis.	struction- Effects of	of P, PI, PID
Unit –	III FREQUENCY RESPONSE	Periods	9
Frequency response - lag-lead co	response – Bode plot – Polar plot – Determination of closed loop Correlation between frequency domain and time domain specific ompensation on frequency response- Analysis.	p response from op ations- Effect of L	en loop ag, lead and
Unit -	IV STABILITY AND COMPENSATOR DESIGN	Periods	9
Characteri lead and la	stics equation – Routh Hurwitz criterion – Nyquist stability criter ag-lead networks – Lag/Lead compensator design using bode plot	ion- Performance o s.	criteria – Lag,
Unit –	V STATE VARIABLE ANALYSIS	Periods	9
Concept o equation in feedback.	f state variables – State models for linear and time invariant Syste n controllable canonical form – Concepts of controllability and ob	ems – Solution of s oservability –Effect	tate and output t of state
		Total Periods	45
Text Bool	KS		1 - 1
1.	Sivanandam S.N, Deepa , S.N. "Control Systems Engineering" Publishing House Pvt. Ltd., New Delhi, NOV2009.	using MATLAB 2	nd Ed. Vikas
2.	Nagrath I.J. and Gopal M "Control Systems Engineering" Wile Ed. 2008	y Eastern Limited,	New Delhi, 5th
Reference	28		
1.	M. Gopal, "Control Systems, Principles and Design", 4th Editio Delhi,2012	on, Tata McGraw H	Hill, New
2.	S.K.Bhattacharya, Control System Engineering, 3rd Edition, Pe	earson, 2013.	
3.	Dhanesh. N. Manik, Control System, Cengage Learning, 2012.		
4.	Nagrath & Gopal, "Modern Control Engineering", New Ages In	nternational	
5.	Arthur, G.O.Mutambara, Design and Analysis of Control; Syste	ems, CRC Press, 20	009.
6.	Richard C. Dorf and Robert H. Bishop, "Modern Control Syste 2012.	ms", Pearson Prent	ice Hall,
7.	Benjamin C. Kuo, Automatic Control systems, 7th Edition, PH	I, 2010.	
E-Resour	ces		
1.	https://www.tutorialspoint.com/control_systems/control_system	ns_block_diagrams	s.htm
2.	https://www.tutorialspoint.com/control_systems/control_system	ns_time_response_	analysis.htm
3.	https://www.tutorialspoint.com/control_systems/control_system	ns_frequency_resp	onse_analysis.htm
4.	https://www.tutorialspoint.com/control_systems/control_system	ns_stability_analys	is.htm
5.	https://www.tutorialspoint.com/control_systems/control_system	ns_state_space_ana	lysis.htm

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Programme	B.E.	Pro	gramm	e Code	102	Regulation		2019
Department	ELECTRICAL AND ELECT	RONI	CS			Semester		IV
1	ENGINEERING							·
Course Code	Course Name	Period	ls Per	Week	Credit	Maxii	num M	larks
Course Code	Course Manie	L	Т	Р	С	CA	ESE	Total
U19CS417	Data Structures	3	0	0	3	40	60	100
Course Objective	 The student should be made to Impart the basic concept of Learn the linear data struct Describe the non linear data Examine various algorithm Analyze various searching 	, of list Al tures su ta struc ns for fi g, sorting	DT. ch as s tures s nding g algor	tack an uch as shortest ithms a	d queue. Free and t path an nd hashi	Graphs. d minimum sp ng techniques	anning	tree.
	At the end of the course, the stu	ident sh	ould b	e able to	0,		Kı	nowledge level
	CO1: Implement abstract data	type fo	r list a	nd oper	ations.			K3
Course	CO2: Apply the stack and que	eue data	structu	are for p	oroblem	solution.		K3, K4
Outcome	CO3: Analyze various tree da applications	ta struct	ures to	impler	nent vari	lous		K4
	CO4: Critically analyze and so and minimum spanning.	olve the	proble	ems in f	inding sl	nortest path		K5
	CO5: Demonstrate the various techniques	s search	ing, so	rting al	gorithms	and hashing		K3,K4
Pre- requisites	-							

<u> </u>	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak														
COs				PSOs	1										
	PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO PO PO 10 11 12														PSO 3
CO 1	3	3	3	2								2	2	2	
CO 2	3	3	3	2								2	2	2	
CO 3	3	3	3	3								2	2	3	
CO 4	3 3 3 2													3	
CO 5	3	3	3	3								2	2	3	

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

1. Course – end survey

Content of	f the syllabus		
Unit – l	LINEAR DATA STRUCTURE – LIST	Periods	9
Abstract D Linked Lis (Insertion,	pata Types (ADTs) – List ADT – Array Implementation – Linked I ts – Circular Linked Lists – Doubly Linked Lists – Applications of Deletion, Merge, Traversal).	List Implement Lists – Polync	tation — Singly omial operations
Unit - I	LINEAR DATA STRUCTURE – STACKS, QUEUES	Periods	9
Stack ADT expression queues.	 Operations – Application: Evaluating Arithmetic Expressions – C – Queue ADT – Operations – Circular Queue – Priority Queue – De 	onversion of In Queue – Appli	ifix to postfix cations of
Unit – Il	I NON LINEAR DATA STRUCTURE – TREES	Periods	9
Terminolo Binary Sea	gies – Tree ADT – Binary Tree – Tree Traversals – Expression Trees rch Tree ADT - AVL Trees – B- Trees – Heap – Applications of Hea	ap.	s of Trees –
Unit - I	NON LINEAR DATA STRUCTURES – GRAPHS	Periods	9
Definition Topologica	– Representation of Graph – Types of graph – Breadth-First Traversa al Sort – Shortest Path Algorithms - Minimum Spanning Tree - Appli	al – Depth-First cations of grap	t Traversal – bhs.
Unit – V	SEARCHING, SORTING & HASHING TECHNIQUES	Periods	9
Quick Sort Addressing	, Hashing: Hash Functions – Collision Resolution Techniques – Separate Section Soft	arate Chaining	– Open 45
Text Book	s	ui i ci ious	
1.	Mark Allen Weiss — Data Structures and Algorithm Analysis in C Education, 2011	C, Second Editi	on, Pearson
2.	Reema Thareja — Data Structures Using C, Second Edition, Oxfo	ord University	Press, 2011
Reference	S		
1.	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Cliffor Algorithms", Second Edition, Mcgraw Hill, 2002.	d Stein — "Int	roduction to
2.	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, — "Fundamer Second Edition, University Press, 2008	ntals of Data St	ructures in C",
3.	Stephen G. Kochan, — "Programming in C", Third edition, Pearson	n Education.	
4.	Joe Bentley — "Programming Pearls", Second Edition, Pearson Ed	ucation, 2006	
5.	Steven S. Skiena — "The Algorithm Design Manual", Second Edit	ion, Springer, 2	2010.
E-Resourc	ces		
1.	https://www.edx.org/course/algorithms-and-data-structures		
2.	https://hackr.io/tutorials/learn-data-structures-algorithms		
3.	https://www.learneroo.com/subjects/8		

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Progr	amme]	B.E.			Prog	ramme	e Code	e		102	Regu	lation		2019	
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Cou	urse			Cour	se Na	me		Pe	eriods Weel	Per k	Credit		Max	ximum	Marks	
	<i>A</i> C							L	Т	Р	С	C	A	ESE	Т	otal
U19E	EE414		AC N	Machi	nes La	abora	tory	0	0	4	2	60		40	1	100
		The	e stude	ents sh	ould r	nade t	0	•						•		
Cou Obje	urse ective	•	Evalı Expe	uate th rimen	ne per ts.	forma	nce o	of vari	ous A	le ma	chines b	y condu	ucting	appro	priate	
		A	t the er	nd of tl	ne cou	rse, the	e stude	ent sho	uld be	able t	0,				Kno L	wledge evel
		CO1: Calculate the regulation of a three-phase alternator by different methods K2														
Cou Outo	ırse come	CO	2: Me	easure	negati	ve seg	luence	and z	ero se	quenc	e impeda	nce of a	alterna	tors.	K2	
		CO inv	3:Synerted	chron V curv	izatior 'es	n of sy	nchro	nous n	nachir	e to n	nains and	determ	ine V	and	K2	
		CO and	94:Pre	determ ked rot	ine th or test	e perfe ts.	orman	ce of i	induct	ion m	otor by c	onducti	ng no-	load	K2	
		CO ind	5: Preuction	deterr moto	nine tł r.	ne perf	formai	nce of	Load	test of	n single-p	bhase &	three-	phase	K2	
Pre- requis	sites	-														
					CO /	PO M	Iappin	g								
	(3/2/	1 indic	cates st	rength	of corr	elation	n) 3-Sti	rong, 2	- Mec	lium, 1	- Weak		(CO/PSC) Mappi	ng
					Progr	amme	Outco	mes (P	Os)			1		P:	SOs	
COs	PO 1	PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10 PO 11 PO 12 PSO 1 PSO 2 PSO 3 PSO 4											PSO 4			
CO 1	3	2	3	-	1	2	-	-	2	1	2	2	2	1	1	-
CO 2	3	2	3	1	1	-	-	-	1	-	2	1	1	1	2	
CO 3	3	2	3	-	1	2	1	-	2	-	1	2	1	1	2	-
CO 4	3	3	3	1	1	-	-	-	2	-	1	1	2	1	1	-
CO 5	3	3	3	2	2	1	-	-	1	2	1	2	1	1	1	-

Direct

- 1. Pre lab and Post lab test
- 2. Record mark
- 3. End-Semester examinations

Indirect

1.Course – end survey

Content of the syllabus

S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Regulation of three phase alternator by EMF and MMF methods.	CO1	PO1,PO4,PO9,P SO1,PSO3
2.	Regulation of three phase alternator by ZPF method.	CO1	PO1,PO4, PO9,PSO1, PSO3
3.	Regulation of three phase salient pole alternator by slip test.	CO1	PO1,PO4, PO9,PSO1, PSO3
4.	Measurements of negative sequence and zero sequence impedance of alternators.	CO2	PO1, PO9,PSO1
5.	V and Inverted V curves of Three Phase Synchronous Motor.	CO3	PO1, PO9,PSO1
6.	Load test on three-phase induction motor.	CO5	PO1, PO9,PSO1
7.	No load and blocked rotor test on three-phase induction motor.	CO4	PO1, PO9,PSO1
8.	Separation of No-load losses of three-phase induction motor.	CO4	PO1,PO4, PO9,PSO1, PSO3
9.	Load test on single-phase induction motor.	CO5	PO1, PO9,PSO1
10.	No load and blocked rotor test on single-phase induction motor.	CO4	PO1, PO9,PSO1
	60		

Content of the syllabus Program Outcome & Course Program S.No LIST OF EXPERIMENTS Outcome Specific Outcome 1. Inverting, Non – Inverting amplifiers using op -amp CO1 PO3.PSO1 2. CO1 PO3, PSO1, PSO3 Integrator and differentiator using op - amp 3. CO1 PO1,PO3,PSO1 Instrumentation amplifier using op -amp 4. CO1 PO1, PSO1, PSO3 Differential amplifier using op -amp PO2, 5. CO4 Active low pass, high pass and band pass filters PSO1,PSO3,PSO4 6. CO3 PO3,PSO1,PSO3 Comparator clipper and clamper using op -amp 7. CO3 PO3,PSO1,PSO3 Wein bridge oscillators using op -amp 8. CO3 PO2,PSO3,PSO4 A/D and D/A converter. A stable, Monostable and Bistable multi vibrators using op -9. CO2 PO2,PSO3, PSO1 amp Study of PLL characteristics and its use as frequency 10. CO5 PO1,PSO1 multiplier. Total Periods 60

		V	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205													TUrbaner Contract Contract			
Programme		e B	S.E.					F	rogra	amme	Code	e			Re	gulatio	ation 2019		
Dep	t El	ELECTRICAL AND ELECTRONICS ENGINEERING Semest												emest	er	IV			
Course Code			Course Name					Pe	eriods	PerW	/eek	Cre	edit		Ma	Maximum Marks			
										L T P				С			E	Total	
U19N		VERBALABILITY						3	0	0		-		-		100			
Course The main objective of the course is to: Objective To help the student understand the importance of having his language skills kept ready for effective use To provide a host of varied opportunities for the student to hone his acquired language skill basic components, namely, Grammar, Vocabulary, Spelling and Comprehension														ready for guage skills					
		At 1	the er	nd of	f the	cou	rse, the	studen	t sho	uld be	e able	to,					KL		
Cou Outc	CO	CO1 :, Identify the verb and tense in a sentence by circling and labeling												K1					
		CO	7. Sta	nta tk	no do	finit	ion of	n artic	ما								K1		
CO2: State the definition of an article CO3: Develop their awareness of correct usage of English grammar in writing												ing	K3						
		and	spea	king	g .		1		4 .1.1	11 4 a f	11	41- 0.1-0		farmta					
	CO5 : Discuss how word root based extends werehulary												K4 K2						
Pre-requ	uisites		0121	Seu s	5 110		Jiu 100	- ouseu	enter		, euo u	iui y							
						CO)/PO Ma	pping						CO)/PSO				
		(3/	/2/1indi	icates	streng	th of c	orrelation	n)3-Strong	g,2– M	edium,1	-Weak			Ma	pping			-	
	COs		Programme Outcomes(POs)											PSOs				-	
		PO1	PO2	PO3	PO4	PO5	PO6 PC	07 PO8	PO9	PO10	PO1	1 P	012	PSO1	PSO2	PSO.	B PSO	4	
	CO 1						2		3	3			3		2				
	CO 2						2		3	3			3		2			_	
	CO 4						2		3	3			3		2			_	
	CO 5						2		3	3		3	3		2				
Content	of the	sylla	bus																
Unit–I TENSES Periods 6												6							
Purpose and rules of tenses and its keywords (focus should be given to present continuous, future continuous, present perfect, future continuous) and the set of th																			
ureperfect, present perfect continuous, past perfect continuous, future perfect continuous With more examples) -Direct and Indirect Speech –Voices.																			
Unit-II ARTICLES Periods 6																			
Purpose of Articles: Indefinite Article: If you want to say about ANY item, you should use the articles A /An.A:AEuropean,AOneEyedbeggar,AUniversity,AUsefulWebsite.Nameofprofessions,Expressionof quantity, To make a Proper noun a Common noun, With certain numbers, used before the word 'Half' when it follows a whole number. Exceptions: Choosing A or An There are a few exceptions to the general rule of using a before words that start with consonants and an before words that begin with vowels. The first letter of the word honor, for example, is																			
a consonant, but it's unpronounced. In spite of its spelling, the word honor begins with a vowel sound. Therefore, we use an. **Example.**

The Definite Article:

Where to use the Definite Article -A specific item, a particular person or thing, Before superlative forms, Before double comparatives, Before musical instruments, Before rank or title, Before name of the political parties, armed forces, physical positions, Before a Proper noun when used as a Common noun, Before some adjectives to make them nouns, Before Ordinal numbers, Before the names of Oceans, Seas, Rivers, Canals, Deserts, Groups of Mountains and Groups of Islands, Before the names of the Things, which are unique in nature, Before the names of Planets and Satellites, Before Holy Books, Before the names of News Papers, Before the names of some countries ,measuring expressions beginning with by.**Omission of articles**:

Before Plural countable noun, Before proper noun, Before languages, a single item of uncountable noun, Before name of the meals except adjective usage, Double expressions – with wife and fork, with hat and folk, from top to bottom, With the names of meals such as Breakfast, Before predicative nouns denoting a unique position, After type of / kind of / sort of / post of / title of / rank of / articles are not used. Ex. He is not that sort of man, Articles are not used with material nouns, After di-transitive verb articles should not be used except when it is used as mono transitive verb, Before the names of meals no article should be used in a general way except in particular causes.

Repetition of the articles

1. When two or more adjectives qualify the same noun, the article is used before the first adjective only; but when they qualify different nouns, expressed or understood, the article is used before each adjective.

PREPOSITIONS

a. PrepositionsOfTime-On,In,At,Since,For,Ago,During,Before,After,Until,Till,To/Past,From/To,By

- b. PrepositionsOfPlace-In,At,On,Off,By,Beside,Under,Over,Below,Above,UpAndDown,Ago
- c. PrepositionsOfDirections/MovementsAcross,Through,To,Into,OutOf,Onto,Towards,From
- d. Other Prepositions-Of, By, About , For, With Prepositions UsagewithItsContext

d. Ouler repositions Or, Dy, roout , ror, with repositions Osuge with seconext		
Unit – III SENTENCECORRECTION	Periods	6
SENTENCE CORRECTION		
a) In each of the following sentences, four options are given. You are required to id	entify the best	way
of writing the sentence in the context of the correct usage of standard written English. While doing so, you write the sentence in the context of the correct usage of standard written English. While doing so, you write the sentence in the context of the correct usage of standard written English. While doing so, you write the sentence in the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the context of the correct usage of standard written English. While doing so, you write the correct usage of standard written English. While doing so, you write the correct usage of standard written English. While doing so, you write the correct usage of standard written English. While doing so, you write the correct usage of standard written English. While doing so, you write the correct usage of standard written English. While doing so, you write the correct usage of standard written English. Write	havetoensure	the
message being conveyed remains the same in all the cases.		
b) For each of the following questions, a part or the whole of the original sentence has been une	derlined. You h	ave to
find the best way of writing heunderlined partof the sentence.		
c) In the following questions, you have to identify the correct sentence/s. For each of the following	owing questions	, find
the sentence/s that are correct.		
d) In each of the following questions, one or more of the sentences is/are incorrect. You	have to identif	y the
incorrectsentence/s.		
SENTENCE IMPROVEMENT		
a. Subject-Verb Agreement		
b. Parallelism		
c. Redundancy: Theerrorofrepeating hesamething.		
d. Modifier		
e. Comparisons		
RULE:(a) When comparativedegreeis used with than ,makesure that weex clued the thi	ng compared fro	omthe
rest of class of things by using the		
f. Confusing words		
i) Fewand Less		
ii) FewandA few		
iii) LittleandALittle		
g.A little tact would have saved the situation(some tact).Layand Lie Lay, laid		
	r	
Unit – IV SENTENCE CORRECTION	Periods	6
FNTENCECORRECTION		

e) In each of the following sentences, four options are given. You are required to identify the best way of writing these ntence in the context of the correct usage of standard written English. While doing so, you have to ensure the message being conveyed remains the same in all the cases. f) For each of the following questions, a part or the whole of the original sentence has been underlined. Youhaveto find the best wayofwritingtheunderlinedpartof the sentence. g) In the following questions, you have to identify the correct sentence/s. For each of the following questions, find the sentence/s thaarecorrect. h) In each of the following questions, one or more of the sentences is/are incorrect. You have to identify the incorrectsentence/s. **SENTENCEIMPROVEMENT** a. Subject-Verb Agreement b. Parallelism c. Redundancy: Theerrorofrepeatingthesamething. d. Modifier e. Comparisons RULE:(a) Whencomparativedegree is used with than, makes ure that we exclude the thing compared from the restofclass ofthings by using the f. Confusing words i) Fewand Less ii) FewandA few iii) LittleandALittle g. A little tact would have saved the situation(some tact).Layand Lie Lay, laid **Unit-IV** Periods **SENTENCE COMPLETION** 6 **SENTENCE COMPLETION :**Purposeandusageofproperwords.**SPOTTINGERRORS**: a. Errorsonconjunctions b. Errorson, if 'clauses c. Errors onadverbs d. Errorsonadjectives e. Errorsonprepositions f. Errorsondeterminers g. Errorson verbs h. Errors onnouns i. Errorsonmodifiers j. Errors ondegreesofcomparison k. Errorsonsubject-verbagreement 1. Errorsoninfinitives m. Errors onpronouns n. Errors ontenses o. Redundancyerrors p. Errorsonarticles Error on complex sentences VOCABULARY Periods Unit-V 6 Synonyms: Root BasedWord,Suffix BasedWord.Antonyms-ContextualVocabulary-Verbal Analogy TotalPeriods 30 **Text Books** ObjectiveGeneral EnglishbySPBakshi–Arihant Publication 1. References

Q	VIVEKA (Au	IVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205B.E.Programme Code102Regulation										
Programme	B.E.		Progra	imme (Code	102	Regulation		2019			
Department	ELECT ENGIN	TRICAL AND ELEC EERING	TRON	NICS			Semester		V			
Course Code	(Course Name	Per	iods Po Week	er	Credit	Max	imum N	/larks			
		L T P C CA ESE										
U19EE516	Microp Microc	rocessors and ontrollers	3	0	0	3	40	60	100			
Course Objective	The stud	dents should made to Understand the Archi Learn the design aspe Learn the design aspe 8085 &8051. Design and develop	itecture ects of I ects Ade uP8085	of μP8 //O and dressin & μC	3085 d Men g mo 8051	& μC805 nory Inter des, Instr based sys	1. facing. uction set Inter stem.	rrupt sti	ructure of			
	At the e	nd of the course, the	student	should	be al	ole to,			Knowledge Level			
Course	CO1: E	xplain the architecture ion set of 8085.	e of Mic	croproc	essor	, addressi	ng modes &		K2			
Outcome	CO2: U	se of Interrupt structu	re 8085	and p	ograi	nming			K2			
	CO3: U 8051.	CO3: Understand the architecture of Microcontroller, and programming with 3051.										
	CO4: U	CO4: Understand the importance of Interfacing and its programming K2										
	CO5: D	CO5: Develop the Microprocessor and Microcontroller based applications K3										
Pre-requisites												

(3/	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak											CO/PSO Mapping				
	Programme Outcomes (POs)									PSOs						
COs	COs PO PO 1 2 3 4 5 6 7 8 9 10 11 12											PSO 1	PSO 2	PSO 3	PSO 4	
CO 1	3	2	2	3	2	3	3	-	-	3	3	-	3	-	2	2
CO 2	3	2	2	3	2	3	3	-	-	3	3	-	3	-	3	2
CO 3	3	2	2	3	3	3	3	-	-	3	3	-	3	-	3	3
CO 4	CO4 3 3 2 3 3 3 3 3 3 -											3	-	3	3	
CO 5	3	3	2	3	3	3	3	-	-	3	3	-	3	-	3	3

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus		
Unit –	I INTRODUCTION TO 8-BIT MICROPROCESSOR	Periods	9
General 8 Memory o Memory A	-bit microprocessor and its architecture - 8085 functional bloc rganization - I/O ports - Data transfer techniques: Programmed I/C cccess - Timing Diagram – Interrupts-PIC and ARM processors.	k diagram - I), Interrupt Driv	Pin configurations – ven I/O, Direct
Unit -	INSTRUCTIONSETS AND ASSEMBLY LANGUAGE PROGRAMMING OF 8085 PROCESSOR	Periods	9
Instruction control gr Assembler Subroutine	Set: Format and addressing modes – Data transfer, Arithmetic, Lo oup of instruction set; Unspecified flags and Instructions As Directives – ALU operations - Code conversions – Program using es, parameter passing – Stack operations - Programming using look	bgical, Branch, sembly Langu Rotate and co up table.	Stack and Machine age Programming: ntrol Instructions -
Unit –	III 8051 MICRO CONTROLLER – INSTRUCTION SET, PROGRAMMING	Periods	9
Architectu Registers - Algorithm	re, pin outs – Functional Building Blocks of Processor – Memory I/O ports operation – Timing Diagram – Interrupts, Data s & I/O instructions, Comparison to Programming concepts with80	organization – Transfer, Ma)85.	Special Function nipulation, Control
Unit - I	IV PERIPHERAL DEVICES AND INTERFACING WITH 8085& 8051	Periods	9
programm communic Keyboard	able DMA controller (8257), programmable interrupt co ation interface (8251), programmable counter/interval timer (8253) and display controller (8279).	nable peripher ontroller (825 /54), A/D and l	al interface (8255), 9), programmable D/A converters,
Unit –	V SYSTEM DESIGN USING MICRO CONTROLLER	Periods	9
Case Studi Applicatio	es: Traffic Light control – Washing Machine control – RTC interf n to automation systems: Control of servo motor, and stepper moto	acing using I2C or.	C standard - PWM -
		Total Periods	45
Text Book	S		
1.	R.S. Gaonkar, "Microprocessor Architecture Programming and A Eastern Ltd., New Delhi, 2013.	Application", w	vith 8085, Wiley
2.	Muhammad Ali Mazidi & Janice Gilli Mazidi, R.D.Kinely "The Embedded Systems", PHI Pearson Education, 5th Indian reprint,	8051 Micro Co 2003.	ontroller and
Reference	S		
1.	DouglasV.Hall,,,MicroprocessorandInterfacing",McGrawHillEdu,	2016.	
2.	Ajay V.Deshmukh, "Microcontroller Theory & Applications", M	cGraw Hill Ed	u,2016.
3.	Sunil Mathur & Jeebananda Panda, "Microprocessor and Microc Ltd, 2016.	ontrollers", PH	II Learning Pvt.
4.	Soumitra Kumar Mandal, Microprocessor & Microcontroller Ard Interfacing using 8085,8086,8051,McGraw Hill Edu,2013.	chitecture, Prog	gramming &
5.	Krishna Kant, "Microprocessor and Microcontrollers", Eastern C India, New Delhi, 2007.	Company Edition	on, Prentice Hall of
E-Resourc	es		
1.	https://adityaeeeb.weebly.com/uploads/4/2/0/0/42007913/mpmc	_textbook_god	se.pdf
2.	https://www.vssut.ac.in/lecture_notes/lecture1423813120.pdf		
3.	https://rk2bukz.cf/read.php?id=P-n3kelycHQC		

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Code Institution Ins														
Prog	gramn	ne	B.E.			<u> </u>	1	Prog	amm	e Coc	le	102	Regu	lation		2019	
Dep	artme	nt	ELEC ENGI	TRIO NEE	CAL RING	AND G	ELEC	CTRO	NICS	5			Sen	nester		V	
Course	code	•		Cou	se Na	ame		Pe	eriods Wee	Per k		Credit		Max	kimum	Marks	
			L T P C CA ESE												To	tal	
U19E	E517]	Power System Protection and Switchgear 3 0 0 3 40 60												10	0	
Cou Objee	rse ctive	,	The st • •	 The students should made to Learn the causes of abnormal operating conditions (faults, lightning and switching surges) of the apparatus and system. Understand the characteristics and functions of relays and protection schemes. Understand the problems associated with circuit interruption by a circuit breaker 													
			Understand the problems associated with circuit interruption by a circuit breaker At the end of the course, the student should be able to, Knowledge Level														
			C O1: I	Under	stand	the ca	auses o	of abno	ormal	opera	ating	g conditi	ons of t	he syst	tem.	K	2
Cou	rse		CO2:	Classi	fy an	d desc	cribe th	ne wor	king o	of var	rious	s relayin	g schen	nes		K	2
Outc	ome	1	CO3: power	Ident: appa	ify an ratus.	d imp	olemen	t an ap	prop	riate 1	relay	ving sche	emes for	differ	rent	К	2
		1	CO4:	Analy er.	ze the	e prob	olem as	ssociat	ed wi	th cu	rrent	t interruj	ption by	a circ	uit	К	3
			C O 5:	Illust	rate th	ne fun	ction of	of vari	ous C	Bs ar	nd re	lated sw	vitching	issues		K	3
Pre-requ	uisite	s															
				(CO/1	PO Ma	apping	[(CO/PSO	О Марр	oing]
(3/	/2/1 ind	dicate	es stren	igth of	corre	lation)	3-Stro	ong, 2 –	Medi	um, 1	- W	eak					
]	Progra	amme	Outcor	nes (PO	Ds)					F	PSOs		
COs	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO 10	PO	PO 12	PSO	PSO	PSO	PSO	
CO 1	3	2	2	4	2	3	3	-	-	3	3	-	3	-	2	2	-
CO 2	3	2	2	3	2	3	3	-	-	3	3	-	3	-	3	2	1
CO 3	3	2	2	3	3	3	3	-	-	3	3	-	3	-	3	3	-
CO 4	3	3	2 3 3 3 3 3 3 - 3 3														
CO 5	3	3	2	3	3	3	3	-	-	3	3	-	3	-	3	3	1
	1		1	1				I	1	1		L	1	I	1	1	J

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of the syllabus									
Unit –	I INTRODUCTION	Periods	9						
Importance and essentia grounds - P	of protective schemes for electrical apparatus and power system al qualities of protection. Protection against over voltages due to eterson Coil - ground wires – surge absorber and diverters Power	 relay termino lightning and sv r System earthir 	ology – definitions - witching - arcing ng – neutral earthing.						
Unit - I	I OPERATING PRINCIPLES AND RELAY CHARACTERISTICS	Periods	9						
Electromag	netic relays: over current (directional and non-directional	, distance, ne	gative sequence and						
differential	relays –Introduction to static relays- digital Protection of sync	hronous gener	ator and						
transmissi	on lines.		0						
Unit – L	II APPARATUS PROTECTION	Periods	9						
Main consi Transmissi	derations in apparatus protection- transformer and generator pro	ection-protectio	on of bus bars.						
Unit - T	V THEORY OF CIRCUIT INTERRUPTION	Periods	9						
Physics of a	arc phenomena and arc interruption restriking voltage and recov	erv voltage -rate	of rise of recovery						
voltage - re	sistance switching - current chopping - interruption of capacitive	e current- DC ci	cuit breaking.						
Unit – V	V CIRCUIT BREAKERS	Periods	9						
Introduction	n of circuit breaker-Types of circuit breakers – air blast, Oi	, SF6 and vacu	um circuit breakers –						
comparativ	e merits of different circuit breakers- testing of circuit breakers-	МСВ-МССВ-Е	LCB-RCCB.						
		Total Periods	45						
Text Books	S								
1.	B. Ravindranath, and N. Chander, "Power System Protection & (P) Limited, 2014.	Switchgear", N	ew Age International						
2.	SinghL.P.,—DigitalProtectionI,SecondeditionNewAgeInternationDelhi,2004.	onal(P)Limited,	New						
References	S								
1.	M.L. Soni, P.V. Gupta, V.S. Bhatnagar, A. Chakrabarti, "A Tez Engineering", Dhanpat Rai & Co., 2013	t Book on Powe	er System						
2.	V.K.Mehta, Rohit Methta, "Principles of Power system" S.Cha 2008.	nd Publications,	4th revised edition						
3.	Y.G. Paithankar and S.R. Bhide, "Fundamentals of Power Syst Pvt. Ltd., NewDelhi–110001, 2012	em Protection",	Prentice Hall of India						
4.	Sunil S. Rao, "Switchgear and Protection", Khanna publishers,	New Delhi, 201	3.						
5.	Donald Reimert, Protective Relaying for Power generation Sys	ems, CRC Press	s, Pages 592, 2015						
E-Resource	28								
1.	https://drive.google.com/file/d/1MvUCgdYXz23IyuPsqay-PvW	/nkoo0DHTa/vi	ew						
2.	https://www.philadelphia.edu.jo/academics/mlazim/uploads/Po %20Part%2001.pdf	wer%20System9	%20protection%20-						
3.	https://www.iitr.ac.in/departments/HRE/uploads/modern_hydro 3_Electrical_Protection_System.pdf	electric_engg/V	OL_2/Chapter-						

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Programme	B.E.		Progra	mme (Code	102	Regulation		2019				
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Course Objective	The stu	Understanding of mo Understanding of var for specific types of a Understand and analy	dern po tious im applicat yze non	ower se portan ions. -linear	emicon t topo circu	nductor d logies of its involv	evices, power convert ing power elec	er circu etronic c	its onverters.				
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Countra	CO1:C construe	hoose various power s ction and characteristi	semicor cs	ductor	devi	ces based	on their		K2				
Outcome	CO2: E R, RL a	valuate the input and on the order of the or	output p	oarame	ters o	f controll	ed rectifiers w	ith	K3				
	CO3: D	etermine the principle	e of ope	ration	of DC	to DC co	onverters		K3				
	CO4: <i>A</i>	analyze the different t	ypes of	inverte	ers an	d their wo	orking principl	e	K4				
	CO5:In controll	CO5: Interpret the principle of operation of cycloconverter and ac voltage K4											
Pre-requisites	-							•					

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CO 4	A 3 3 3 1 2 3										3	2	1	2	1			
CO 5	3	3	3		1						2	3	2	1	2	1		

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
 - 3. End-Semester examinations
- Indirect
 - 1. Course end survey

Content of	the syllabus									
Unit –	I POWER SEMI-CONDUCTOR DEVICES	Periods	9							
Constructio TRIAC, M	on, Operation Static and Dynamic Characteristics of Power dic OSFET, IGBT, IGCT.	des - operation of	SCR, GTO,							
Unit - I	II PHASE-CONTROLLED CONVERTERS	Periods	9							
Single pha with R, RL RLELoad– and three p	ase converter: Half wave, Half controlled bridge converter L,RLE Load - Three phase bridge converter: Half wave and Estimationofaverage&RMSvaluesofloadvoltage,loadcurrentfo hase)- Dual converter.	and full controlle full wave conver Rload(bothsingle	d bridge converter ter with R, RL and phase							
Unit – I	III DC-DC CONVERTERS	Periods	9							
Fly back co Converters	onverters – forward converters-Switching Mode Regulators: B – Cuk Converters- SEPIC Converter –Applications.	ick – Boost – Buc	k Boost							
Unit - I	DC-AC CONVERTERS	Periods	9							
Types of in analysis wi Voltage co	nverters – operation of Single phase and three phase (120°, 18 ith star connected R load – operation of single phase current so ntrol of Single phase inverters – harmonic reduction technique	^o) voltage source urce inverter – Mu s-UPS-SMPS.	inverter modes ıltilevel inverters –							
Unit –	V AC-AC CONVERTERS	Periods	9							
AC Voltage Controllers : Single phase voltage regulators – half wave and full wave with R, RL loads – sequence control of AC regulators – two stage sequence regulator with R, RL load –Introduction to Three phase regulators (no analysis). Single phase and three phase Cycloconverters-Matrix converters										
Total Daviada										
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Text Book	'S	Total Periods	45							
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Text Book 1. 2.	Rashid, M.H, "Power Electronics - Circuits, Devices and Ap Edition, New Delhi, 2017. M.D.SinghandK.B.Khanchandani, "PowerElectronics", TataMa Limited, 2nd Edition, 2019.	Total Periods	45 n Education, 3rd ning Company							
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Department	ELECTRICAL AND EL ENGINEERING	ECTRON	ICS			Semester		V	
Course Code	Course Name	Per	iods P Week	er	Credit	Maxi	mum N	Iarks	
		L T P C CA							
U19EE520	Microprocessors and Microcontrollers laboratory	0	0	4	2	60	40	100	
Course Objective	 Provide training o Understand the in Simulate various n simulator. 	to n programi terface requ microproce	ming c uireme essors a	of mic ents. and m	roprocess	sors and micro	control EIL or	lers Equivalent	
	On completion of the cour	se the stud	ents w	ill be	able to		K	nowledge Level	
Course	CO1: Understand and apple engineering problems	ly computi	ng plat	form	and softv	vare for		K4	
Outcome	CO2:Programming logics	for code c	onvers	ion.				K4	
	CO3: Acquire knowledge	on A/D an	nd D/A					K3	
	CO4: Understand basics of	of serial con	mmuni	catio	n.			K4	
	CO5: Understand and i	impart kno	owledg	ge in	DC and	l AC motor		K6	
	interfacing.								
Pre-requisites	-								
	CO / PO Mann	ing				CO/PS() Manı	oing	

					CO/I	PO M	apping	Ţ					CO/PSO Mapping						
(3/	2/1 inc	licates	s stren	gth of	corre	lation)	3-Stro	ng, 2 –	Medi	um, 1	– Wea	ak							
COs		Programme Outcomes (POs)													PSOs				
	DO													DCO	DCO	DCO			
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CO 2	3	2	3	3	3					3	2	1	3	3	3	3			
CO 3	2	3	3	3	2					3	2	1	3	3	3	3			
CO 4	2	2	3	3	3					3	2	1	3	3	3	3			
CO 5	3	3	3	3	3					3	2	1	3	3	3	3			

Direct

- 1. Pre lab and post lab test 2. Record mark
- 3. End-Semester examinations

Indirect

1.Course - end survey

Conter	nt of the syllabus		
S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Simple arithmetic operations using 8085: addition / subtraction / multiplication /division.	CO1	PO1,PO3, PSO1,PSO4
2.	 Programming with control instructions: a. Sorting and searching of numbers. b. Counting of odd and even numbers in a block of data. c. Counting of positive and negative numbers in a block of data d. Code conversions 	CO2	PO1,PO3, PSO1, PSO4
3.	Interface Experiments: with8085 A/D Interfacing. and D/A Interfacing	CO3	PO2,PO3, PO10, PSO1, PSO4
4.	Interfacing Traffic light controller with8085.	CO1	PO1,PO3, PSO1,PSO4
5.	Serial communication interfacing with8085.	CO4	PO1,PO4, PSO1,PSO4
6.	Read a key, interface display using 8085.	CO4	PO3,PO4,PO5 ,PSO1,PSO4
7.	Programming Practices with Simulators/Emulators/open source	CO1	PO1,PO3, PO4,PSO1, PSO4
8.	Simple arithmetic operations using 8051: addition / subtraction / multiplication /division.	CO1	PO1,PO3, PO4 PSO1,PSO4
9.	Square and Cube program, Find 2,,s complement of a number using8051	CO2	PO1,PO3, PSO1,PSO4
10.	 Programming I/O Port and timer of 8051 a. study on interface with A/D and D/A b. Study on interface with DC and AC motors c. Firing pulse generation using 8051 	CO5	PO1,PO3, PO4, PSO1,PSO4
	Total periods		45

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C Ol	Course The students should made to Objective Provide knowledge on basics instrumentation • Analysis and design of control system along with basics of instrumentation • At the end of the course, the student should be able to												entation					
			At th	e end	of the	e cour	se, the	e stude	nt shou	ıld be	able	to,				Kno	wledge level	
			C01	: Eval	uate th	ne trai	nsfer f	unction	of a g	iven A	C and	1 DC so	ervo mo	tor	1 .		K4	
C	ourse		CO2	: Dete	rmine	the p	erform	ance o	t first a	ind see	cond c	order sy	ystems 1	n time	domaii	1	$\frac{K3}{K2}$	
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			ČO 4	: Und	erstan	d the	Digita	al simu	lation	of firs	st orde	er and	second	order s	ystem	8	K2	
			CO5:	: Und	erstan	d the	basic	concep	ots of b	ridge	netwo	orks.					K2	
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	CO1 CO2 CO3	PO1 3 3 3	PO2 2 2 2 2 2	PO3 2 2 2 2	PO4	PO5 1 1 1 1	PO6 1 1 1 1	P07	PO8	PO9 1 1 1 1	PO10	PO11 1 1 1	PO12 1 1 1 1	PSO1 3 3 3 3	POS2 2 2 2 2 2	POS3	POS4 1 1 1 1	
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Content o	f the Syllabus		
S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Determination of transfer functions of DC Servomotor.	CO1	PO1,PO2,PO3, PSO1,PSO3,PSO4
2.	Determination of transfer functions of AC Servomotor.	CO1	PO1,PO2,PO3, PSO1,PSO3,PSO4
3.	Analog simulation of Type - 0 and Type – 1system.	CO2	PO1,PO2,PO3, PSO1,PSO3,PSO4
4.	Stability analysis of linear systems.	CO2	PO1,PO2,PO3, PSO1, PSO3,PSO4
5.	DC and AC position control systems.	CO3	PO1,PO2,PO3, PSO1,PSO3,PSO4
6.	Digital simulation of first and second systems.	CO4	PO1,PO2,PO3,PO5 PSO1,PSO2,PSO3,P SO4
7.	Linear Variable Differential Transformer (LVDT).	CO5	PO1,PO2,PO3, PSO1,PSO4
8.	Measurement of Low Resistance by Kelvin''s Double Bridge Method.	CO5	PO1,PO2,PO3, PSO1,PSO3,PSO4
9.	Measurement of Self Inductance and Capacitance using Bridges.	CO5	PO1,PO2,PO3, PSO1,PSO3,PSO4
10.	Measurement of Power in a single phase circuit by using CTs and PTs.	CO5	PO1,PO2,PO3, PSO1,PSO3,PSO4
	Total periods		45

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		ļ	CO4: E particul	Examine the possibilities of wind energy systems in the ilar locality.									K2			
			C O5: E energy f	xamine	the so o-grid	lar PV, installa	wind, f	fuel cel r a give	l and b en requi	attery remer	sourc	es of			K2	
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Content of	the syllabus		
Unit –	I LOAD DEMAND	Periods	9
Demand fo	r Electric Power – Load Curves and Load Curve Analysis – Divers	ity and Plant fa	ctors - Reliability
Evaluation	– Outages, Causes and Interruptions – Cost versus Reliability – Sh	ort and Long ra	ange planning.
Unit - I	I CONVENTIONAL GENERATION SCHEMES	Periods	9
Hydroelect stations and	ric power plants - Pumped storage plants- Thermal power plants: S Diesel generators – Nuclear power plants – Safety aspects – Envir	team power sta ronmental conc	ations, Gas turbine cerns.
Unit – I	II SOLAR PV SYSTEMS	Periods	9
Solar radia and Types power conc Application	ion and measurement -Block diagram of solar photo voltaic system - Arrays and Panels - DC power conditioners - Maximum powe litioners - Synchronized operation with grid supply – Standalone P is: Water pumping and Street lighting.	m- Solar PV C r point trackin V System. Sola	ell- Characteristics g algorithms - AC ar PV
Unit - I	V WIND ENERGY SYSTEMS	Periods	9
Basic prin Componen generation	ciple of wind energy conversion - Nature of wind power in the winn the of Wind Energy Conversion System (WECS) - Classification of A Applications – Water pumping and Village electrification.	d - Site selecti f WECS - Sche	on considerations- mes of electrical
Unit – T	V COGENERATION AND MICROGRID	Periods	9
micro grids	:: Biomass and Fuel cells – Structure and Configuration of AC nd Control of micro grid: Grid connected and Islanded mode.	and DC micro	b grid – Modes of
		I otal r erious	45
Text Book	3		
1.	C.L.Wadhwa, "Electrical Power Systems", New Age Intern	ational, 2007	•
2.	Mukund R. Patel, "Wind and Solar Power Systems", CRC	Press, New Y	ork, 2009
References			
1.	Digambar M. Tagare, "Electricity Power Generation: The C Wiley & Sons,2011	Changing Dim	nensions", John
2.	Chetan Singh Solanki, "Solar Photovoltaics: Fundamentals Applications", PHI, Delhi, 2015	, Technologie	s and
3.	Adolf Goetzberger, Volker Hoffmann, "Photovoltaic Solar Springer- Verlag Berlin Heidelberg, 2005	Energy Gene	ration",
4.	P Breeze, "Power Generation Technologies", Elsevier, 2nd	Edition, 2014	1
5.	S.Chowdhury and P.Crossley, "Microgrids and Active Dist Institution of Engineering and Technology (IET Press), 201	ribution Netw	/orks",
E-Resource	s c c c c c c c c c c c c c c c c c c c		
1.	https://www.google.com/search?q=generation+of+electrical+energy&ags=chrome_69i57i0i46i015 26017i0i7&sour	ergy&oq=gene ceid=chrome&	ration+of+ rie=UTF-8
2.	https://www.google.com/search?q=solar+pv+systems&oq=SOL	AR+PV+SYST	TEMS&aqs=chr
3.	https://en.wikipedia.org/wiki/Electricity_generation		
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Prog	ramn	ne	B.E.					Progr	amm	e Co	ode	102	Reg	ulation		2019	
Depa	artme	nt E	LEC NGI	CTRIO NEE	CAL RIN(AND 3	ELEO	CTRO	NICS	5			Se	mester		VI	
Course	Code	;		Cou	rse Na	ame		Pe	eriods Wee	Per k	•	Credi	ţ	Maxi	mum M	arks	
								L	Т		Р	С	(CA	ESE	Total	
U19EF	E623	P a	ower nd C	: Syst ontro	em o ol	perat	ion	3	0		0	3	40		60	100	
Cour Objec	rse tive		 The students should made to Learn the voltage control methods and reactive power compensation tech Analyze the unit commitment and economic dispatch scheduling. Learn the control methods and energy management system of power sys network 											hniques. tem			
		A	At the end of the course, the student should be able to,											Knowledg e Level			
Cour	rse	C c	CO1: understand the voltage control methods and reactive power compensation techniques.											K2			
Outco	ome	0	<u>202:</u>	Analy	yze th	e uni	t comn	nitmen	t proł	olem	ns.					K4	
			203: 204	Analy Unde	yze th	e eco	nomic	dispat	ch pro	oble	ms.	v mana	gement	system	of	K 4	
		p	ower	syste	m net	twork		meth	Jus ai	iu ci	nerg	y mana	gement	system	01	K2	
		C	CO5:	Appl	y the	state	estima	tion in	powe	er sy	sten	n netwo	rk.			K3	
Pre-requ	isites	s P	ower	Syste	em A	nalysi	is										
(3/2	2/1 ind	licates	stren	gth of	CO/I correl	PO M lation)	apping 3-Stro	ng, 2 –	Medi	um,	1 – V	Veak		CO/PS	O Mappi	ng	
005	PO	PO	РО	PO	PO	PO	PO	PO	PO	РО	P	0 р	PSO	PSO	PSO	PSO	
<u>CO 1</u>	1	2	3	4	5	6	7	8	9	10	1	$\frac{1}{2}$ 12	1	2	3	4	
CO 2	3	3	3	3	-	-	-	-	-	-	2	$\frac{2}{2}$ 2	2	-	3	3	
CO 3	3	3	3	3	-	-	-	-	-	-	2	$\frac{2}{3}$	2	-	3	3	
CO 4 CO 5	3	3	3 2	3 2	-	-	-	-	-	-	2	$\frac{2}{2}$ 3	2	-	3	3	
				_											_		
Course A	ssess	ment	Metł	nods													
Direct 1. 2. 3. Indirect 1.	Direct 1. Continuous Assessment Test I, II &III 2. Assignment 3. End-Semester examinations Indirect 1. Course – end survey																

Conte	nt of the	e syllabus		
Un	nit – I	REACTIVE POWER AND VOLTAGE	Periods	9
		CONTROL		-
Produc	ction and	d absorption of reactive power – Methods of voltage control – Sh	unt reactors – Shu	ant Capacitors
- Serie	es capaci	itors – Synchronous condensers – Static VAR systems – Principl Modeling of reactive componenting devices	es of Transmissio	n system
compe	insating-	- Modening of reactive compensating devices.		
Un	it - 11	GENERATION SCHEDULING	Periods	9
The E	conomic	c dispatch problem – Thermal system dispatch problem – Th	ermal system dis	spatching with
networ	'k losses	s considered – lambda – iteration method – Gradient method of e	economic dispatch	– Incremental
loses a	nd pena	ity factors – Hydro thermal scheduling using DP.		-
Uni	it – III	UNIT COMMITMENT	Periods	9
Constr	aints in	unit commitment - Spinning reverse - Thermal unit constraint	ts – Other constra	aints –Solution
using	priority	list method, Dynamic programming method – Forward DP a	approach, lagrang	gian relaxation
method	d.			
Uni	it - IV	CONTROL OF POWER SYSTEMS	Periods	9
Review	v of AG	C and reactive power control system operating states by security	control functions	_
Monito	oring – I	Energy control centre - SCADA System - Functions - monitoring	g data acquisition	and
control	ls – EM	S System		
Un	it – V	STATE ESTIMATION	Periods	9
Maxim	num like	elihood weighted least squares estimation: Concepts - Matri	x formulation –	Example for
weight	ed leas	t squares states estimation :state estimation of an AC netw	ork :Typical rest	ults of states
estimat	tion on	an AC network - States estimation by orthogonal decompositi	on algorithm – Ir	ntroduction to
advanc	ed topi	cs : detection and identification of bad measurements, estim	nation of quantiti	ies not being
measur	red , net	work observability and pseudo measurements – Application of p	ower systems stat	e estimation
			ever systems stat	e estimation.
			Total Periods	45
Text B	ooks		Total Periods	45
Text B	ooks Koth Com	ari.D.P and Nagrath.I.J, "Modern Power System Analysis", Tata pany Limited, New Delhi, 4th Edition, 2011.	Total Periods	45 blishing
Text B 1 . 2	ooks Koth Com Chak India	ari.D.P and Nagrath.I.J, "Modern Power System Analysisl", Tata pany Limited, New Delhi, 4th Edition, 2011. crabarti and Halder, "Power System Analysis: Operation and Con ,3rd Edition, 2010.	Total Periods a McGraw Hill Pu atrol", Prentice Ha	45 blishing
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Text B 1 2 Referent	ooks Koth Comj Chak India nces Kundu	ari.D.P and Nagrath.I.J, "Modern Power System Analysisl", Tata pany Limited, New Delhi, 4th Edition, 2011. rrabarti and Halder, "Power System Analysis: Operation and Con ,3rd Edition, 2010. ur.P, "Power System Stability and Control", Tata McGraw Hill P	Total Periods a McGraw Hill Pu atrol", Prentice Ha	45 blishing 11 of 006.
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Programme	B.E.		Progra	mme (Code	102	Regulation		2019
Department	ELECT ENGIN	TRICAL AND ELECTI IEERING	RONIC	8			Semester		VI
Course Code		Course Name	Per	iods Po Week	er	Credit	Maxi	imum N	Iarks
			L	Т	Р	C	CA	ESE	Total
U19HS603	Princip	ples of Management	3	0	0	3	40	60	100
Course Objective	•	Understand the funct Understand the plann Organize and learn de Understand the effect Understand the system	ions and ing pro elegatio tive and m and p	d evolu cess ar on of au barrie process	ition of of eff	of Manag ps involv ty. communi fective co	ement ed in organizat cation in the o ontrolling in th	tion. rganiza e organ	tion ization
Course	At the of CO1 : U manage	Understand the function ement.	student	should respon	be al	ole to, ies of ma	nagers and		Kilowiedge Level K1
Outcome	CO2: U	Understand the plannin	ig proce	ess in t	ne org	ganizatior	1		K2
	CO3 :U	Inderstand the organization	ation st	ructure	and 1	recruitme	nt process		K2
	CO4 :U	Inderstand the effective	e and ba	arriers	comn	nunicatio	n in the organi	zation	K3
	CO5 : <i>A</i>	Analyse, isolate issues	and for	mulate	best	control m	nethods.		K2
Pre-requisites	-								
(3/2/1 indica	tas strang	CO / PO Mapping	ng 2_Ν	<i>ledium</i>	1 - V	Veak	CO/PSO	Mappi	ng

(3/	(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													20/130	э марр	ng			
20		Programme Outcomes (POs)												PSOs					
COs	PO 1	PO 2	PO 3	PO 4	РО 5	PO 6	РО 7	PO 8	PO 9	PO 10	РО 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
CO 1						2		2	2	1	3	1	1			1			
CO 2						2		2	2		2	1		2	1	1			
CO 3						2		2	2			1	1			1			
CO 4						2		2	2	3	2	1	1			2			
CO 5						2		2	2			1	2			1			

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus		
Unit –	I INTRODCUTION TO MANAGEMENT	Periods	9
Definition, Manageria Approache Manageme	Functions, Process, Scope and Significance of Managem Roles,-Managerial Skills and Activities-Management and sofManagementThought-FunctionsofManagement-Significanceon nt	ent-Nature of Administratio ValuesandEthi	Management and n Evolution and csin
Unit - I	II PLANNING	Periods	9
Nature, Ob Strategic M	jectives, Types and Levels, Process of Planning, Planning Premis Ianagement – Planning Tools and Techniques – Decision making	es and Forecast steps and proce	ting, MBO,- ess.
Unit – l	II ORGANIZING	Periods	9
Basic cond Delegation Organizing Recruitmen	 cept-Forms of Organizational Structure-Combining Jobs: Depa of Authority, Authority & Responsibility- Line and Staff Organizational Structure- Formal and Informal Organizations- Nat & Selection-Training & Development-Performance Appraisal. 	rtmentalization Relationship- Ianpower Plan	, Span of Control, Staffing Effective ning-Job Design-
Unit - I	V DIRECTING	Periods	9
Effective I Leadership	Directing-Supervision and Motivation-Different Theories of Motiv - Theories and Styles-Communication Process, Channels and Bar	ation-Job Satis	faction-Concept of Communication.
Unit –	V CONTROLLING AND COORDINATING	Periods	9
System and Concept, In	l process of controlling -Elements of Managerial Control-Control nportance, Principles and Techniques of Coordination, Concept o	ling Technique f Managerial E	sCoordination ffectiveness.
		Total Periods	45
Text Book	S		
1.	Harold Koontz, Heinz Weihrich, Mark V. Cannice (2020). An In and Leadership Perspective (11th ed.), Tata McGraw Hills, New	ternational, Ini Delhi.	novation
2.	Ghuman, K & Aswathapa, K, (2017). Management concepts and McGraw Hills, New Delhi.	l cases (10th ec	l.), Tata
Reference	3		
1.	Robbins, S. (2017). Management, (13th ed.), Pearson Education	, New Delhi.	
2.	Telsan, M.T. (2016). Industrial and Business Management, (4th Delhi.	ed.), S. Chand,	New
3.	Ramaswamy, I. (2011). Principles of Business Management, (8th Publishing House, New Delhi.	ed.), Himalay	a
4.	Mahadevan, B., Operations Management, Theory and Practice, 1 2009.	Pearson Educat	ion Asia,
5.	Hicks, Management: Concepts and Applications, Cengage Learn	ning, 2007.	
E-Resourc	es		
1.	https://nptel.ac.in/courses/110/105/110105146/		
2.	https://aits-tpt.edu.in/wp-content/uploads/2018/08/MS-NOTES-	UNIT-1-2-3.pd	f
3.	https://www.businessmanagementideas.com/management/princi lecture-notes/7447	ples-of-manage	ement-

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Programme	B.E.		Progra	mme (Code	102	Regulation		2019
Department	ELECT ENGIN	TRICAL AND ELEC EERING	CTRON	ICS			Semester		VI
Course Code		Course Name	Per	iods Po Week	er	Credit	Max	imum 1	Marks
Course Code			L	Т	Р	С	CA	ES E	Total
U19EE624	Power Labora	Electronics tory	0	0	4	2	60	40	100
Course Objective	The stu	dents should be able t Analyze the static ch Analyze and design t motor drive and indu Perform various testi and three phase Indu	o aracteris he curre ction m ng in A ction me	stics of ent and otor dr C moto otor.	f Pow speed ive. or driv	er Semico d controll ve and co	onductor Devi lers for a close ntrol paramete	ces. ed loop ers of I	o solid DC DC motor
	At the e	nd of the course, the s	student	should	be at	ole to,			Knowledge Level
Course	CO1:A	nalyze the V-I charac	teristics	of SC	R, M	OSFET, I	GBT and TR	AC.	K4
Outcome	CO2: A	Inderstand the multi o	undrant	in gen	tion o	ig and mo	storing modes	•	K4 K3
	CO4: A	analyze the operation	of Singl	le Phas	e AC	voltage of	controller.		K4
	CO5: In converte	nterpret the need of pr	otection	n circu	its for	thyristor	s, develop a p	ower	K6
Pre-requisites	-								

(3/	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping			
COs	s Programme Outcomes (POs)													PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
CO 1	3	3	3		1			1			2	1	2	1	1	1	
CO 2	3	2	3		1			1			2	1	2	1	1	1	
CO 3	2	3	3		1			1			2	1	2	1	1	1	
CO 4	2	2	3		1			1			2	1	2	1	1	1	
CO 5	3	3	3		1			1			2	1	2	1	1	1	

Direct

- 1.Pre lab and Post lab test
- 2. Record mark
- 3. End-Semester examinations

Indirect

1.Course - end survey

Conten	t of the syllabus		
S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Static characteristics of SCR, MOSFET.	CO1	PO1,PSO1
2.	Static Characteristics of IGBT and TRIAC.	CO1	PO1,PSO1
3.	AC to DC half controlled converter	CO2	PO1,PO3,PSO1
4.	AC to DC fully controlled Converter	CO2	PO1,PO3,PSO1
5.	IGBT based single phase PWM inverter	CO3	PO2,PO3,PSO1
б.	IGBT based three phase PWM inverter	CO3	PO2,PO3,PSO1
7.	Experimental Verification of Boost regulator	CO3	PO2,PO3,PSO1
8.	Experimental Verification of Buck regulator.	CO3	PO2,PO3,PSO1
9.	Experimental Verification of cycloconverter.	CO4	PO2,PO3,PSO1
10.	Experimental Verification of AC-AC voltage regulator.	CO4	PO3,PSO1
11.	SimulationofPEcircuits(1Φ&3Φsemiconverter,1Φ&3Φfullc onverterdc-dcconverters)	CO5	PO1,PO2,PO3,PO5 PSO1
	Total p	eriod	45

Q			VIN	VEKA (A	NAN utonon	DHA (nous Ins Elaya	C OLL stitutior ampala	EGE (1, Affili 1yam, Ti)F EN ated to ruchen	I GIN Anna gode -	E ER Univ - 637	ING FO ersity ,Che 205	R WOM ennai)	IEN	ĩ	60 901-275		
Prog	gramn	ne	B.E.					Prog	amm	e Coo	le	102	Regul	ation		2019		
Dep	artme	nt E	ELEC ENGI	CTRI NEE	CAL RINC	AND] ;	ELE(CTRO	NICS	5			Sem	nester		VI		
Course	Code			Cou	rse Na	ame		Pe	eriods Wee	s Per ek		Credit		Max	ximum N	Aarks		
								L	Т]	P	С	CA	A	ESE	,	Total	
U19E	E625	F I	Power Labor	r Syst ratory	tem Si y	imula	tion	0	0) .	4	2	60)	40		100	
Cou Obje	rse ctive	Г	The st	udent Sol For Ana	s show ve the m the alyze	uld be algeb Y bus the loa	able t oraic a s by us ad flo	o nd dif sing va w stuc	ferent arious ly for	ial ec metl AC/I	juatio nod DC	ons by v	arious n	nethod	ls			
		A	At the	end o	of the	course	e, the	studen	t shou	uld be	e abl	e to,				Knov Lev	vledge /el	
Cou Outc	rse ome	(CO1: Compute the line parameters and evaluate the performance indices.														K4	
		(C O2:	Anal	yze th	e netw	vork n	natrice	s to c	arryo	ut va	arious po	ower sys	stem st	udies		K4	
		0	C O3 :	Com	pute t	he tim	e curr	ent ch	aracte	eristic	s of	analog/c	ligital/n	umerio	cal relay	s	K3	
Pre-req	nisites																	
	quisites - CO / PO Mapping CO/PSO Mapping																	
(3/2	2/1 ind	icates	stren	gth of	CO / I	PO Ma lation)	pping 3-Stro	ng, 2 –	Medi	um, 1	– W	eak	C	CO/PSC) Mappin	ng		
(3/2 COs	2/1 ind	icates	stren	gth of	CO / I correl	PO Ma lation)	pping 3-Stro Dutcon	ng, 2 – nes (PC	Medi Ds)	um, 1	– W	eak	C	CO/PSC) Mappin SOs	ng		
(3// COs	2/1 ind	icates	s stren	gth of	CO / I correl Progra	PO Ma lation)	PO	ng, 2 – nes (PC	Medi Ds)	um, 1	– W PO	eak PO	PSO C	PSO) Mappin SOs PSO	PSO		
(3/2 COs	2/1 ind PO 1 3	PO 2 3	PO 3 3	gth of PO 4	CO / I correl Progra PO 5	PO Ma ation) : umme (PO 6	PD Dutcon PO 7	ng, 2 – nes (PC <u>PO</u> 8 1	Medi Ds) PO 9	um, 1 PO 10	- W PO 11 2	eak PO 12 1	PS0 1 2	PSO 2 1	O Mappin SOs PSO 3	ng PSO 4 1		
(3/2 COs CO 1 CO 2	2/1 ind PO 1 3 3	PO 2 3 2	PO 3 3 3	gth of PO 4	CO / I correl Progra PO 5 1 1	PO Ma lation)	Ppping 3-Stro Dutcon PO 7	ng, 2 – nes (PC <u>PO</u> 8 1 1	Medi Ds) PO 9	um, 1 PO 10	- W PO 11 2 2	eak PO 12 1 1	PSO 1 2 2	PSO 2 1 1	O Mappin SOs PSO 3 1 1	ng PSO 4 1 1		
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Content of the syllabus													
S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome										
1.	Computation of line parameters for single and double circuits.	CO1	PO2,PO3,PO5, PSO2,PSO3										
2.	Modeling of medium transmission lines	CO1	PO2,PO3,PO5, PSO2,PSO3										
3.	Formation of bus admittance matrices	CO2	PO2,PO3,PO5, PSO2,PSO3										
4.	Formation of impedance matrices	CO2	PO2,PO3,PO5, PSO2,PSO3										
5.	Load flow analysis using Gauss Serial method	CO2	PO2,PO3,PO5, PSO2,PSO3										
6.	Symmetrical and Unsymmetrical fault analysis	CO3	PO2,PO4,PO5, PSO2,PSO3										
7.	Transient and small signal stability analysis: Single-Machine infinite bus system	CO2	PO2,PO3,PO5, PSO2,PSO3										
8.	Economic Dispatch in Power Systems	CO2	PO2,PO3,PO5, PSO1,PSO2,PSO3										
9.	Load – Frequency Dynamics of Single- Area and Two-Area Power Systems.	CO2	PO2,PO3,PO5, PSO1,PSO2,PSO3										
10.	Load forecasting and Unit Commitment	CO2	PO2,PO3,PO5, PSO1,PSO2,PSO3										
	Total periods		45										

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Prog	gramme	B.E.	Pr	ogramme	Code	e 1	02	Regi	ulation	2019
Depa	artment	ELECTRICA	L AND ELECTRO	NICS EN	IGIN	EERI	NG	Sei	mester	V
Course	Code	Cou	rse Name	Periods L	Per V T	Veek P	Credit C	Ma CA	aximum ESE	n Marks Total
U19M	CTY5	Logical Reaso	ning	2	0	0	-	100	-	100
Content	of the sy	llabus	0							
Unit	- I		VERBAL R	EASONI	NG				Perio	ds 6
Word co Informat Choosing Classific Choosing Alpha-N given wo	oding an ion Arra g the A cation(Cl g the od- umeric s ord, By u	nd Numeral co ngement Coding Analogues pair, hoosing the odd d number and o equence, Letter nscrambling wo	ding, Substitution g), Analogy (Direc Choosing the sin l words, Choosing t dd pair of numbers) word problems, Rule rds)	Coding, t and Sin nilar wo he odd p b, Alphak e detection	Crypi nple 2 ord, 1 oair o oet Tu n), W	t codi Analog Numb of word est(Ar Vord F	ng – cr gy, Comp er Analo ds, Choo rangemen ormation	ypt add bleting the bleting the sing the nt accord (Using	lition, s he Anal phabet odd le ding to letters f	subtraction, logues pair, Analogy), etter group, dictionary, roma
Unit	- 11	SIT	TING ARRANGEN	AENT &	SEN	ISE TI	EST		Perio	ds 6
Arranger Direction Test (Nu and com	nent ard n)Final I umber Te parison,	Dund pentagona Detection, Displa est, Ranking Test Family Based pr	acement in a fine, Ar acement, Direction a t, Time Sequence Te roblems)	nd Displa birectior d Displa st), Puzzla	n Sen aceme es (B	nse T ent], N ased o	bi a circ f est [(Main Nu mber, n classifi	n, Card Rankin cation, I	inal an g, Tim Based of	ad Shortest e sequence n placing
Unit -	- III	7 1	NUMBER AND I	LETTER	SER	RIES			Perio	ds 6
Number	and Le	tter Series[(Nu	mber Series: To fir	d a missi	ing te	rm, Fi	nd the nu	umber th	nat does	not follow
the patte no"s, Ba subtracti Letter S (Jumblec and Nota conclusio issues)	rn, Misc ased on a on of sq <u>eries (</u> A d up desc ations- Pr ons), Lo g	ellaneous patter addition / subtra uares of natural lphabet Series, C criptions, Relatio coblem of solvin gical order of w	n of the series (Bas action of prime num l numbers, Based or Continuous pattern of on puzzles, Coded Re g by substitution, Int rords, Clerical aptit	sed on ad bers, Mu additior f series)], elations), erchangin ude (Que	ldition ltiplion n / su Inse Cloc l ng sig stion	n / sub cation ubtract: rting k and gns and based	otraction and Division of cu the missi calendar d number on addre	of conse ision, B ibes of r ing chan c (Mathe s, Deriv ss, Ques	ecutive ased or natural racter , <i>A</i> ematical ing the stion bas	odd / even n addition / numbers) , Age, Blood l operations appropriate sed on
Unit -	– IV	LOG	GICAL AND ANAL	YTICAI	RE	ASON	ING		Perio	ds 6
Logical Miscella Assump Verifica	venn d neous, (tions, St tion of T	iagrams (Univ Geometrical Fig atement and Co Fruth of the Sta	ersal positive, Uni- gures on Venn Dia onclusions, Stateme tement, Data Suffic	versal Negrams), 1 nt and A iency.	egativ Eligil rgun	ve, Ui bility nents,	niversal test, Syl Statemer	Affirma llogisms nt and (tive or s, State Course	Negative, ement and of Action,
Unit	$-\mathbf{V}$	DAT	A INTERPRETAT	ION & I	FLOV	W CH	ART		Perio	ds 6
Input – C chart,Mi Value up Text Boo 1. Referen	Output (xedchart odating fl oks How to	(Shifting, Arrang), Cube (noofside ow chart), Quan o crack Test of R	ging), Data Interpre te edpainted,Fullcube,cu ntitative reasoning, deasoning - Jai kishar	tation (Ta uttingcube Logical of n and Pres	able c e), Flo leduo m kis	chart, I owcha ction, han -a	Bar chart, rt (Descri Deductiv rihant pu	Pie cha ptionflo e reaso Tot blication	rt, Misc wchart, ning, B al Perio	inarylogic ods 30
1.	How to	prepare logical	reasoning for CAT -	- Arun Sł	narma	a – Mc	Graw Hi	ill Publia	cation	
1.	110 % ((, propure logical	reasoning for CAT-				Siaw III	u i u u u u u u	Junon	

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Programme	B.E.	Pro	gramme	Code	e 10	2		Regi	ulation		2019
Department	ELETH	RICALA AND ELCTRONI	S ENG	INEF	ERING	r		Se	mester		VI
Course Code		Course Name	Period	s Per	Week	Cr	edit	М	aximun	n Ma	ırks
			L	Т	Р	(С	CA	ESE]	Total
U19MCTY6		PERSONALITY DEVELOPMENT	3	0	0		-	100	-		100
		Content of	the sylla	abus							
Unit – I	NUME	RICAL ABILITY							Perio	ls	8
Number Propertie Mixtures & Allig on Ages – Partne	es – Tim ations – rship – N	e & Work – Pipes & Cisterr Averages – Percentages – Pro Iensuration – Geometry - Mis	ns - Tim ofit & L scellane	e, Spe oss – ous	eed & l Simple	Dista e & (ance - Comp	– Ratio oound l	os & Pr nterest	opor – Pr	tions – oblems
Unit - II	LOGIC	CAL REASONING							Period	ls	8
Coding Decoding Syllogisms – Ver Miscellaneous	g – Bloc 1n Diagra	od Relations – Direction Se ams – Statements – Data Inte	nse Tes erpretati	t – S on –	eating Data S	Arra uffic	anger ciency	nent – / – Clo	Numbocks &	er S Cale	eries – ndars -
Unit – III	SOFT	SKILLS & VERBAL ABIL	ITY						Perio	ds	8
Resume Preparat Writing	ion – Mo	ock GD – Interview Etiquette	e – Mocl	k Inte	rview -	- Re	ading	g Comp	orehensi	on –	- Essay
Unit - IV	TECH	NICAL SKILLS I							Perio	ls	8
Recap of C – Va Statements – Wo	ariables &	& Datatypes – Console IO C h Functions – Working with	Operation Arrays	ns – (Operato	ors &	& Exp	pressio	ns – Co	ontro	l Flow
Unit – V	TECH	NICAL SKILLS II							Perio	ls	8
Pointers – String Line Arguments	Handling & Variab	g – Structures & Unions - les – Searching & Sorting – S	– File Ha Stack – (andlir Oueue	ng – Pre e – Linl	e Pro ked]	ocesso List -	or Dire Trees	ctives –	- Coi	nmand
				C				Tot	al Perio	ods	40
REFERENCES											
1.Quantum Cat b	y Sarvesl	h Verma – Arihant Publication	ns								
2.Qualitative apti	tude by I	R.S. Aggarwal									
3.A Modern App	roach to	Verbal & Non-Verbal Reason	ning by 1	R. <u>S.</u> A	ggarwa	al					
4.Word Power M	ade Easy	by Norman Lewis									
5.Let us C By Ya	shavant	P Kanetkar									
6.Programming i	n ANSI (C By E. Balaguruswamy									

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205															
Programm	B.	E.				Pro	ograr	nme (Cod	e	102	Regul	atio n		2019		
Departmen	t ELE ENC	CTRI	CAL A RING	AND E	LECI	RONI	CS					Seme	ster		VII		
Course Code		С	ourse	Name	•		Per	iods l Week	Per	С	redit		Ma	aximum	Marks		
							L	Т	Р		С	CA		ESE	Т	`otal	
U19HS704	Tota	al Qua	lity N	Ianag	emen	t	3	0	0		3	40		60		100	
Course Objective		 U1 U1 U1 co U1 	ndersta ndersta ndersta ncepta ndersta	and th and th s of se and th	e proc he fui rvice e chal	, ess of ndame excelle lenges	mana ntal ence a in Q	aging discij and q uality	qua pline ualit 7 Im	lity a es of y. prove	nd ma busin	naging s ness are Program	service intrir	s. nsically	linked	with the	
	At t	ne end	of the	e cours	se, the	studer	nt sho	ould b	be at	ole to	,				Kno I	wledge .evel	
Course	CO	Real:	ize the	e impo	rtance	of sig	nific	ance	of q	uality	1				K1		
Outcome		2:Knov	w the j	princi	ples of	qualit	y and	d con	tinu	ous p	rocess	simprov	ement			K2	
	CO_{2}	:Unde	erstand	1 the c	oncep	tistical	roces	ss con	ntroi	r im	rovin	g proces	Sec			K2 K1	
	CO: Qua	:Appl lity M	y vari anage	ous Q ment	uality	Syster	ns an	nd Au	ditir	ng on	imple	ementatio	on of T	`otal		K1 K2	
Pre-requisite	s U19	HS603	3 -Prir	nciples	s of M	anager	nent										
(3/2	1 indica	ites stre	ength o	CO /	PO M ation)	apping) 3-Stro	ng, 2	– Me	diun	n, 1- `	Weak			CO/PS	О Марр	ing	
				Prog	ramme	Outcon	mes (Pos)						Ι	PSOs		
Car			1	1			1				1			1	1		
COS PC	PO 2	PO 3	РО 4	РО 5	PO 6	РО 7	PC 8) P	9 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO3	PSO4	
COS PC 1 CO1 -	PO 2 3	PO 3 2	PO 4 -	РО 5 2	PO 6	PO 7 -	PC 8 2) P	9 9 3	PO 10 2	PO 11 -	PO 12 2	PSO1	PSO 2	PSO3 -	PSO4	

	(3/2/1	indica	tes stre	ength o				8								
~					PSOs											
Cos	РО 1	PO 2	PO 3	PO 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO3	PSO4
CO 1	-	3	2	-	2	-	-	2	3	2	-	2	-	-	-	2
CO 2	-	3	2	-	2	-	-	2	3	2	-	2	-	-	-	2
CO 3	-	3	2	-	2	-	-	2	3	2	-	2	-	-	-	2
CO 4	-	3	2	-	2	-	-	2	3	2	-	2	-	-	-	2
CO 5	-	3	2	-	2	-	-	2	3	2	-	2	-	-	-	2

Direct

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus		
Unit – I	INTRODUCTION	Periods	9
Introductio	n –Definition- Need for quality – Evolution of quality – Qual	ty Dimensions	- Products and Services-
Basic conc	epts of TQM – TQM Framework – Contributions of Deming, Jun	an and Crosby	 Barriers to TQM
Unit – I	TQM PRINCIPLES	Periods	9
Leadership	- Strategic quality planning, Quality statements - Customer f	ocus – Custom	er orientation, Customer
satisfaction	, Customer complaints, Customer retention - Employee invo	olvement – Mo	ptivation, Empowerment,
Team and T	Feamwork, Recognition and Reward, Performance appraisal - C	ontinuous proce	ess improvement – PDSA
cycle, 5s, k	aizen - Supplier partnership – Partnering, Supplier selection, Su	oplier Rating.	
Unit – II	I STATISTICAL PROCESS CONTROL	Periods	9
Significanc	e of statistical process control (SPC)- Process capability - De	finition, signifi	cance and measurement-
Total produ	ctive maintenance (TMP)- Business process Improvement (BPI)		
TI	TOOLS AND TECHNIQUES FOR QUALITY	Dominda	0
Unit - IV	MANAGEMENT	Perious	9
Quality fur	actions development (QFD) - Benefits, Voice of customer, info	ormation organ	ization, House of quality
(HOQ), bu	ilding a HOQ, QFD process. Failure mode effect analysis (FMI	EA) – requirem	ents of reliability, failure
rate, FMEA	stages, design, process and documentation.		
Unit – V	QUALITY SYSTEMS	Periods	9
ISO 9000:	2000,ISO 9001: 2015, ISO 9004:2018, ISO 9011:2018 Quali	y System – E	lements, Documentation,
Quality au	liting- Concepts, Requirements and Benefits - Case studies of	TQM impleme	ntation in manufacturing
and service	sectors including IT.		
		Total Periods	45
Text Book	S		
1	Dale H.Besterfield, Carol Besterfield – Michna, Glen H.	Besterfield, Ma	ary Besterfield – Sacre,
1.	Hermant – Urdhwareshe, RashmiUrdhwareshe, "Total Qu	ality Managen	hent" Revised.0F0.1fth.0
	Iames P. Evans and William M. Lindsay. "The Management at	d Control of O	uality" 8th Edition First
2.	Indian Edition Congage Learning 2012		uanty, our Eution, Thst
Doforonco	indian Edition, Cengage Learning, 2012.		
Kelefence	Joy Haizan Dame Dandan Church Munson Operations Manag	amont Twolfth	Edition Deenson
1.	Jay Heizer, Barry Kender, Chuck Mulison, Operations Manag	ement, i wentin	Euluoli, realsoli
	Education, 2017	t" Ninoth Edit	ion Deerson Education
2.	Stephen Robbins, Mary Coulter, Fundamentals of Managemer	t Nineth Edit	ion, Pearson Education,
	2010 V. Viieven and H. Damakrichnen, "Tatal Ovelite Manager"	Chard D-1-1	ishing 2014
3.	v. vijayan and H. Kamakrisnnan, Total Quality Management	,S. Chand Publ	Isning ,2014.

4	K. ShridharaBhat, Total Quality Management: Text and Cases, Himalaya Publishing House, 2010.
E-Resourc	es
1.	https://www.srividyaengg.ac.in/coursematerial/Mech/114741.pdf
	http://www.uop.edu.pk/ocontents/Total%20Quality%20Management%20by%20Dale%20H.%20Bester
2.	field,%20Carol%20BesterfieldMichna,%20Glen%20H.%20Besterfield,%20Mary%20Besterfield-
	Sacre,%20Hemant%20Urdhwareshe,%20Rashmi%20Urdhwarshe%20(z-lib.org).pdf
3	https://www.kngac.ac.in/elearning-portal/ec/admin/contents/5
5.	18KP3COELCO4_2020101610563491.pdf
4	David Hoyle, ISO 9000 Quality Systems Handbook-updated for the ISO 9001: 2015 standard:
4.	Increasing the Quality of an Organization's Outputs, Routledge publisher, 2017

	2		VI	VEK (/	ANAN Autono	NDHA mous l Ela	COLL Institutio Iyampala	EGE n, Affili iyam, T	OF E iated to iruche	NGIN o Ann ngode	NEE a Un - 63	RING F iversity, G 37 205	OR WO	MEN		TU/Findhard CETTFED 0 reserve	
Prog	gramn	ne	B.E.					Progr	amme	e Co	de	102	Regu	lation		2019	
Dep	artme	nt F	ELEC' ENGII	TRIC NEER	AL A	ND E	LECTI	RONIC	CS				Sen	nester		VII	
Course	Code			Cou	ırse N	lame		P	eriod: Wee	s Per ek		Credit		Maxi	imum N	Aarks	
								L	Т		Р	С	C	4	ESE	Tota	al
U19E	E726	I	Digita	al Sig	gnal]	Proce	essing	3	0		0	3	40)	60	100)
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			•	1		ina ino	e Progr	amma			tai s	ignai pr	ocessor	x quai	IIIZatio	Knowl	edge
		F	At the	end o	of the	cours	se, the s	studen	t shou	ild b	e ab	le to,				Lev	el
		(<u>CO1:</u>	Analy	ze th	e disc	rete tin	ne sys	tems.	1		0 1	1		1	K1	L
Cou	2 60	r	C O2: Acquire knowledge on Signals and systems & their mathematical representation.													K2	2
Outc	ome	C C	representation. CO3:Understand the importance of Fourier transform and its effective computation.												K4		
		(i	CO4: The second	Under nenta	rstand tion.	the t	ypes of	filters	and	their	des	ign for c	ligital			K1	
		q q	C O5: Juanti	Acqu zatior	uire k n effe	cnowl cts.	edge o	on pro	gram	mabi	lity	digital	signal	proces	sor &	K2	
Pre-ree	quisit	es $\begin{bmatrix} 1\\2 \end{bmatrix}$.U19 2.U19	MA3 EE51	03 -T 7 -Mi	ransfo icropr	orms ar	nd Part rs and	ial D Micr	iffere ocon	entia troll	al Equat ler	ons				
(3/	/2/1 in	dicate	s stren	igth of	CO / I f corre	PO M elation	apping) 3-Stro	ng, 2 –	Medi	ium, i	1– W	Veak		CO/PS	O Mapp	oing	
````				<u> </u>	Progr	amme	Outcon	nes (Po	os)					I	PSOs		
Cos	PO	PO	РО	РО	PO	PO	PO	PO	PO	PO	Р	0 РО	PSO	PSO	PSO	PSO	
	1	2	3	4	5	6	7	8	9	10	1	1 12	1	2	3	4	_
CO 1	2	2	-	-	-	-	-	-	-	-	-	· _	3	-	3	-	_
	2	2	-	-	-	-	-	-	-	-	-	· -	3	-	3	2	-
CO 4	2	2	2	2	-	-	-		-	-	2	2 -	2	-	3	3	-
CO 5	2	-	3	2	2	-	-	-	-	-	2	2 2	2	3	2	3	-
Course	1 55655	ment	Meth	nds							1						<u> </u>
	100000		- TVICU	IOUS													
Direct	1 1	Con	tinuc		CACOM	10nt T	Poet I T	[ <i>8</i> , 111									
	1. 1 2. <i>A</i>	Assign	nmen	us As t	505511	ICIII I	est 1, 1	i a m									
	3. I	End-S	emes	ter ex	amin	ations	5										
Indirec	t																
1.0	Course	e – ene	d Sur	vey													

Content of	the syllabus		
Unit –	I INTRODUCTION	Periods	9
Classificat	on of systems: Continuous, discrete, linear, causal, stability, o	lynamic, recurs	ive, time variance;
classificati	on of signals: continuous and discrete, energy and power; math	ematical repres	entation of signals;
spectral de	nsity; sampling techniques, quantization, quantization error, Nyq	uist rate, aliasin	g effect.
Unit –	II DISCRETE TIME SYSTEM ANALYSIS	Periods	9
Z-transform application	n and its properties, inverse Z-transforms; difference equa to discrete systems - Stability analysis, frequency response - Co	tion – Solutio prvolution – Di	n by Z-transform, screte Time Fourier
transform,	magnitude and phase representation.		
Unit – I	II DISCRETE FOURIER TRANSFORM & COMPUTATION	Periods	9
Discrete Fe algorithm -	Durier Transform- properties, magnitude and phase representation - DIT &DIF using radix 2 FFT – Butterfly structure.	- Computation	of DFT using FFT
Unit - l	V DESIGN OF DIGITAL FILTERS	Periods	9
FIR & IIR	t filter realization - Parallel & cascade forms. FIR design: W	indowing Tech	niques - Need and
choice of approxima	windows – Linear phase characteristics. Analog filter designing tions; IIR Filters.	n – Butterwor	th and Chebyshev
Unit –	V DIGITAL SIGNAL PROCESSORS	Periods	9
Introductio	n - TMS320C Fixed point and floating point Architecture -	Features – Add	dressing Formats –
Functional	modes –Applications in video coding.		-
		<b>Total Periods</b>	45
Text Book	s		
1.	S.K. Mitra, 'Digital Signal Processing – A Computer Based Ap	proach', McGra	w Hill Edu, 2013.
2.	Lonnie C.Ludeman,"Fundamentals of Digital Signal Processing	g",Wiley,2013	
3.	J.G. Proakis and D.G. Manolakis, 'Digital Signal Proces	sing Principles	s, Algorithms and
Df	Applications', Pearson Education, New Delhi, PHI. 2003.		
Reference	S Debaut Schilling & Sondro I. Harrig Introduction to Divital Size	al Dragging u	aina Matlah"
1.	Cengage Learning,2014.	iai Processing u	sing Matiab ,
2.	SenM.kuo, woonsengs.gan, "Digital Signal Processors, Archi Applications, Pearson, 2013	tecture, Implem	entations &
3.	DimitrisG.Manolakis, Vinay K. Ingle, applied Digital Signal Pr	ocessing, Camb	ridge, 2012.
4.	B.P.Lathi, 'Principles of Signal Processing and Linear Systems'	, Oxford Univer	rsity Press, 2010.
5.	Taan S. ElAli, 'Discrete Systems and Digital Signal Processing	with Mat Lab',	CRC Press, 2009
E-Resourc	es		
1.	https://www.tutorialsduniya.com/notes/digital-signal-processing	g-notes/	
2.	https://ocw.mit.edu/resources/res-6-008-digital-signal-processin	g-spring-2011/s	study-materials/
3.	https://mrcet.com/downloads/digital_notes/ECE/III%20Year/DI SING.pdf	GITAL%20SIC	SNAL%20PROCES

	VIVI	EKANANDHA COLLE (Autonomous Institution, Elayampalaya	<b>GE O</b> l Affiliat 1m, Tirt	F ENG ed to Ar	INEE ina Un le – 63	<b>RING FO</b> iversity, Ch 37 205	<b>PR WOMEN</b> lennai)		CONTRACTOR	
Programme	B.E.		Progra	.mme (	Code	102	Regulation		2019	
Department	ELECT ENGIN	RICAL AND ELECTR EERING	ONIC	S			Semester		VII	
Course Code		Course Name	Pe	riods F Week	er	Credit	Maximum M		Marks	
			L	Т	Р	C	CA	ESE	Total	
U19EE727	Embed	ded System	3	0	0	3	40	60	100	
Course Objective	The stud	lents should made to Understand the techni related to embedded pr Analyze the Various p Acquire an exposure to Understand the real time real time operating systems	ques o rocess rocess o embo me op	of inter ing. sched edded erating ool.	facin facing softwo syste	ng betwee algorithn are devele em and e	en processors ns. opment proces xample tutoria	& peripss and to als to di	oheral device ools. scuss on one	
	At the end of the course, the student should be able to,									
Course	<b>CO1:</b> S		K1							
Outcome	CO2: 0	Operate various Embed	ded D	evelop	ment	Strategie	s.		K2	
	CO3:St	udy about the bus Con	nmuni	cation	in pro	cessors.			K4	
	CO4:Ad	equire knowledge on va	arious	proces	sor so	cheduling	algorithms.		K1	
	CO5:U1	nderstand basics of Rea	al time	operat	ing s	ystem.			K2	
Pre-requisites	U19EE	517 -Microprocessors a	and Mi	icrocor	trolle	ers				

(3/	/2/1 in	dicate	s strer	igth of	CO / I f corre	PO M	<b>apping</b> ) 3-Stro	ong, 2 –	Medi	um, 1-	– Wea	k	(	CO/PSO	О Маррі	ng
	Programme Outcomes (Pos)											PSOs				
Cos	PO 1	PO 2	PO 3	РО 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	2	2
CO 2	2	2	-	2	-	-	-	-	-	-	-	-	3	-	2	2
CO 3	2	2	2	2	-	-	-	-	-	-	-	-	2	2	2	3
CO 4	2	2	2	2	3	-	-	-	-	-	-	2	3	2	2	2
CO 5	3	3	3	3	3	-	-	-	-	2	2	2	2	3	3	3

## Direct

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus		
Unit –	I INTRODUCTION TO EMBEDDED SYSTEM	Periods	9
Introductio	n to Embedded systems - Structural units in Embedded pro	cessor, select	ion of processor -
Processor	Embedded into a system – Embedded hardware units – Power s	ource, Registe	er, memory devices,
ports, time	r, interrupt controllers – Embedded Software in a System.	•	
Unit –	II DEVICES & BUSES FOR DEVICES NETWORK	Periods	9
I/O device	s; timer & counting devices; serial communication using I	2C, CAN, U	SB buses; parallel
communic	ation using ISA, PCI, PCI/X buses, arm bus – Internet Enabled	l Systems – W	/ireless and Mobile
System pro	tocols.		-
Unit –	II   PROGRAMMING AND SCHEDULING	Periods	9
Intel I/O	instructions – Synchronization - Transfer rate, latency; inter	rupt driven i	nput and output -
Nonmaska	ble interrupts, software interrupts, Preventing interrupts of	overrun - Di	sability interrupts.
Multithrea	ded programming –Context Switching, Preemptive and non-pree	mptive multita	asking, semaphores.
Scheduling	-thread states, pending threads, context switching	Dominula	0
Unit - I	V KIOS BASED EMBEDDED SYSTEM DESIGN	Perious	9 S. Multinga again a
and Multit	n to basic concepts of RTOS- Task, process & threads, interrupt r	nightion share	d momory massage
	asking, Freemplive and non-preemplive scheduling, Task communication	incation share	a Mailbox pipes
passing-, 1	arcion priority inheritance, comparison of Real time Operating sy	sses-semaphon	es, Manuellos, pipes,
priority inv	FMBEDDED SVSTEM APPLICATION		πκδ, μC/05-11.
Unit –	V DEVELOPMENT	Periods	9
Case Study	v of Washing Machine- Automotive Application- Smart card Sys	tem Application	on-ATM machine –
Digital car	nera		
	,	<b>Total Periods</b>	45
Text Book	S		
1.	Shibu. K.V, "Introduction to Embedded Systems", Mcgraw Hill	, 2017.	
2.	Raj Kamal, 'Embedded System-Architecture, Programming, Des	ign', McGraw	Hill, 2013.
3.	Peckol, "Embedded system Design", John Wiley & Sons, 2010.		
Reference	5		
1.	Lyla B Das," Embedded Systems-An Integrated Approach", Pear	rson, 2013	
2.	C.R.Sarma, "Embedded Systems Engineering", University Press	(India) Pvt. Lt	td, 2013.
3	Jonathan W. Valvano, "Embedded Microcomputer Systems	Real time Int	erfacing", Cengage
5.	learning, 3rd edition, 2012		
4.	Han-Way Huang, "Embedded system Design Using C8051", Cer	ngage Learning	g, 2009.
5.	Rajib Mall "Real-Time systems Theory and Practice" Pearson Ed	ducation, 2007	
E-Resourc	es		
1.	https://mrcet.com/downloads/digital_notes/ECE/IV%20Year/EM	IBEDDED%2	0SYSTEMS%20D
2.	https://www.tutorialspoint.com/embedded systems/es overview	.htm	
3	https://www.slideshare.net/yayayaram/embedded_systems_class_	notes	
5.	incps.// w w w.shueshare.new yayavarani/enibedded-systems-class-	notes	

C				VIVI	E <b>KAN</b> (Aut	<b>JAND</b> conome	HA Co Dus Insti Elayar	<b>OLLE</b> tution, npalaya	GE Ol Affiliat am, Tiru	F EN( ed to A cheng	GINE Anna U ode –	ERIN( Jniversit	G FOR ty, Chen	<b>WOM</b> nai)	EN	TÜV	SO SET 2115 Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Printing Pri			
	Program	nme	B.E					Pr	ogram	me C	ode	102	Re	egulatio	on	2	019			
	Departn	nent	ELE ENG	CTR SINE	ICA ERIN	L AN NG	D EL	ECTI	RONIO	CS				Semest	er	۲	/II			
Co	ourse Co	de		Co	ourse	Name	;		Perio We	ds Pe eek	r	Credi	it	]	OMEN       lation       nester       Maximum       A     ESI       0     40       ate how they a       ntime execution       thm       CO/PSO       SO     PSO       SO     PSO       3     3       3     3       3     3       3     3	um Mar	n Marks			
									L	Т	Р	С		CA	]	ESE	Total			
	U19EE	728	Eml Lab	oedd orat	ed Sy ory	ysten	n		0	0	4	2		60		40	100			
(	Course Objectiv	e	The •	stude Lea Un De Cre	nts sh arn th dersta velop eate th	e arue and th prog	be able dino pi ne basi rams a wn pro	e to rogran c prog ind ha oject	nming gramm rdware	lang ing co e desi	uage onstru gns v	ucts an vith a d	nd artic desired	culate ł runtin	now the	y are us ution flo	sed ow			
			At th	ne enc	l of th	ne cou	irse, th	e stuc	lent sh	ould	be ab	le to,				ŀ	Knowledge Level			
Course		!	CO1:	CO1: Write programs on Arduino IDE													K3			
(	Outcome			CO2: Sketch flow of execution of Arudino programs using algorithm and flowcharts													K4			
			CO3:	CO3: Create hardware designs on Proteus													K4			
			CO4:	Deve	elop a	nd de	emonst	rate o	wn pro	ojects							K4			
Pr	e-requis	sites	U19]	EE52	0 - N	licrop	process	sors a	nd Mic	roco	ntroll	ers La	borator	у						
	(3/	′2/1 ir	dicates	s stren	gth of	<b>CO / I</b> corre	PO Ma lation)	pping 3-Stro	5 ong, 2 –	Med	ium, 1	– Wea	k		CO/PS(	) Mappi	ing			
Ī						Progr	amme	Outcon	nes (Po	os)				1	Р	SOs	)s			
	Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
	CO 1	3	-	3	3	3	2	-	-	-	-	3	3	3	3	2	3			
	CO 2	3	-	3	3	3	2	-	-	-	-	3	3	3	3	2	3			
-	CO 3	3	-	3	3	3	2	-	-	-	-	3	3	3	3	3	3			
	CO 4	3	-	3	3	3	2	-	-	-	-	3	3	3	3	3	5			
Cou	ırse Ass rect	essm	ent M	etho	ds															
1 2 3	. Pre lab . Record . End-Se	and mari	post la k er exa	b test	tions															

1.Course - end survey

Content of the syllabus

S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	LED interface with Arduino	CO1	PO1,PO3,PO5 PO9,PSO1,PSO4
2.	Series of LEDs interface with Arduino	CO1	PO1,PO3,PO5 PO9,PSO1,PSO4
3.	Controlling Two Bulbs with a double Relay using Arduino	CO2	PO1,PO3,PO5 PO9,PSO1,PSO4
4.	Reading Analog Voltage in Serial Monitor using Arduino	CO2	PO1,PO3,PO5 PO9,PSO1,PSO4
5.	Servo Motor control using Arduino	CO3	PO1,PO3,PO5 PO9,PO11,PO12, PSO1, PSO4
6.	DC Motor control using Push-Pull 4 Channel driver using Arduino	CO4	PO1,PO3,PO5 PO9,PSO1,PSO4
7.	Connecting sound device buzzer to Arduino	CO4	PO1,PO3,PO5 PO9,PSO1,PSO4
8.	Measurement of capacitance using Arduino	CO1	PO1,PO3,PO5 PO9,PSO1,PSO4
9.	Implementation of interfacing of 16 x 2 LCD with Arduino	CO4	PO1,PO3,PO5 PO9,PSO1,PSO4
10.	Implementation of interfacing of 7segment LED display with Arduino	CO4	PO1,PO3,PO5 PO9,PSO1,PSO4
	Total periods		45

# **PROFESSIONAL ELECTIVE COURSES :VERTICALS**

Signature of the BOS Chairman, EEE

	VIVI	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	B.E.		Progra	amme (	Code	102	Regulatio	n	2019			
Department	ELECT ENGIN	'RICAL AND ELEC' EERING	FRONI	CS			Semeste	er				
Course Code	(	Course Name	Periods Per Week			Credit	Maximum Marks		Marks			
		L	Т	Р	C	CA	ESE	Total				
U19EEV11	HVDC System	Transmission	3	0	0	3	40	60	100			
Course Objective	The stud	High voltage direct special situations Withtheadventofthyr attractive operation, modeling	current istorval	transn veconv ntrol o	nissic verters of HV	on has ad s,HVDCt 'DC link	vantages ov ransmission in power sy	ver ac tra becamee ^v vstem	nsmission in ven more			
	At the e	Knowledge Level										
	<b>CO1:</b> E	K2										
Course	CO2:E System	VDC	K2									
Outcome	CO3:E Technic	ıbility	K2									
	CO4: D Output	d	K6									
	CO5:S System	electsuitableprotectio	onscher	nebyic	lentif	yingthefa	ultinthe		K3			
Pre-requisites	• Pov	ver Electronics, Tran	smissio	on and	Dist	ibution						

(3/	'2/1 ine	dicate	s stren	gth of	CO / I corre	PO M lation	<b>apping</b> ) 3-Stro	ng, 2 –	Medi	um, 1	- Wea	ık	CO/PSO Mapping						
		Programme Outcomes (POs)													PSOs				
COs	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
CO 1	2	3										2	1						
CO 2	2	3										2	1		2				
CO 3	1	2										2	1		2				
<b>CO 4</b>	1	2	3									2	1						
CO 5	1	2	3									2	2	1	2	2			

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect
a i i	0.13			
Content	of the s $-I$	Introduction	Periods	9
Dovelopr	nont of	HVDC technology Significance of DC transmission Ox	vorvious and or	ganization of
HVDC sv	vstems-I	Review of the HVDC system reliability-HVDC characteristi	cs and economic	aspects
Unit	- II	Power Conversion and Harmonics	Periods	9
Power co HVDC at	onversion nd remo	n - Thyristor, Phase converter, Phase full bridge converter, I val-Determination of resulting harmonic impedance-Active	Pulse converter- l power filter	Harmonics of
Unit -	- III	Control of HVDC Converter and System	Periods	9
Converte functions	r contro - Reacti	l for an HVDC system-Commutation failure- HVDC contro ve power and voltage stability- Interactions between AC an	l and design- HV d DC systems	DC control
Unit -	- IV	Protection of HVDC System	Periods	9
Valve pro Insulation	otection n coordi	functions- Protective action of an HVDC system-Protection nation of HVDC	by control actio	ns-Fault analysis-
Unit -	$-\mathbf{V}$	Trends for HVDC Applications	Periods	9
Wind Fai	rm Tech	nology- Modern Voltage Source Converter (VSC)- 800 kV	HVDC System-	Practical
examples	s of an H	IVDC system		
		t De system		
			Total Periods	45
Text Boo	oks		Total Periods	45
<b>Text Boo</b> 1.	oks Chan-I Wiley	Ki Kim, "HVDC Transmission Power Conversion Applic	Total Periods	45 Systems", John
Text Boo 1. Reference	oks Chan- Wiley ces	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009	Total Periods	45 Systems", John
Text Boo 1. Reference 1.	oks Chan- Wiley ces P.Kuno	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur, "PowerSystemStabilityandControl",McGraw-Hill,1993	Total Periods	<b>45</b> Systems", John
Text Boo           1.           Reference           1.           2.	Chan- Wiley ces P.Kuno K.R.Pa 2.	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur,"PowerSystemStabilityandControl",McGraw-Hill,1993 adiyar,"HVDCPowerTransmissionSystems",NewAgeInte	Total Periods cations in Power ernational(P)Ltd	45 Systems", John .,NewDelhi,200
Text Boo           1.           Reference           1.           2.           3.	oks Chan- Wiley ces P.Kun K.R.Pa 2. J.Arril	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur,"PowerSystemStabilityandControl",McGraw-Hill,1993 adiyar,"HVDCPowerTransmissionSystems",NewAgeInto laga,"HighVoltageDirectCurrentTransmission",PeterPres	Total Periods cations in Power ernational(P)Ltd grinus,London,1	45 Systems", John .,NewDelhi,200 983.
Text Boo           1.           Reference           1.           2.           3.           4.	oks Chan- Wiley ces P.Kuno K.R.Pa 2. J.Arril ErichU	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur, "PowerSystemStabilityandControl", McGraw-Hill, 1993 adiyar, "HVDCPowerTransmissionSystems", NewAgeInter laga, "HighVoltageDirectCurrentTransmission", PeterPreg Jhlmann, "PowerTransmissionbyDirectCurrent", BSPublicati	Total Periods cations in Power ernational(P)Ltd grinus,London,1 ons,2004.	45 Systems", John .,NewDelhi,200 983.
Text Boo           1.           Reference           1.           2.           3.           4.           5.	Dks Chan- Wiley ces P.Kuno K.R.P 2. J.Arril ErichU V.K.S	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur, "PowerSystemStabilityandControl", McGraw-Hill, 1993 adiyar, "HVDCPowerTransmissionSystems", NewAgeInter laga, "HighVoltageDirectCurrentTransmission", PeterPress Jhlmann, "PowerTransmissionbyDirectCurrent", BSPublicati ood, "HVDC and FACTScontrollers—	Total Periods cations in Power ernational(P)Ltd grinus,London,1 ons,2004.	45 Systems", John .,NewDelhi,200 983.
Text Boo           1.           Reference           1.           2.           3.           4.           5.	oks Chan- Wiley ces P.Kun K.R.Pa 2. J.Arril ErichU V.K.S Applic	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur,"PowerSystemStabilityandControl",McGraw-Hill,1993 adiyar,"HVDCPowerTransmissionSystems",NewAgeInte laga,"HighVoltageDirectCurrentTransmission",PeterPreg Jhlmann,"PowerTransmissionbyDirectCurrent",BSPublicati ood," HVDC and FACTScontrollers— eationsofStaticConvertersinPowerSystem",APRIL2004, F	Total Periods cations in Power ernational(P)Ltd grinus,London,1 ons,2004. KluwerAcademie	45 Systems", John .,NewDelhi,200 983. cPublishers.
Text Boo           1.           Reference           1.           2.           3.           4.           5.           E-Resou	oks Chan Wiley ces P.Kuno K.R.Pa 2. J.Arril ErichU V.K.S Applic rces	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur,"PowerSystemStabilityandControl",McGraw-Hill,1993 adiyar, "HVDCPowerTransmissionSystems",NewAgeInto laga, "HighVoltageDirectCurrentTransmission",PeterPreg Jhlmann, "PowerTransmissionbyDirectCurrent",BSPublicati ood," HVDC and FACTScontrollers— cationsofStaticConvertersinPowerSystem",APRIL2004, F	Total Periods cations in Power ernational(P)Ltd grinus,London,1 ons,2004. CluwerAcademic	45 Systems", John .,NewDelhi,200 983. cPublishers.
Text Boo           1.           Reference           1.           2.           3.           4.           5.           E-Resou           1	Chan- Wiley Ces P.Kund K.R.Pa 2. J.Arril ErichU V.K.S Applic rces	Ki Kim, "HVDC Transmission Power Conversion Applic & Sons Pvt. Ltd., 2009 dur,"PowerSystemStabilityandControl",McGraw-Hill,1993 adiyar,"HVDCPowerTransmissionSystems",NewAgeInte laga,"HighVoltageDirectCurrentTransmission",PeterPreg Jhlmann,"PowerTransmissionbyDirectCurrent",BSPublicati ood," HVDC and FACTScontrollers— eationsofStaticConvertersinPowerSystem",APRIL2004, F ps://easyengineering.net/hvdc-power-transmission-systems-f	Total Periods cations in Power ernational(P)Ltd grinus,London,1 ons,2004. KluwerAcademic pu-padiyar/	45 Systems", John .,NewDelhi,200 983. cPublishers.

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		۲.	The students should be made to																	
Соц	ırse		• Understand the standards of power quality problems																	
Obied	ctives		• Understand power quality monitoring classification techniques																	
j			Understand different mitigation techniques																	
																	iledge			
	At the end of the course, the student should be able to,															Le	vel			
Cou	irse	se CO1: Understand the major power quality problems.															12			
Outc	ome	1	CO2:	App r qua	ly an lity p	d ana roble	lyze/c ms.	compa	re tec	chniq	ues	availab	le to m	itigate	e e	К3				
			CO3:	Unde	erstan	nd and	d anal	yze sc	urces	s of h	narm	onics a	nd solu	itions		K	3			
		(	CO4:	Unde	erstar	d dif	ferent	types	of fi	lters	and	compe	nsators			K2				
		(	C <b>O</b> 5:	Use	equi	omen	t that	are re	quire	d to 1	meas	sure the	quality	y of p	ower	2				
Pre-		]	Powe	r Ele	ctron	ics, P	ower	Syster	n An	alysi	.S					1				
requisi	tes																			
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CO 4	1		2		1	2		3	1	3	2	1	1			2				
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Content of	he syllabus		
Unit – I	INTRODUCTION	Periods	9
Electric pov voltage vari Business Ec	ver quality phenomena: IEEE and IEC - EMC standards, over ations, interruptions, transients, waveform distortion and power to uipment Manufacturers Associations (CBEMA) curve.	view of powe requency varia	r quality disturbances - tions— Computer
Unit - I	VOLTAGE SAG AND SWELL	Periods	9
Estimating condition –	voltage sag performance – Thevenins equivalent source – Anal Estimation of the sag severity – Mitigation of voltage sag– Mitig	ysis and calcul ation of voltag	ation of various faulted e swell.
Unit – Il	I HARMONIC ANALYSIS	Periods	9
Introduction Transform -	of Harmonic Analysis - Fourier series and coefficients – Fourie fast Fourier transform -Window function- numerical problems.	r transforms, di	screte Fourier
Unit - IV	HARMONIC ELIMINATION	Periods	9
Introduction	of Harmonic elimination- Design and analysis of filters to	reduce harmo	nic distortion – Power
conditioners	POWFR OUALITY MONITORING AND		
Unit – V	MANGEMENT	Periods	9
equipment Smart Grid: Energy Sou	harmonic spectrum analyzer - flicker meters – disturbance ana Introduction of Power Quality in Smart Grid - Power Quality iss rcces - Power Quality Conditioners for Smart Grid.	lyzer. Power Q sues of Grid con	Quality Management in nnected Renewable
		<b>Total Periods</b>	45
Text Books			
1.	Dugan C. Roger, "Electrical Power Systems Quality", 3rd Editio 2012.	on,Tata McGrav	w Hill, New Delhi,
2.	F. Fuchs and Mohammad A.S. Masoum "Power Quality in Power	er Systems and	Electrical Machines
	Academic Press,2008		
References	Phim Singh Ambrich Chandra Vamal Al Haddad " Dawar Qua	lity Drobloma	r Mitigation
1.	Techniques" Wiley, 2015	inty Floblenis c	k Miligation
2.	Angelo Baggini (Ed.) Handbook of Power Quality, Wiley, 2008		
3.	M.H.J Bollen, "Understanding Power Quality Problems: Voltage York: IEEE Press), 2000.	e Sags and Inte	rruptions", (New
4.	ArrillagaJ, Watson.N.R and Chen.S, "Power System Quality Ast England, 2008.	sessment", Johr	n Wiley & Sons Ltd.,
5.	Sankaran.C, "Power Quality", CRC Press, Washington, D.C., 20	02.	
E-Resource	s		
1.	https://nptel.ac.in/courses/108/107/108107157/		
2	https://lecturenotes.in/subject/53/electrical-power-quality		

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U19E	EV13	F S	Restru ysten	ıctur n	e Pow	ver		3	0	(	)	3	40		60	100	
Cou Obje	rse ctive		<ul> <li>Ine students should made to</li> <li>Impart knowledge on fundamental concepts of congestion management</li> <li>Analyze the concepts of locational marginal pricing and financial transmission rights</li> <li>Understand gain insight on the ancillary service management and pricing of transmission network</li> <li>Illustrate about the electricity act and various power reforms in India</li> <li>At the end of the course, the student should be able to,</li> </ul>														
		A C p	t the <b>CO1:</b> ower	end o Gain I syste	of the cnowl ms	cours ledge	e, the solution on the	student funda	t shou menta	ld be	able dere	e to, egulatio	n of			Knowled Level K2	lge
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Oute	ome	С р	CO3: rices	Learn and f	abou	it the ial tra	fundar nsmiss	nental sion rig	conce ghts	epts i	nvol	ved in l	ocationa	l marg	gin	K2	
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		C In	CO5: ndia	Gain	know	ledge	about	the va	rious	refor	ms i	in the po	ower sec	tors of	f	K3	
Pre-ree	quisit	es U	J19EI	E518	- Pow	ver Sy	stem A	Analysi	s								
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Course	Assess	sment Methods		
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1.	Cont	inuous Assessment Test I, II & III		
2.	Assi End	gnment Semester examinations		
J. Indire	ert	Semester examinations		
1.	Cou	rse - end Survey		
Conten	t of th	e syllabus		
Unit	– I	INTRODUCTION TO RESTRUCTURING OF POWER INDUSTRY	Periods	9
Introdu	ction:	Deregulation of power industry, Restructuring process, Iss	ues involved	in deregulation,
Deregu	lation	of various power systems-Fundamentals of Economics: Consumer	r 96 behavior, S	Supplier behavior,
Market	equili	brium, Short and long run costs, Various costs of production– Marl	ket models: Ma	rket models based
on Cor	itractu	al arrangements, Comparison of various market models, Electri	city other com	modities, Market
archited	cture.			-
Unit	- II	TRANSMISSION CONGESTION MANAGEMENT	Periods	9
Introdu	uction:	Definition of Congestion, reasons for transfer capability limits	ation, Importar	ice of congestion
Calcula	ement,	features of congestion management–Classification of cong	gestion manag	and Intra zonal
congest	tion m	anagement_Price area congestion management_ Canacity alleviation	n method	and mula zonai
Unit -	- <b>III</b>	ELECTRICITY MARKETS	Periods	9
Cint			1 offous	
Comper- markets	titive g s – inte	encos and discos in markets, Supply and demand functions, Marke er-utility interchanges. Strategic bidding: Market power and its miti	t equilibrium, t gation, Imperfe	ypes of electricity ct markets.
Unit ·	- IV	ANCILLARY SERVICE MANAGEMENT AND PRICING OF TRANSMISSION NETWORK	Periods	9
Introdu	ction	of ancillary services - Types of Ancillary services Classification	on of Ancillar	y services- Load
generat	ion ba	lancing related services Voltage control and reactive power suppo	rt devices– Bla	ck start capability
service-	- ancı	llary service –Co-optimization of energy and reserve serv	ices- Internati	onal comparison
1 ransm	norodi	pricing –Principles– Classification– Rolled in transmission pricing	g methods–Mar	ginal transmission
Unit .	$-\mathbf{V}$	REFORMS IN INDIAN POWER SECTOR	Periods	9
Introdu	otion	Frame work of Indian newer sector. Deform initiatives. Availability	hasad tariff El	octricity oct
2003_C	Doen a	riane work of indian power sector-Reforms in the near future		ectricity act
2003 C	open a	Total I	Dorioda	15
Text B	ooks	101411	erious	43
1.	Moha	ammad Shahidehpour, Muwaffaq Alomoush, Marcel Dekker, "Rest	tructured Electr	ical power
2.	Kank	ar Bhattacharya, JaapE.Daadler, MathH.J.Boolen," Operation of R	estructured Pov	ver Systems",
Refere	nces	er / Keddenne 1 db. 2001.		
1.	Sally	Hunt "Making competition work in electricity" John Willey and S	Sons Inc 2002	
2	Steve	Profit "Power system economics: designing markets for electricit	v" John Wiley	& Sons 2002
2.	MS	habidebpour H Vamin and Zuvi Li "Market Operations in Elect	tric Power Syst	ems: Forecasting
3.	Sche	duling, and Risk Management", Wiley-IEEE Press, 2002.	the rower syst	ems. Torceasting,
4.	Loe l	Lie Lai "Power Systems Restructuring and Deregulation", John Wi	ly, 2002	
E-Reso	ources			
1.	https	://link.springer.com/chapter/10.1007/978-1-4615-1465-7_5		
2.	https	://www.google.com/search?q=Restructure+power+Systm&rlz=1C	1VDKB_enIN9	58IN958&oq=Re
3.	https	ure+power+Systm&aqs=cnrome6915/J33116013J33121.324/6J0J9 ://nptel.ac.in/courses/108/101/108101005/#	&source1d=chr	0me&1e=U1F-8
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	At the	end o	of the	cours	e, the	student	shou	ld be	abl	e to,				Knov	vledge Level
G	Course       Course       Knowledge Level         Course       CO2: Understand the architecture and advanced metering infrastructure       K2														
CourseCO2: Understand the architecture and advanced metering infrastructure.K2OutcomeCO3: Acquire knowledge about different smart meters and advanced metering															K2
Course       CO2: Understand the architecture and advanced metering infrastructure.       K2         Outcome       CO3:Acquire knowledge about different smart meters and advanced metering infrastructure.       K2															K2
CONSEquire knowledge about unrefert smart meters and advanced metering infrastructure       K2         CO4: Understand the communication technologies in smart grid.       K2															
	<b>CO5:</b> <i>A</i>	Acqui	ire kn	owled	lge on	power	quali	ty ma	inag	gement i	n Smart	Grids.			K2
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Indirect 1. Course	- end Su	rvey													
Content of the sv	llahus														
Unit – I	INTRO	ODU	CTIC	ON T	O SMA	ART G	RID				Peri	ods		9	
Evolution of El	ectric (	Grid,	Con	cept,	Defin	itions	and	Need	l fo	or Smar	t Grid,	Smar	t grid	drivers	functions,
opportunities, ch	allenges	and	bene	fits, I	Differe	nce be	tweer	n con	ven	tional &	: Smart	Grid,	Nationa	l and I	nternational

Unit - I	II SMART GRID ARCHITECTURE AND COMPONENTS	Periods	9
Smart Grid	d Architecture Models, Components of Smart Grid: Smart Ger	eration systems,	Smart Transmission Grid:
Geographi	c Information System (GIS). Intelligent Electronic Devices (I	ED) & their app	olication for Monitoring &
Protection.	. Wide Area Monitoring Protection and Control (WAMPAC).		
Unit – 1	III SMART METERS AND ADVANCED METERING INFRASTRUCTURE	Periods	9
Introductio	on to Smart Meters, Advanced Metering infrastructure (AM	II) drivers and	benefits, AMI protocols,
standards	and initiatives, AMI needs in the smart grid, Phasor Measu	ement Unit (PN	AU), Intelligent Electronic
Devices (II	ED) & their application for monitoring & protection.		
Unit - I	IV COMMUNICATION NETWORKS FOR SMART GRID	Periods	9
Communic	cation Architecture for Smart Grids, Home Area Network	(HAN) : IEEE	E 802.11, IEEE 802.15.4,
6LoWPAN	N, Neighborhood Area Network (NAN) / Field Area Network (I	AN): Radio ove	r Power-Lines (BPL/PLC),
IEEE P190	01, Wide Area Network (WAN) : Optical Fiber Communicati	on, Cellular Net	works, Introduction to Wi-
Max and W	Vireless Sensor Networks.		
Unit	<b>POWER QUALITY MANAGEMENT IN SMART</b>	Dominda	0
Umt –	GRID	renous	9
Power Qua	ality in Smart Grid, Power Quality issues of Grid connected	Renewable Energ	gy Sources, Power Quality
Conditions	and for Smooth Cried Web based Derson Oscility manitoring Derso	O 1' $A$ 1'	
Conditione	ers for Smart Grid, web based Power Quanty monitoring, Powe	Quality Audit.	
Conditione	ers for Smart Grid, web based Power Quanty monitoring, Powe	Total Periods	45
Text Book	ss	Total Periods	45
Text Book	sons, 2022.	Total Periods	45 chnology" S.K. Kataria &
Text Book	<ul> <li>Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solu</li> </ul>	Total Periods f Smart Grid Te	45 chnology" S.K. Kataria & ss, 1st Edition, 2013.
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Text Book 1. 2. References 1.	<ul> <li>Series for Smart Grid, web based Power Quanty monitoring, Power Start Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solutions Stephen F. Bush, "Smart Grid : Communication – Enabled Interview."</li> </ul>	Total Periods f Smart Grid Te ions", CRC Pres	45 chnology'' S.K. Kataria & ss, 1st Edition, 2013. Electric
Text Book 1. 2. References 1.	<ul> <li>Signart Grid, web based Power Quanty monitoring, Power Start Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solutions Stephen F. Bush, "Smart Grid : Communication – Enabled Interpower Grid", Wiley – IEEE Press, 2014.</li> </ul>	f Smart Grid Te ions", CRC Pres	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric
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Text Book           1.           2.           References           1.           2.           3.           4.	<ul> <li>Signart Grid, web based Power Quanty monitoring, Power Start Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solutions", Sons, 2022.</li> <li>Stephen F. Bush, "Smart Grid : Communication – Enabled Int Power Grid", Wiley – IEEE Press, 2014.</li> <li>Ali Keyhani, "Design of Smart Power Grid Renewable Energy Janaka.E.Kanayake, Nick Jenkins, KithsiriLiyanage, Jianzh Grid: Technology and Applications", John Wiley &amp; Sons Ltd.</li> <li>James Momoh, "Smart Grid - Fundamentals of Design and Article Power Power Grid Powe</li></ul>	Total Periods f Smart Grid Te ions", CRC Pres elligence for the Systems", Wile ong Wu and A West Sussex, 2 alysis", IEEE Pr	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric y, 2016 kihiko Yokoyama, "Smart 012. ess,John Wiley & Sons,
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Text Book           1.           2.           References           1.           2.           3.           4.           5.	<ul> <li>Bharat Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solu</li> <li>s</li> <li>Stephen F. Bush, "Smart Grid : Communication – Enabled Int Power Grid", Wiley – IEEE Press, 2014.</li> <li>Ali Keyhani, "Design of Smart Power Grid Renewable Energy Janaka.E.Kanayake, Nick Jenkins, KithsiriLiyanage, Jianzh Grid: Technology and Applications", John Wiley &amp; Sons Ltd.</li> <li>James Momoh, "Smart Grid - Fundamentals of Design and An INC., New Jersey, 2012.</li> <li>Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Power Grid: A Survey", IEEE Transaction on Smart Grid, 201</li> </ul>	Quality Audit.         Total Periods         f Smart Grid Te         ions", CRC Prese         elligence for the         Systems", Wile         ong Wu and A         West Sussex, 2         alysis", IEEE Pr         Smart Grid – Th         2.	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric y, 2016 kihiko Yokoyama, "Smart D12. ess,John Wiley & Sons, e New and Improved
Text Book           1.           2.           References           1.           2.           3.           4.           5.           Resources	<ul> <li>Bharat Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solutions Simulation Simulatin Simulation Simulatin Simulation Simulation Si</li></ul>	Total Periods f Smart Grid Te ions", CRC Pres elligence for the Systems", Wile ong Wu and A West Sussex, 2 alysis", IEEE Pr Smart Grid – Th 2.	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric y, 2016 kihiko Yokoyama, "Smart 012. ess,John Wiley & Sons, e New and Improved
Text Book           1.           2.           References           1.           2.           3.           4.           5.           Resources           1.	<ul> <li>Bharat Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solutions Simulation Simulatin Simulation Simulatin Simulation Simulation Si</li></ul>	Total Periods f Smart Grid Te ions", CRC Pres elligence for the Systems", Wile ong Wu and A West Sussex, 2 alysis", IEEE Pr Smart Grid – Th 2.	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric y, 2016 kihiko Yokoyama, "Smart 012. ess,John Wiley & Sons, e New and Improved
Text Book           1.           2.           References           1.           2.           3.           4.           5.           Resources           1.           2.	<ul> <li>Bharat Modi, Anu Prakash &amp; Yogesh Kumar "Fundamentals of Sons, 2022.</li> <li>S. Borlase, "Smart Grids, Infrastructure, Technology and Solu</li> <li>s</li> <li>Stephen F. Bush, "Smart Grid : Communication – Enabled Int Power Grid", Wiley – IEEE Press, 2014.</li> <li>Ali Keyhani, "Design of Smart Power Grid Renewable Energy Janaka.E.Kanayake, Nick Jenkins, KithsiriLiyanage, Jianzh Grid: Technology and Applications", John Wiley &amp; Sons Ltd. James Momoh, "Smart Grid - Fundamentals of Design and Ar INC., New Jersey, 2012.</li> <li>Xi Fang, Satyajayant Misra, Guoliang Xue, and Dejun Yang "Power Grid: A Survey", IEEE Transaction on Smart Grid,201</li> <li>ps://archive.nptel.ac.in/courses/108/107/108107113/</li> <li>ps://ganeshphd4u.weebly.com/uploads/7/3/4/0/7340277/ee_e19</li> </ul>	Quality Audit.         Total Periods         f Smart Grid Te         ions", CRC Prese         elligence for the         Systems", Wile         ong Wu and A         West Sussex, 2         alysis", IEEE Pr         Smart Grid – Th         2.         _smart_grid.pdf	45 chnology" S.K. Kataria & ss, 1st Edition, 2013. Electric y, 2016 kihiko Yokoyama, "Smart D12. ess,John Wiley & Sons, e New and Improved



# VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205



	Program	nme	B.E.   Programme Code   102   Regulation												201	9		
	Departn	nent	EL EN	LECT NGIN	'RICA EER	AL A ING	ND E	LECTI	RON	ICS				Semes	ster			
	Carrier	To do			Con	na N			]	Perio W	ds Per eek		Credit		Ma	ximum	Marks	
,	Course	Lode			Cou	rse N	ame		Ι		Т	Р	С		CA	ESE	, T	'otal
	U19EE	V15	Fle Sy	Flexible AC Transmission30034060Systems													100	
	Cours Object	se ive	Th	<ul> <li>Systems</li> <li>The students should made to</li> <li>Understand the state-of-art of the power system.</li> <li>Understand the FACTS controllers for load flow and dynamic analysis.</li> <li>Understand the needs and working of shunt compensators and emerging FACTS devices.</li> </ul>														
			At	the en	nd of	the co	ourse,	the stuc	dent s	hould	l be at	ole to,					Kno L	wledge Level
			CO	1: Ex	plain	the no	ecessi	ty and b	senefi	ts of	FACT	S conti	collers.				K	2
	Cours	se	CO	<b>2:</b> An	alyze	the s	hunt c	compens	sation	ı devi	ces us	ed for j	power f	actor ir	nprover	nent.		K4
	Outcol	ne	CO	<b>3:</b> Co	mpare	e serie	es cor	npensati	ion de	evices	s base	d on the	eir oper	ating cl	naracter	ristics.		K4
			CO	<b>4:</b> Ex	amine	the o	operat	tion of th	hyrist	or co	ntrolle	ed volta	ige and	phase a	ingle re	gulators	•	K2
			CO	<b>5:</b> An	alyze	the o	perati	ion of U	<b>IPFC</b>	and I	PFC F	ACTS	control	lers.				K3
P	re-requ	isites	Pow	ver El	ectror	nics, 7	Fransr	nission	& Di	stribu	ition							
	(?	3/2/1 in	ndicat	es stre	ength c	CO / of corr	PO N elation	<b>1apping</b> n) 3-Stro	ong, 2	– Mec	lium, 1	- Weak	2		CO/P	'SO Map	ping	
	COs					Prog	ramme	e Outcon	nes (P	Os)					P	SOs		
		PO 1	PO 2	PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 10 11 12 1 2 3											PSO 4			
	CO 1	3	2	2     2     2     2     2     2     2     2     1     1     12     1     1     12     1     1										2	]			
	CO 2	3	3	2	2	2	2	1	1	1	2	2	3	3	2	2	2	

### **Course Assessment Methods**

## Direct

CO 3

CO 4

CO 5

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

#### Indirect

1. Course - end survey

Content of	the syllabus		
Unit – I	INTRODUCTION TO FACTS	Periods	9
Electrical T Consideration abroad.	ransmission Network - Opportunities for FACTS - Power Flow in ons- Relative importance of controllable parameter -IEEE definition	AC System- as, FACTS de	Dynamic Stability vices in India and
Unit - II	SHUNT COMPENSATORS	Periods	9
Need for co VAR gener & TSC- app	mpensation - Concept of shunt compensation- Objectives of shunt comp ation - Thyristor Controlled Reactor (TCR) - Thyristor Switched Capac plications.	ensation- Metheristic (TSC) - C	hods of controllable Comparison of TCR
Unit – III	SERIES COMPENSATORS	Periods	9
Principles of Compensate	f operation- types - static series compensation using GCSC, TCSC and or (SSSC) – Comparison of TSSC & TCSC Characteristics and control a	TSSC, Static pplications.	Synchronous Series
Unit - IV	STATIC VOLTAGE PHASE ANGLE REGULATOR	Periods	9
Objectives Angle Reg	of voltage & phase angle regulators - approaches to Thyristor - ulator- Power system applications.	Controlled V	oltage & Phase
Unit – V	EMERGING FACTS CONTROLLER	Periods	9
STATCON Introduction	A - Unified Power Flow Controller (UPFC) & Interline Power to sub synchronous resonance - thyristor-controlled braking resonance.	ver Flow Co esistor (TCBI	ntroller (IPFC) - R)- Power system
Toyt Books	•	I otal Periods	45
1.	<ul> <li>K.R.Padiyar, —Facts Controllers in Power Transmission and Distrib Edition, 2007, Reprint August 2014, New Delhi.</li> </ul>	oution, New A	ge International, 1st
2.	Narain G. Hingorani and Laszlo Gyugyi, Understanding FACTS conc AC Transmission Systems, Standard Publishers, Delhi 2001.	epts and Tech	nology of Flexible
References		0	1
1.	R.MohanMathur, Rajiv.K.Varma, "Thyristor Based FACTS Controller Transmission systems" John Wiley and Sons, 2011.	rs for Electrica	1
2.	Jos Arrillaga, Y. H. Liu, Neville R. Watson "Flexible Power Transmis Options" Wiley 2007	ssion: The HVI	DC
3.	G. K. Dubey, Thyristerized Power Controller, New Age international (	P) Ltd., New I	Delhi 2016.
4.	T. J. E. Miller, Reactive Power Control in Electric System, John Wiley	v & Sons, 2014	
E-Resource	28:		
1.	https://easyengineering.net/ee6004-flexible-ac-transmission-systems/		
2.	https://www.jbiet.edu.in/pdffls/EEE-Coursematerial/FACTS-IV-I-EEE	E.pdf	
3.	https://www.brainkart.com/subject/Flexible-AC-Transmission-System	s_183/	
4.	https://www.rejinpaul.com/2021/07/ee8011-facts-syllabus-notes-quest	ion-bank.html	
5.	https://onlinecourses-archive.nptel.ac.in/noc18_ee44/preview		

<b>S</b>			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205       Image: Colspan="2">Image: Colspan="2" Image: Colspan="2" Ima														
Prog	ramme	B	<b>.E.</b>				Pr	ogram	me Co	ode	102	Reg	ulation		2019	)	
Depa	rtmen	t EI EN	LECT IGINI	RICA EERIN	L ANI NG	) ELE(	CTRO	NICS				Se	mester				
Course	Code		(	Course	e Nam	e		Perio W	ds Pei eek	•	Credit		Ma	ximun	n Marks		
			L     T     P     C     CA     ESE       Utilization of Electrical     2     0     0     2     10     10														
U19EF	EV16	Ut Er	Utilization of Electrical     3     0     0     3     40     60       Energy     The students should made to														
Cou Objec	rse tive	Th	<ul> <li>The students should made to</li> <li>Design illumination systems, choose appropriate motors for any drive applicat debug the domestic electric wiring, heating, welding, and specific guidance of traction applications.</li> <li>Orient the subject matter in the proper direction, visits to industrial establishmer recommended</li> <li>Familiarize the students with the different electric energy appliances in d applications.</li> </ul>														
		At	the e	nd of	the co	urse, th	ne stuc	lent sh	ould	be ab	le to,				Kı	nowledge Level	
		CC pa	D1: I rticul	dentif ar ind	y an ustrial	approp applic	oriate ation.	metho	d of	heati	ng and	l weldi	ng for	any	K1		
Cour	rse	CC lig	D2:De	evelop schen	a cleane for	ar idea specifi	of var	ious Il licatio	lumin 1s.	ation	technie	iques and hence design a K5					
Outco	ome	CO	03:Ev	aluate	e dome	estic w	iring c	connec	tion a	nd de	bug an	y faults	occurre	ed.		K2	
		the ac	D4:Re e perf	ealize formai ries.	the ap	propria f a tra	te typ	e of el unit, a	ectric and de	supp escrip	ly syste	em as w f variou	ell as to is equip	o evalua oment	ate	K5	
		CC ref ho	D5:Co frigera useho	onstrue ator a old app	ct an e is wel plication	electric ll as t on.	conne to des	ection a sign a	for an batte	y dor ery c	nestic a harging	pplianc g circui	e like a t for a	a spec	ific	K3	
Pre-requ	isites																
	(2/0/1:	ndiaat	a a atra	moth o	CO/J	PO Ma	pping		Madin		Waala			CO/PS	O Mappi	ng	
	3/2/11	nuicat	es sue	ingui 0	Progr		Jutcon	$\frac{19}{19}, 2 - \frac{19}{10}$		, 1	- weak			T	2505		
COs					Tiogr		Jucon	105 (1 C	-3)					1	503		
005	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3	PSO 4	
CO 1	3	2	3	2	3	2	2		2		1	1	3	1	2		
CO 2	3	1	2	1	1	3					2	1	3	2	2	2	
CO 3	2	2	2 2 2 1 1 3 2 3 3												3	1	
CO 4	3	1	3		3	1		1					3		2	2	
CO 5	2	2	1	2	2	2	1		1		2	2	3	2	2		

Course As	sessment Methods		
Direct			
1.Continu	bus Assessment Test I, II & III		
2.Assignin 3 End-Se	Rent examinations		
Indirect			
	ourse – end Survey		
Content of	the syllabus		
Unit –	I ELECTRIC HEATING & WELDING	Periods	9
Electric He	ating: Advantages and methods of electric heating, resistance heating	ting induction l	neating and dielectric
heating. El	ectric welding: resistance and arc welding, electric welding equip	ment, comparis	on between A.C. and
D.C. Weld	ng.		
Unit - I	I ILLUMINATION	Periods	9
Introductio	n, terms used in illumination, laws of illumination, polar cur	ves, photometr	y, integrating sphere,
sources of	light. Electric lamps –Different types of lamps, LED lighting a	nd Energy effic	cient lamps. Discharge
lamps, MV liohtino	and SV lamps, Basic principles of light control, Types and desig	n of lighting an	d flood lighting- street
inginting.			0
Unit – I	II EARTHING	Periods	9
Domestic u	tilization of electrical energy - House wiring. Induction based ap	pliances, Onlin	e and OFF line UPS,
Batteries. I	ower quality aspects – nonlinear and domestic loads. Earthing –	domestic, indus	trial and sub-station –
Earthing S	andards.		•
Unit - I	V ELECTRIC DRIVES AND TRACTION	Periods	9
Different t	pes of electric traction- DC and AC systems, types of motors use	d for electric tr	action, electric
braking, tra	ictive effort calculations, and speed-time characteristics. Electrica	l block diagram	n of an electric
locomotive	ELECTRICAL CIRCUITS USED IN		
Unit –	V REFRIGERATION AND AIR CONDITIONING	Periods	9
	AND WATER COOLERS		
Principle of	f air conditioning, vapour pressure, refrigeration cycle, eco-f	iendlyrefrigera	nts Description of
Electrical of	ircuit used in a) refrigerator, b) air-conditioner, and c) water cool	er	-
		<b>Total Periods</b>	45
Text Book	s		
1.	RajputR.K.,"UtilizationofElectricalPower",Laxmipublications,1st	Edition,2007.	
2	H.Partab, "ArtandScienceofUtilizationofElectricalEnergy", Dhanp	atRaiandCo,Ne	wDelhi,
2.	2004.		
Reference	<u>}</u>		
1.	Dr. S. L. Uppal and Prof. S. Rao"s Electrical Power Systems, pu	blished by Kha	nna Publishers, 1981.
2.	E. Openshaw Taylor, "Utilization of Electrical Energy in SI Uni	ts ^w , Orient Lon	gman Pvt. Ltd, 2013
3.	Utilization of Electrical Energy by JB Gupta, Kataria Publicatio	ns, Ludhiana, 2	011.
4.	H Partab," Modern electric traction (Including other application	s of electrical en	ngineering in
	railways). Deini: Dhanpat Rai & Sons, 2017.	and Dower by	Wilow Eastorn I td
5.	New Delhi.2014.	ical i Uwel Uy, V	whey Eastern Ltu.,
E-Resource	es		
1	https://nptel.ac.in/courses/108/105/108105060/		
<u> </u>	https://mpul.ac.m/courses/100/100/100105000/	row adf notes -	use adf notes/
<u>∠.</u>	nups.//www.smartzworld.com/notes/utilization-of-electrical-ene	agy-pai-notes-t	iee-pui-notes/
3.	https://lecturenotes.in/subject/386/utilization-of-electric-energy		

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Programme		B.E.					Pro	gram	ne Co	ode		102		Re	gulation	20	19
Departmen	t E E	LEC NGII	TRIC NEEF	CAL A RING	AND I	ELEC	TRO	NICS						5	Semester		
Course Code			Cou	se N	ame		-	Period We	ls Per ek		C	Credit		]	Maximur	n Marks	
							L	J	Γ	Р		С		C	А	ESE	Total
U19EEV17	E T	HV rans	AC a missi	nd D ion	C		3	(	)	0		3		40	1	60	100
Course Objective	Т	<ul> <li>th e students should made to</li> <li>Know the basic concepts of EHV AC and HVDC transmission.</li> <li>Understand the operation of EHVAC and DC Transmission systems</li> <li>Know the fault protective methods of EHVAC and DC systems</li> </ul>															
	А	At the end of the course, the student should be able to, <b>Knowledge</b> Level															vledge vel
Comme	С	It me end of me course, me student should be able to,     Level       CO1:Understand the importance of HVDC Transmission and HVDC Converters     K2															2
Course Outcome	C	202:	Unde	erstar	nd the	oper	ation o	of EH	VAC	Trans	smissi	ion syst	ems.			К	2
	C	:03:1	Unde	rstan	d the	testin	g of E	HVA	C and	I DC '	Frans	missio	1 syste	ms		К	2
	C	:04:1	Unde	rstan	d con	trol o	f HVI	DC Sy	stem							K	2
	C	205:1	Unde	rstan	d the	prote	ction 1	metho	ds of	EHV	syste	m				К	2
Pre-requisites	Р	ower	syste	m an	alysis	,, FA	CTS d	evices									
(2)(2)(1)	. 1.			(1 )	CO/1	PO M	apping	g	м	1.	1 337	1		CO/P	SO Mapp	oing	
(3/2/1	indi	cates	streng	<u>gin oi</u> I	Progra	mme	Outcon	$\frac{\text{ong, } 2}{\text{mes (P)}}$	- Med Os)	num,	1 - W6	еак			PSOs		_
COs	PO	PO 2	PO 3	PO 4	PO	PO	PO 7	PO	PO	PO 10	PO	PO	PSO 1	PSO	PSO 3	PSO	
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CO 2	3	2	2	2	2							2	2	2	2	2	_
CO 3	3	2	2	2	2								2	2	2	$\frac{2}{2}$	
CO 5	3	2	2	2									2	2		2	
Course Assess	nent	Met	hods														
Direct																	
1. Conti	nuou	ıs As	sessr	nent '	Test 1	, II &	III										
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Indirect	seme	ster	слап	mati	0115												-
1. Cours	e – e	end S	urvey														

Content of the syllabus											
Unit –	Ι	Introduction	Periods	9							
Need of E	HV tra	nsmission, standard transmission voltage, comparison of EHV AC &D	C transmission sy	stems and							
their appli	cations	s & limitations, surface voltage gradients in conductor, distribution of v	voltage gradients o	n sub-							
Unit –	II	EHV AC Transmission	Periods	<u>9</u>							
Corona los	s form	ulas, corona current, audible noise- generation and characteristics coro	na pulses their ge	neration							
andproper	ties,rac	liointerference(RI)effects, overvoltagedue tos witching, ferroresonance, re	ductionofswitchin	ıg							
surges on	EHV s	ystem, principle of half wave transmission.									
Unit – I	II	Extra High Voltage Testing	Periods	9							
Characteri voltage by state limits EHV lines	stics a spher s, EHV	nd generation of impulse voltage, generation of high AC and DC vo e gaps and potential dividers. Consideration for Design of EHV Lines, I line insulation design based upon transient overvoltage. Effects of pol	ltages, measurem , Design factors un lution on perform	ent of high nder steady ance of							
Unit – I	[V	EHV DC Transmission-I	Periods	9							
Types of d on operation	le links on of e d excit	s, converter station, choice of converter configuration and pulse numbe onverters, principle of dc link control, converter controls characteristic ation angle control, power control, starting and stopping of d dcl ink.	r, effect of source s, firing angle con	inductance trol,							
Unit –	V	EHV DC Transmission- II	Periods	9							
Converter and dc filt	faults, ers, mi	protection against over currents and over voltage, Smoothing reactors, ilti –terminal dc systems (MTDC): Types, control, protection and appli	generation of har cation.	monics, ac							
		Total Periods	45								
Text Book	KS .										
1.	R. D.	Begamudre, "Extra High Voltage AC Transmission Engineering" Wil	ey Eastern 1997.								
2.	S.Ra	o, "EHV AC & HVDC Transmission Engineering and practice" Khan	na Publishers,2013	3.							
Reference	S		·								
1.	J. Ar. Pereg	rillaga," High Voltage Direct current Transmission" IFFE Power Engir grinus Ltd, London.1986.	neering Series 6, P	eter							
2.	Kim Wile	Chan Ki "Hvdc Transmission Power Conversation Applications In Pov y,2001	ver Systems", Joh	n							
3.	Uhln	ann"Power Transmission By Direct Current", Springer India Private L	.td,2008								
4.	Arril	lagaJos"Flexible Power Transmission", WILEY 2007.									
5.	M. S	Naidu & V. Kamaraju, "High Voltage Engineering" Tata Mc Graw H	ill 2012.								
E-Resour	ces										
1.	https	://nptel.ac.in/courses/108/108/108108099/									
2.	https	://nptel.ac.in/courses/108/104/108104013/									
3.	https://www.youtube.com/playlist?list=PL4B78E9972172086A										

Ç			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205       Image: Context of Context												Review State		
Prog	gramn	ne	B.E.					Progr	amm	e Co	ode	1	102	Regul	lation		2019
Dep	artme	nt 1	ELEC ENGII	TRIC NEER	AL A NG	ND E	LECT	RONIC	CS					Sen	nester		
Course	code			Cou	rse N	ame		Pe	riods Wee	Per k		Cı	redit		Max	imum N	Iarks
								L	Т		Р		С	CA		ESE	Total
U19E	EV18		Static	Rela	ays			3	0		0		3	40		60	100
Cou Obje	irse ctive		<ul> <li>The students should made to</li> <li>Understand the construction of static relays</li> <li>Understand the operation of amplitude and phase comparators</li> <li>Comprehend the concepts of Static over current, static differential and static distance relays.</li> <li>Understand multi-input comparators and concept of power swings on the distance relays.</li> <li>Understand the operation of microprocessor based protective relays.</li> </ul>														
			At the end of the course, the student should be able to,														
		-	At the end of the course, the student should be able to, Level														
		5	CO1: Describe the construction of static relay and identify the advantages of static relay over electromagnetic relay. K2														
Outc	ome		C <b>O2</b> : 2 compa distanc	Explo rators ce rela	re the , phas iys	opera se con	ation of parato	f rectifi rs, mul	er bri ti inp	dge ut co	com ompa	para arato	ators, in ors, sta	nstantar tic diffe	eous erential	l and	K2
			C <b>O3</b> : over ci	Descr urrent	ibe ir relav	nstanta s	aneous	, defini	te tin	ne a	nd i	nvei	rse def	inite m	inimur	n time	K2
			CO4:	Analy	ze the	e conc	ept of	power	swing	S							K4
		•	C <b>O5</b> :U	Jnder	stand	the m	icropro	cessor	basec	l pro	otecti	ive 1	relays				
Pre-req	uisites	5 1	U19EI	E517-	Powe	er Sys	tem Pr	otectio	on and	l Sw	vitch	igea	r				
(3/	/2/1 ind	dicate	es strer	igth of	<b>CO</b> / I f corre	PO M lation	apping ) 3-Stro	<b>;</b> ong, 2 –	Medi	um,	1 - 1	Wea	k		CO/P	SO Maj	pping
					Progra	amme	Outcor	nes (PC	Ds)							PSOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	) P	0 1	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	2	3	2	2	-	-	-	-	-		2	2	3	-*	2	3
CO 2	3	2	2	2	2	-	-	-	-	-		2	2	3	-	2	3
CO 3	3	2	2	2	2	-	-	-	-	-		3	3	3	-	2	3
CO 4	3	2	2	2	2	-	-	-	-	-		3	3	3	-	3	3
CO 5	2	2	2	2	2	-	-	-	-	-		3	3	3	-	3	3
	I		I		I					<u> </u>							
Course Assessment Methods																	
Direct 1. 2. 3. Indirece	Cont Assig End-	inuou gnme Seme	is Assent nt ester ez	essme xamin	ent Te ations	st I, II s	& III										
1.	Indirect         1. Course - end Survey																

Signature of the BOS Chairman, EEE

Content of	f the syllabus		
UNIT – I	STATIC RELAYS	Periods	9
Advantage	es of static relays - Basic construction of static relays - Level	detectors – R	eplica impedance –
Mixing ci	rcuits - General equation for two input phase and amplitude	e comparators	s -Duality between
amplitude	and phase comparators. Amplitude Comparators: Circulating curre	ent type and o	pposed voltage type
– rectifier	bridge comparators, Direct and Instantaneous comparators.	1	
Unit -	II PHASE COMPARATORS	Periods	9
Coinciden	ce circuit type – block spike phase comparator, techniques to me	asure the period	od of coincidence –
Integrating	g type – Rectifier and Vector product type – Phase comparate	ors. Static Ov	ver Current Relays:
Instantane	ous over-current relay – Time over-current relays-basic princip	ples – definit	e time and Inverse
definite tin	ne over-current relays.		0
Unit –	III   STATIC DIFFERENTIAL RELAYS	Periods	9
Analysis o	f Static Differential Relays – Static Relay schemes – Duo bias tra	instormer diffe	erential protection –
Harmonic	restraint relay. Static Distance Relays: Static Impedance-reactan	ce - MHO ar	angle impedance
relay-samp	The second secon		arator.
UNII -	IV MULTI-INPUT COMPARATORS	Periods	9
Conic sect	ion characteristics -Three input amplitude comparator – compar	ator-switched	distance schemes -
Poly phase	e distance schemes – phase fault scheme – three phase scheme – co	ombined and g	round fault scheme.
Power Sw	ings: Effect of power swings on the performance of distance i	relays – Powe	er swing analysis –
Principle of	of out of step tripping and blocking relays – effect of line and	length and so	ource impedance on
distance re	lays		
UNIT	W MICROPROCESSOR BASED PROTECTIVE	Dorioda	0
UNII -	RELAYS	renous	9
(Block dia	gram and flowchart approach only) - Over current relays - impe	dance relays -	- directional relay -
reactance	relay - Generalized mathematical expressions for distance relays	s -measuremen	nt of resistance and
reactance -	- MHO and offset MHO relays - Realization of MHO characteris	stics – Realiza	tion of offset MHO
characteris	tics – Basic principle of Digital computer relaying.		
	·	Fotal Periods	45
Text Book	S		
1.	Badri Ram and D. N. Vishwakarma, "Power system protection as publication New Delhi 1995	nd Switch gear	f ^{°°} , IMH
2.	T S Madhava Rao "Power System Protection: Static Relays" T	MH publicatio	on.2008.
	Revindranath B and chander M "Power System Protection And	witchgear''Ne	
3.	International Publishers 2018	switchgear ive	w Age
Reference	s		
Reference	BhayeshBhalia R P Maheshwari Nilesh G Chothani"Protectio	n and Switchs	ear" Oxford
1.	University Press.2010.	in and is writing	, onioid
2.	C. Christopoulos and A. Wright "Electrical Power System Protec	tion., Springe	r International
3.	J.B.Gupta, "Switchgear and Protection" S.K. Kataria& Sons2013	<u>, , , , , , , , , , , , , , , , , , , </u>	
	Bhuvaneshoza, Nirmalkumar, Rashesh Mehta "Power System Pro	tection & Swi	tchgear,1st
4.	Edition,2012.		<u>C</u>
5.	Sunil S.Rao, "Switch Gear and Protection", Khanna Publication		
E-Resourc	es		
	https://www.bharathuniv.ac.in/colleges1/downloads/courseware	eee/Notes/CF	1/BFF012%20SOL
1.	ID%20STATE%20RELAYS.pdf		<u>1/DEL012/02050E</u>
2.	http://www.miet.edu/course/wp-content/uploads/2019/07/4.7-PA	SG_Optimize	d.pdf
3	https://www.studocu.com/row/document/tribhuvan-vishwavidala	ya/switchgear	-and-
5.	protection/static-relay-4/12574437	_	

ů,			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205       Image: Color of													
Progr	amme	]	<b>B.E.</b>			Progra	amme	Code			102	Regula	ation		2019	)
Depar	rtment	EI EN	LECT	RICAI EERIN	L ANI IG	D ELF	CTR	ONICS	5		Se	emester				
Course	o Coda			Course	Nom		I	Periods	Per W	/eek	Credit		Max	ximum	Marks	
Course	e Coue			Course		le		L	Т	Р	С	CA		ESE		Total
U19E	EV21	S	olid St	tate Di	rives			3	0	0	3	40		60	10	0
Coı Obje	urse ective	Th	<ul> <li>Steady state operation and transient dynamics of a motor load system.</li> <li>Analyze the operation of the converter/chopper fed dc drives</li> <li>Familiarize on the operation of VSI and CSI fed induction motor drives.</li> <li>Operation and performance of Synchronous motor drives.</li> <li>Analyze and design the current and speed controllers for a closed loop solid state DC motor drive.</li> </ul>													
		А	At the end of the course, the student should be able to, Knowledge Level													
		CC	CO1:Understand the basic concepts of Electrical drives K2													
Сот	urse	<b>CO2</b> : Analyze the power electronic converters fed DC Drives K3													K3	
Oute	come	CC	<b>)3:</b> Exp	pertise	in the	contro	ol of In	ductio	n moto	or driv	ves					K4
		CC	<b>)4:</b> An co	alyze to ndition	the cons.	nverte	r fed	synchr	onous	drive	s under	different	torque	e/speed		K4
		CC	<b>)5:</b> Fo	rmulat	e the c	control	schen	nes for	Electr	ical D	rives.					K4
Pre-rec	quisite	s U	19EE	519 - P	ower	Electro	onics								I	
	(	3/2/1 i	ndicate	es stren	CO gth of o	/ PO M correlat Wea	<b>lappin</b> ion) 3- k	<b>g</b> Strong,	2 – Me	edium,	. 1 –			CO/I	PSO M	apping
Cos					Pro	gramm	e Outc	omes (l	Pos)	1					PSOs	
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 1	) PO 11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	2	2	2	2	2	-	-	-	-	-	-	2	3	-	2	2
	2	2	2	2	2	-	-	-	-	-	-	2	2	-	2	2
	2	2	2	2	2	-	-	-	-	-	-	2	2	-	2	2
CO 4	2	2	2	2	2	-	-	-	-	-	-	2	2	-	3	2
	2	2	-	2	2	-	-	-	-	-	-	2	2	-	2	2
Course Direct Indire	Course Assessment Methods         Direct         1. Continuous Assessment Test I, II &III         2. Assignment         3. End-Semester examinations         Indirect         1.Course – end survey															

Unit - 1         DRIVE CHARACTERISTICS         Periods         9           Electric drive – Equations governing motor load dynamics – steady state stability – multi quadrant, Dynamics: acceleration, deceleration, starting & stopping – typical load torque characteristics – Selection of motor – Choice of Electric Drives and Losses         9           Vint – II         CONVERTER/CHOPPER FED DC MOTOR DRIVE         Periods         9           Steady state analysis of the single and three phase converter fed separately excited DC motor drive-continuous and discontinuous conduction – Time ratio and current limit control – 4 quadrant operation of chopper fed DC drives. Unit – III         INDUCTION MOTOR DRIVES         Periods         9           Speed Control using Stator voltage control—vif control–Rotor side Control – constant air gap flux–field weakening mode – voltage / current fed inverter – closed loop control- energy efficient drive         9           Unit – IV         SYNCHRONOUS MOTOR DRIVES         Periods         9           Vif control and self-control of synchronous motor: Margin angle control and power factor control – permanent magnet synchronous Motor-Three phase voltage/current source fed synchronous motor         9           Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback- armature voltage control and field weakening mode –current controller and speed controller- converter selection and characteristics.         9           1.         G.K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing house, 2 nd edition, 2008.         2 <t< th=""><th colspan="11">Content of the syllabus</th></t<>	Content of the syllabus										
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discontinuous conduction- Time ratio and current limit control - 4 quadrant operation of chopper fed DC drives.         Unit - III       INDUCTION MOTOR DRIVES       Periods       9         Speed Control using Stator voltage controlw/f control-Rotor side Control - constant air gap flux-field weakening mode - voltage / current fed inverter - closed loop control- energy efficient drive       Periods       9         V/f control and self-control of synchronous motor: Margin angle control and power factor control - permanent magnet synchronous Motor-Three phase voltage/current source fed synchronous motor       Periods       9         Transfer function for DC motor / load and converter - closed loop control with Current and speed feedback-armature voltage control and field weakening mode -current controller and speed controller- converter selection and characteristics.       9         Text Books       Total Periods       45         1.       G.K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing house, 2 nd edition, 2008.         2.       R.Krishnan, "Electric Motor Drives - Modeling, Analysis and Control", Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.         3.       B.K. Bose," Modern Power Electronics and AC drives", Pearson Education Publications, 2 nd edition, 2005.         4       Vinod Kumar, Ranjan Kumar Behera, Dheeraj Joshi, "Power Electronics, Drives, and Advanced Applications" CRC Press, 2020.         References       1.       T. Wildi, "Electrical Machines Drives and Power Systems", Pearson Education Publications, 6 th edition, 2004.       2. <td>Steady state</td> <td>analysis of the single and three phase converter fed separately excite</td> <td>d DC motor drive-</td> <td>-continuous and</td>	Steady state	analysis of the single and three phase converter fed separately excite	d DC motor drive-	-continuous and							
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V/f control and self-control of synchronous motor: Margin angle control and power factor control – permanent magnet synchronous Motor-Three phase voltage/current source fed synchronous motor         Unit – V       CONTROLLERS FOR DRIVES       Periods       9         Transfer function for DC motor / load and converter – closed loop control with Current and speed feedback-armature voltage control and field weakening mode –current controller and speed controller- converter selection and characteristics.       Total Periods       9         Text Books       I.       G.K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing house, 2 nd edition, 2008.       45         2.       R.Krishnan, "Electric Motor Drives – Modeling, Analysis and Control", Prentice-Hall of India Pvt. Ltd., New Delhi, 2010.       B.K. Bose," Modern Power Electronics and AC drives", Pearson Education Publications, 2 nd edition 2005.         4       Vinod Kumar, Ranjan Kumar Behera, Dheeraj Joshi, "Power Electronics, Drives, and Advanced Applications" CRC Press, 2020.         References       I.       T. Wildi, "Electrical Machines Drives and Power Systems", Pearson Education Publications, 6 th edition, 2004.         2.       P.C. Sen," Thyristor DC Drives" John Wiley& Sons Publishers, New York, 2008       3.         3.       John Hindmarsh and Alasdain Renfrew, "Electrical Machines and Drives System," Elsevier 2012.       4         4       Vedam Subramanyam, Electric Drives Concepts and Application, 2e, McGraw Hill, 2016       5         5       Theodore Wildi, Electrical Ma	Unit –	IV SYNCHRONOUS MOTOR DRIVES	Periods	9							
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Department	ELECT ENGIN	RICAL AND ELECTRON EERING	NICS				Semester						
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U19EEV22	Special	Electrical Machines	3	0	0	3	40	60	100				
Course Objective	• •	<ul> <li>Understand the constructional features and operating principles of various types of special electrical machines.</li> <li>Analyze the static and dynamic characteristics of special electrical machines.</li> <li>Understand about the different types of drive systems and controllers used in special electrical machines.</li> </ul>											
Course	At the e CO1: H Relucta CO2: A	nd of the course, the stud Explicate the construction nce Motors.	ent sl n and cs ai	hould d ope nd pe	be alterating	ble to, g principle nance of I	es of Synchron Permanent Ma	nous gnet	Knowledge Level K2 K3				
Outcome	CO3:A Perman	nalyze the different type ent Magnet Brushless Dc	es of Mote	cont ors.	troller	s and con	trol technique	s of	K3				
	CO4:Ex Relucta	cplicate the construction nce Motors.	n ar	nd oj	perati	ng princij	ples of Swite	ched	K2				
	<b>CO5:</b> Explicate the construction and operating principles of Steeping motors. K2												
Pre-requisites	U19EE411 - AC Machines												
		CO / PO Mapping					CO/PS	SO Map	ping				

(3/	(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/P	SO Map	ping
					Progra		PSOs									
COs	PO         PO<											PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3 2 3 2 - 2 2 3												3	-	2	2
CO 2	3	2	3	2	-	2	-	-	-	-	2	3	3	-	2	2
CO 3	3	2	3	2	-	2	-	-	-	-	2	3	3	-	2	2
CO 4	3	2	3	2	_	2	-	-	-	-	2	3	3	-	2	2
CO 5	3	3 2 3 2 - 2 2												-	2	2

Direct

- Continuous Assessment Test I, II &III 1
- 2 Assignment3 End-Semester examinations

Indirect

1.Course - end survey

Content o	of the s	yllabus		
Unit –	- I	SYNCHRONOUS RELUCTANCE MOTORS	Periods	9
Construct	ional f	eatures: axial and radial air gap Motors - Operating principle	e - reluctance t	orque – phasor diagram
- motor c	haracte	eristics – Applications: SRM for Electric ships.		
Unit -	II	PERMANENT MAGNET SYNCHRONOUS MOTORS	Periods	9
Permanen	nt Mag	net operating principle and it characteristics, EMF, power	input and tore	que expressions, Phasor
diagram,	Power	controllers, Torque speed characteristics, Self-control, Vec	ctor control, C	urrent control schemes-
Sensor les	ss cont	rol-Applications: PMSM for Railway vehicles.		
Unit –	III	PERMANENT MAGNET BRUSHLESS DC MOTORS	Periods	9
Commuta sensors- M and EMH PMBLDC	tion in Multipl F equa C motor	DC motors- Difference between mechanical and electroni hase Brushless motor- Square wave- Sine wave permanent n ition, Torque-speed characteristics, Controllers-Microproc r for motion control systems.	c commutator nagnet brushle cessor based	s- Hall sensors, Optical ss motor drives, Torque controller-Applications:
Unit -	IV	SWITCHED RELUCTANCE MOTORS	Periods	9
Construct	tional f	Ceatures-principle of operation-Torque equation - Power C	Controllers-Cha	racteristics and control
Micropro	cessor	based controller-Applications: SRM for Hybrid Electric Veh	icles.	-
Unit –	V	STEPPING MOTORS	Periods	9
Construct	ional f	eatures, principle of operation, modes of excitation torque pr	oduction in Va	ariable Reluctance (VR)
stepping i	motor,	Applications: Steeper motor for Computer Printers	n loop control	, closed loop control of
stepping i	10101-	T	otal Periods	45
Text Boo	ks	*	otur i crious	10
1.	Janar	danan E.G., -Special Electrical Machinesl, 1st Edition, PHI	Learning Pvt.	Ltd., New Delhi, 2014.
2.	Venk	ataratnam, "Special Electrical Machines", Tayler and Francis	s, 2009	
3.	Simn	ni P Burman "Special Electrical Machines" ,S.K. Kataria& S	ons,2nd edition	n, 2017.
Reference	es			
1.	Kenjo New	o T., —Stepping Motors and Their Microprocessor Controls Delhi, 2000.	, 1st Edition, C	Oxford University Press,
2.	Mille Unive	r.T.J.E, "Brushless Permanent Magnet and Reluctance meeting, 1989.	otor drives",C	larendon Press, Oxford
3.	Kenjo Univo	p.T and Naganori.S, "Permanent Magnet and brushless I ersity, 1990.	DC motors",C	larendon Press, Oxford
4.	Krish Limit	nan.R, "Electric Motor Drives – Modeling, Analysis and C ed, New Delhi, 2010	Control", Prent	iceHall of India Private
E-Resour	ces			
1.	https:	//www.coursehero.com/file/106572025/Special-Electrical-M	lachinesppt/	
2.	https:	//sist.sathyabama.ac.in/sist_coursematerial/uploads/SEE1307	7.pdf	
3.	https:	//pdfslide.net/documents/special-electrical-machines-ppt.htm	าโ	

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205												
Programme	B.E.	Programm	ne Code	э		102	Regulation		2019				
Department	ELECTR ENGINE	ICAL AND ELECT ERING	RONIC	CS		Ś	Semester						
Course Code	C	ourse Name	Per	iods Pe Week	er	Credit	Maximu	ım Ma	rks				
Course Coue		Juise Ivanie	L	Т	Р	C	CA	ES E	Total				
U19EEV23	Electrical Vehicles	and Hybrid	3	0	0	3	40	6 0	100				
Course Objective	To introdu technologi	To introduce the fundamental concepts and principles of various Hybrid Electric Vehicle echnologies with an insight into Power electronic converters and topologies											
	At the end of the course, the student should be able to,												
	CO1:Explain about concept of electric and hybrid electric vehicles K2												
Course Outcome	<b>CO2:</b> Distinguish the characteristics of internal combustion vehicles and hybrid electric vehicles												
	CO3:Dem drive	onstrate the concept of trains	of elect	rically	coupl	led hybric	l electric		K2				
	CO4: Illus	strate the concept of r	nechani	ically c	ouple	ed hybrid	electric drive trai	ns	K3				
	CO5: Oou	tline the importance	of reger	nerativo	e brea	ıking			K3				
e-requisites	tes Basic principles of Electric Motors												
(3/2/1 ii	CO / PO Mapping       CO/PSO Mapping         (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak       CO/PSO Mapping												

(3/	(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												20/150	Julappi	ng	
	Programme Outcomes (POs)										PSOs					
COs	РО 1	PO         PO<												PSO 2	PSO 3	PSO 4
CO 1	3	2	1	1									2		1	3
CO 2	3	2	1	1									3	2	2	2
CO 3	3	2	1	1									3	2	1	2
CO 4	3	1											3			3
CO 5	3	3 2 1 1												1	2	3

Direct

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

Indirect

1.Course - end survey

Content of th	ne syllabus										
Unit – I	INTRODUCTION	Periods	9								
Environmen	tal impact and history of modern transportation – Electric	vehicles: conf	figuration of EVs-								
performance	of EVs – Tractive effort in normal driving- energy consum	ption – Hybrid	d electric vehicles:								
concept of h	ybrid electric drive trains – Architecture of hybrid electric drive	trains									
Unit - II	IC PROPULSION AND ELECTRIC PROPULSION SYSTEMS	Periods	9								
Vehicle pow DC Motor D	er plant and transmission characteristics – IC engine operating rives – Induction Motor Drives – Permanent Magnetic BLDC N	principle- oper Motor Drives –	ration parameters – SRM Drives								
Unit – III	Unit - IIIELECTRICALLY COUPLED HYBRID ELECTRIC DRIVE TRAINPeriods9										
Design princ	iple of series (electrical coupling) hybrid electric drive trai	n: Operation	patterns – Control								
strategies – D	besign principles of a series (electrical coupling) hybrid drive tr	ain – Design e	example: Design of								
traction moto	r size – Design of the gear ratio – Verification of accelerati	on performance	e – Design of the								
power capaci	ty of PPS – Fuel Consumption										
Unit - IV	MECHANICALLY COUPLED HYBRID ELECTRIC DRIVE TRAIN	Periods	9								
objectives – series – paral methodology	Control strategies – parametric design of a drive train – Des lel (torque and speed coupling) hybrid drive train: Drive train c – design and control principles of plug-in hybrid electric vehicl	sign and contressing configuration –	ol methodology of drive train control								
Unit – V	FUNDAMENTALS OF REGENERATIVE BREAKING	Periods	9								
Braking energy braking power braking energy	gy consumed in urban driving – braking energy versus vehicle s r – braking power versus vehicle speed – braking energy versus y on front and rear axles – brake system of EV, HEV, and FCV	peed – braking vehicle decele	g energy versus eration rate –								
	Т	otal Periods	45								
Text Books											
1. N	Tehrded Ehsani, Yimin Gao & Ali Emadi, "Modern Electric Tehicles: Fundamentals, Theory and Design", 2nd Edition, CRC	Press, USA, 2	2010.								
References											
1. Io 2	pal Hussain, Electric and Hybrid Vehicles design fundamer 018.	ntals" Third E	dition, CRC Press								
2. C	hris Mi, Abdul Masrur and David Wenzhong Gao, Hybrid I pplications with Practical Perspectives, Wiley Press. 2018	Electric Vehic	les, Principles and								
<b>E-Resources</b>	··· · · ·										
1. N	PTEL Course on "Electric Vehicles Part – 1"										
2. N	PTEL Course on "Electric Vehicles and Renewable Energy"										

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205       Image: Constraint of Constraints											
Programme	B.E.		Progra	mme (	Code	102	Regulation		2019			
Department	ELECT ENGIN	RICAL AND ELECT	RONIC	S			Semester					
Course Code		Course Name	Per	iods P Week	er	Credit	Max	imum N	Iarks			
			L	Т	Р	С	CA	ESE	Total			
U19EEV24	Design Appara	Design of Electrical Apparatus30034060The students should made to										
Course Objective	• • •	Magnetic circuit para machines Core, yoke, windin Armature and field Design of stator and characteristics Design stator and re	gs and system d rotor otor of	and th coolir is for 1 of ind synch	ermal g sys D.C. uctio ronou	rating of stems of machine n machin us machi	various types transformers. s. nes and its op nes	of elect erating	rical 5			
	At the	end of the course, the	student	should	be al	ole to,			Knowledge Level			
Course	<b>CO1:</b> U	nderstand the basics o	f desigi	n consi	derati	ons and r	nmf calculatio	n	K2			
Outcome	<b>CO2:</b> D	esign single and three	phase t	ransfo	rmer				K3			
	CO3:D	esign field and arma	ture of	DC n	nachi	nes.			K3			
<b>CO4:</b> Design stator and rotor of induction motor and understand the operational performance.												
	<b>CO5:</b> D	esign and analyze sy	nchroi	nous n	nachi	nes.			K3			
Pre-requisites	Basic concepts of magnetic fields and knowledge in electrical machines											

(3/	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO	SO Mapping			
							PSOs											
COs	PO         PO<										PO 12	PSO 1	PSO 2	PSO 3	PSO 4			
CO 1	3	2	2									2	3		2			
CO 2	3	3	2									2	3	2	2			
CO 3	3	3	2									2	3	2	3			
CO 4	3	2										2	3		2			
CO 5	3	2		2								2	3		2			

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

1. Course – end Survey

Unit - I       MAGNETIC CIRCUITS       Periods       9         Major considerations in Electrical Machine Design – Materials for Electrical apparatus –MMF calculation for various types of electrical machines – real and apparent flux density of rotating machines - Flux leakage – Leakage in Armature - rating of electrical machines.       9         Unit - II       TRANSFORMERS       Periods       9         Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers.       Periods       9         Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – losses and efficiency calculations -Design of field system.       9         Unit - IV       INDUCTION MOTORS       Periods       9         Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram       9         Output equations – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of turbo alternators       9         Output equations – Design of competend submeres – Short circuit ratio – Armature design – Es								
Mathematical Machine Design – Materials for Electrical apparatus –MMF calculation for various types of electrical machines – real and apparent flux density of rotating machines – Flux leakage – Leakage in Armature - rating of electrical machines.         Unit - II       TRANSFORMERS       Periods       9         Construction - KVA output for single and three phase transformers – Overall dimensions – design of yoke, core and winding for core and shell type transformers – Estimation of No load current – Temperature rise in Transformers – Design of Tank and cooling tubes of Transformers.       Periods       9         Construction - Output Equations – Main Dimensions – Choice of specific loadings – Selection of number of poles – Design of Armature – Design of commutator and brushes – losses and efficiency calculations -Design of field system.       9         Unit - IV       INDUCTION MOTORS       Periods       9         Construction - Output equation of Induction motor – Main dimensions – choice of specific loadings – Design of squirrel cage rotor and wound rotor –Magnetic leakage calculations – Operating characteristics : Magnetizing current - Short circuit current – Circle diagram       9         Output equations – Design of salient pole machines – Short circuit ratio – Armature design – Estimation of air gap length – Design of turbo alternators       9         Output equations – Design of turbo alternators       45         Text Books       1.       Sawhney,A.K.,,,ACourseinElectricalMachineDesign'',DhanpatRai&Sons,NewDelhi,Fifth Edition, 2010.								
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gap length – Design of rotor –Design of damper winding – Determination of full load field MMF – Design of field winding – Design of turbo alternators         Total Periods         Total Periods         Text Books         1.       Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth Edition, 2010.         S.K.San_PrinciplesofElectricalMachineDesignwithComputerProgrammes" OxfordandIBH								
field winding – Design of turbo alternators         Total Periods       45         Text Books         1.       Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth         Edition, 2010.       S.K.Sen_PrinciplesofElectricalMachineDesignwithComputerProgrammes" OxfordandIBH								
Text Books     Total Periods     45       1.     Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth Edition, 2010.       S.K.San_PrinciplesofElectricalMachineDesignwithComputerProgrammes" OxfordandIBH								
Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth           1.         Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth           Edition, 2010.         S.K.Sen_PrinciplesofElectricalMachineDesignwithComputerProgrammes" OxfordandIBH								
1.         Sawhney,A.K.,,,ACourseinElectricalMachineDesign",DhanpatRai&Sons,NewDelhi,Fifth           Edition, 2010.         S.K.San, Principles of ElectricalMachineDesignwithComputerProgrammes" OxfordandIBH								
SK San Principles of Electrical Machine Design with Computer Programmes" Oxford and IBH								
2. Publishing Co.Pvt Ltd., New Delhi, 2006.								
ences								
R.K. Agarwal, "Principles of Electrical Machine Design", S.K.Kataria and Sons, Delhi, 2002.								
2 V.N.MittleandA.Mittle, "DesignofElectricalMachines", StandardPublicationsand								
^{2.} Distributors, Delhi, 2002.								
A.Shanmugasundaram,G.Gangadharan,R.Palani,ElectricalMachineDesignDataBook",New								
3. Age International Pvt. Ltd., Reprint 2007.								
4. MVDeshpande, DesignandTestingofElectricalMachines [®] PHIlearningPvtLt, 2011.								
5. V Rajini, V.S Nagarajan, "Electrical Machine Design", Pearson, 2017								
E-Resources								
1. <u>https://nptel.ac.in/courses/108/106/108106023/</u>								
2. https://freevideolectures.com/course/3527/modelling-and-analysis-of-electric-machines								
3. <u>https://www.youtube.com/watch?v=AECBgmkWvo0</u>								

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Progr	amme		B.E.			Progra	amme	Code			102	Regula	ation		202	19
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Course	e Code	2		Cours	e Nam	e		L	Т	Р	С	CA		ESE		Total
U19E	EV25	5	Wind a System	and Sol Is	lar En	ergy		3	0	0	3	40		60	1	00
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		1	At the e	end of t	the cou	rse, th	e stud	ent sho	ould be	e able to	),				Knov	wledge Level
	CO1: Understand the energy scenario and the consequent growths of the power generate renewable energy sources.       K2													K2		
Course Outcome CO2: Understand the basic of solar power generation K2												K2				
CO3: Understand the basic of wind power generation												K2				
<b>CO4:</b> Understand the power electronic interfaces for wind and solar generation.												K2				
		C sy	<b>O5:</b> Ui stems.	ndersta	nd the	issues	relate	ed to th	e grid-	integra	tion of s	olar and	wind e	energy		K2
Pre-req	quisite	s U	19EE6	22 - Ge	eneratio	on of l	Electri	cal En	ergy							
	(3/	2/1 in	dicates	strengt	CO / h of cor	<b>PO M</b> relatio	<b>Iappin</b> n) 3-St	<b>g</b> rong, 2	– Med	ium, 1 V	Veak			CO	/PSO I	Mapping
<b>GO</b>					Prog	gramm	e Outco	omes (I	POs)						PSOs	
COs	PO 1	РО	2 PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3	PSO4
CO 1	2	1	2	2	-	-	2	-	-	-	-	2	2	-	2	1
CO 2	2	2	2	2	2	-	2	-	-	-	-	2	2	1	3	2
CO 3	2	2	2	2	2	-	2	-	-	-	-	2	2	1	3	2
CO 4	3	3     3     2     2     2     -     -     -     -     2     2     1     3     2       2     2     2     2     2     2     1     3     2											2			
0.03	Z	Z	Z	2	Z	-	Z	-	-	-	-	Z	Z	I	Z	2
Course	Asses	smei	nt Met	hods												
Direct	t 2. Ass 3. End ect 1. Co	ntinu signn d-Sei urse	ous As nent mester - end si	examir urvey	ent Tes	t I, II	&III									

Content of the syllabus											
Unit –	I GLOBAL AND NATIONAL ENERGY SCENARIO	Periods	9								
Over view sources, ty sustainable of renewah	y of conventional & renewable energy sources, need, potential pes of renewable energy systems, Future of Energy Use, Global a e development, renewable electricity and key elements, Global cli- ble energy- concept of Hybrid systems	&development of nd Indian Energy mate change, CO	of renewable energy scenario, Energy for 2 reduction potential								
Unit - I	II WIND ENERGY	Periods	9								
Basic Prine	ciples of Wind Energy Conversion, Potential, Nature of the wind,	Vind Data and En	ergy Estimation, Site								
selection,	Types of wind turbines, Wind farms, Wind Generation and Control	, classification of	wind, characteristics,								
Unit – I	III SOLAR ENERGY	Periods	9								
Solar ener	gy system. Solar Radiation - Availability. Measurement and F	stimation. Solar	Thermal Conversion								
Devices and Storage, Solar Photo Voltaic (SVP) system, Different configurations, SPV system components and their characteristics, Stand-Alone and Grid Connected SPV systems, other Miscellaneous Applications of Solar Energy.											
Unit - J	V POWER ELECTRONIC INTERFACES FOR WIND AND SOLAR GENERATION	Periods	9								
Solar Pho	tovoltaic System – Line Commutated Converters (Inversion Mo	le), Boost and Bu	ick-Boost Converter,								
Selection of	of Inverter, Battery Sizing and Array Sizing.										
Wind Sys	tem – Three Phase AC Voltage Controllers, AC-DC-AC Conv Matrix Converters	verters: Uncontrol	lled Rectifier, PWM								
Unit –	V NETWORK INTEGRATION ISSUES	Periods	9								
Overview	of grid code technical requirements. Fault ride-through for w	ind farms - real	and reactive power								
regulation, Power qua solar PV at	voltage and frequency operating limits, solar PV and wind faility issues, Power system interconnection experiences in the world wind systems.	m behavior durin d. Hybrid and is	ng grid disturbances, solated operations of								
	ŗ	<b>Fotal Periods</b>	45								
Text Book	S										
1.	Renewable Energy Resources, John Twidell and Tony Weir, Tay	lor and Francis -se	econd edition, 2013								
2.	Solar Energy: Principles of Thermal Collection and Storage, S New Delhi, 3rd Edition., 2009.	P. Sukhatme and	d J. K. Nayak, TMH,								
3.	G. M. Masters, "Renewable and Efficient Electric Power System	s", John Wiley and	d Sons, 2004.								
4.	T. Ackermann, Wind Power in Power Systems, John Wiley and S	Sons Ltd., 2005.									
Reference	s										
1.	Renewable Energy- Edited by Godfrey Boyle-oxford university,	press, 3rd edition,	2013.								
2.	Handbook of renewable technology Ahmed and Zobaa, Ramesh	C Bansal, World s	cientific, Singapore.								
3.	Renewable energy technologies - A practical guide for beginners	- Chetong Singh	Solanki, PHI.								
4.	Integrated energy systems modelingKarlsson, Kenneth Bernard DTU International Energy Report 2015	; Skytte, Klaus M	lorthorst; Publishedin:								
5.	Non conventional energy source –B.H. Khan- TMH-2nd edition.										
E-Resource	ces										
1.	World-Energy-Scenarios Composing-energy-futures-to-2050 Ex (worldenergy.org)	ecutive-summary	.pdf								
2.	India 2020 - Energy Policy Review (windows.net)										
3.	Solar Energy Basics   NREL										
4.	Wind Energy Basics   NREL										
5.	Solar Power Electronic Devices   Department of Energy										
6.	Power Electronics: Roles in Renewable Energy Generation – Challenges and Opportunities (nrel.gov)										
7.	Overview of Grid Integration Issues — Greening the Grid										

		V	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Program	nme	B.E.		Progra	mme (	Code	102	Regulation		2019				
Departn	nent	ELEC' ENGIN	TRICAL AND ELECT NEERING	<b>FRONI</b>	CS			Semester	emester					
Course Coo	de		Course Name	Per	iods Po Week	er	Credit	Max	imum N	Marks				
				L	Т	Р	С	CA	ESE	SE Total				
U19EEV2	6	Adva Drive	nced Electric s	3	0	0	3	40	60	100				
Course Objective	28	<ul> <li>The students should made to</li> <li>Acquire the knowledge of selection of drives as per practical operational industrial requirement.</li> <li>Apply their knowledge to prepare control schemes as per different types of motors used in industries</li> <li>Estimate &amp; solve harmonic and power factor related problems in controlling AC and DC drives</li> </ul>												
	At the end of the course, the student should be able to,										ge			
C.	_	CO1:	Understand vector co	ntrol ar	nd direct	ct tore	ue control of in technic	nduction moto	)r. r less	K1				
Course		vector control of induction motor.												
Outcom		CO3: Understand control strategies of synchronous motor.												
	Ļ	CO4: Understand control strategies of reluctance motor.												
	<b>CO5:</b> Understand control techniques of Permanent Magnet Synchronous Motor (PMSM), Brushless DC Motor (BLDC).													
Pre-requisit	tes	U19EI	E519 - Power Electron	nics										
(3/2	2/1 indi	icates st	CO / PO Ma rength of correlation)	pping 3-Stror	ng, 2 – I	Mediu	ım, 1 - Weak	CO/	PSO Ma	opping				
		Programme Outcomes (POs) PSOs												

					Progr	amme	Outco	mes (F	Os)				PSOs				
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO 11	PO12	PSO1	PSO 2	PSO3	PSO 4	
CO 1	3	-	1	-	1	-	3	-	-	-	3	3	3	-	2	3	
CO 2	3	2	-	-	1	-	3	-	-	-	3	3	3	1	2	3	
CO 3	3	-	1	-	2	-	3	-	-	-	3	3	3	-	2	3	
CO 4	3	2	-	-	3	-	3	-	-	-	3	3	3	-	2	3	
CO 5	3	-	2	-	3	-	3	-	-	-	3	3	3	1	2	3	

Direct

- 1. Continuous Assessment Test I, II & III
- 2. Assignment
- 3. End-Semester examinations

Indirect

1. Course - end Survey

Content of	f the syll	abus								
Unit -	- I	VECTOR CONTROL OF INDUCTION MOTOR	Periods	9						
Principles diagram, en vector com	of vect stimatio trol of II	or control, direct vector control, derivation of indirect vec n of flux, flux weakening operation. DTC principle, operation M	ctor control, and control a	implementation-block and its comparison with						
Unit -	II	SENSOR LESS VECTOR CONTROL OF INDUCTION MOTOR	Periods	9						
Slip and speed estin filter, inject	peed est nation section of a	imation at low performance, rotor angle and flux linkage est cheme, estimators using rotor slot harmonics, model reference auxiliary signal on salient rotor.	imation at h adaptive sys	igh performance, rotor tems, extended Kalman						
Unit –	III	CONTROL OF SYNCHRONOUS MOTOR DRIVES	Periods	9						
Synchrono constant fl and regene	ous moto lux contr eration, p	or and its characteristics- Control strategies-Constant torque sol, flux weakening operation, Load commutated inverter fed phasor diagrams. Sensor less control and flux observer	angle contro synchronous	l power factor control, motor drive, motoring						
Unit -	Unit - IV     CONTROL OF SWITCHED RELUCTANCE MOTOR DRIVES     Periods     9									
SRM Struc drive desig flux contro	SRM Structure-Stator Excitation-techniques of sensor less operation-convertor topologies SRM Waveforms-SRM drive design factors-Torque controlled SRM-Torque Ripple Instantaneous Torque control -using current controllers-flux controllers.									
Unit –	- V	CONTROL OF BLDC MOTOR DRIVES	Periods	9						
Principle of motors as Brushless	of opera Variabl dc moto	tion and control of BLDC and PMSM Machine, Sensing a e Speed Synchronous motor-methods of reducing Torque r - current controlled Brushless dc motor Servo drive.	nd logic sw pulsations -'	itching scheme, These Three-phase full wave						
		Tota	l Periods	45						
Text Book	KS									
1.	R. Kri	shnan, "Electric Motor Drives Modeling, Analysis & control"	Pearson Edu	cation, 2003						
2.	B. K. Bose "Modern Power Electronics and AC Drives" Pearson Publications, 2002									
J. Deference	reter vas Sensor less vector Direct Forque control, Oxford University Press,2012									
1.	MD Murphy & FG Turn "Power Electronics control of AC motors"Bull Pergman Press -1st edition,2012									
2.	G.K. Dubey "Fundamentals of Electrical Drives"Narosa Publications, 2010.									
3.	3.       G.K. Dubey "Power Semiconductor drives " Prentice hall,2008.									
4. Rik De Doncker, Andre Veltman, Duco WjPulle "Advanced Electrical Drives - Analysis Modeling Control", 4 th Edition 2008										
5.	Ned M	ohan "Advanced Electric Drives: Analysis, Control, and Mode	eling", 5th E	dition 2006.						
E-Resourc	ces									
1.	https://	/www.digimat.in/nptel/courses/video/108104011/L04.html								
2.	https://www.youtube.com/playlist?list=PLA5CA7D35114BA425									
3.	https://onlinelibrary.wiley.com/doi/book/10.1002/9781118910962									

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Course	Code	;		Cou	se Na	ame		Periods Per Week				credit		Maxi	mum Ma	ım Marks		
								L	Т	F	•	С	CA	A	ESE	Tota	ıl	
U19EI	E <b>V27</b>	, I S	ndus Syster	trial l ns	Electi	rical		3	0	0	)	3	40		60	100	)	
Course Objectiv	7e	1	<ul> <li>Learn the basic concepts of electrical equipment's rating calculations and its installation</li> <li>Learn the domestic and industrial electrical illumination systems</li> <li>Learn the basics about industrial power system and storage equipment's</li> <li>Learn the basics of industrial automation</li> </ul>															
Cou Oute	rse ome	A C C Ir C	At the end of the course, the student should be able to,         CO1: Explain electrical protective and safety devices and its rating calculation         CO2: Understand the electrical wiring and earthing systems         CO3:Explain electrical illumination systems and installation procedures         CO4: Design appropriate electrical power system with protective equipment's industrial applications											Know ge Lev K2 K2 K2 K2 K2	led vel			
e-requisit	requisites Basic concepts electrical engineering																	
(3/	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - WeakCO/PSO Mapping Programme Outcomes (POs)Programme Outcomes (POs)PSOs											ng						
C01	PO 1 2	PO 2	PO 3	PO 4 2	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1 3	PSO 2	PSO 3	PSO 4 2		

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CO 2

CO 3

CO 4

CO 5

- 1. Continuous Assessment Test I, II & III
- 2. Assignment

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3. End-Semester examinations

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Indirect

1. Course –end Survey

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Content of	the syllabus		
Unit –	I ELECTRICAL SYSTEM COMPONENTS	Periods	9
LT system	wiring components, selection of cables, wires, switches, distribu	tion box, meter	ring system, Tariff
structure,	Protection components- Fuse, MCB, MCCB, ELCB, Symbols fo	r wiring comp	onents, Single line
diagram (S	LD) of a wiring system, Contactor, Isolator, Relays, MPCB, El-	ectric shock an	d Electrical safety
practices	DOMESTIC AND COMMEDCIAL	1 1	
Unit -	I ELECTRICAL SYSTEMS	Periods	9
Types of re	sidential and commercial wiring systems -Guidelines for installation	on - Load calcu	lation and sizing of
wire-Ratin	g of main switch - distribution board and protection devices- Ea	rthing systems	- Requirements of
commercia	l installation - lighting schemes – Flood lighting		0
Unit –	II ILLUMINATION SYSTEMS	Periods	<b>9</b>
ratio, waste and their o	e light factor, depreciation factor,-various illumination schemes -N peration- Energy saving schemes.	Aodern luminar	ies like CFL, LED
Unit - I	V ELECTRICAL SYSTEMS IN INDUSTRY	Periods	9
HT conne	ction, Industrial substation, Transformer selection, Industrial	loads, Motors,	SLD, Cable and
Switchgeau	selection- Lightning Protection, - Power factor correction -	- kVAR calcu	lations- Types of
compensat	on -Introduction to PCC, MCC panels. Specifications of LT Bro	eakers, MCB a	nd other LT panel
component	S- UPS System - Battery banks -Electrical Systems for the elevator	S Devie de	0
Unit –	V   INDUSTRIAL AUTOMATION	Periods	<u>y</u>
Metering -	-Role of automation - Advantages of process automation - PLC b	ased control sy	stem design- Panel
		<b>Total Periods</b>	45
Text Book	S		
1.	J.B. Gupta, "Utilization of Electric Power and Electric Traction", IX Editon, 2004.	Kataria& Sons	publishers, Delhi,
2.	S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Cos	sting", Khanna	publishers, 2008.
ferences			
1.	K. B. Raina, "Electrical Design, Estimating& Costing", New Age	International, 2	2007.
2	N.V. Suryanarayana, "Utilization of Electrical Power including E	lectric drives ar	nd Electric
۷.	Traction", New Age International (P) Limited Publishers, 2014.		
3.	S. Singh and R. D. Singh, "Electrical estimating and costing", Dh	anpat Rai and C	Co., 2017.
4.	H. Joshi, "Residential Commercial and Industrial Systems", McG	raw Hill Educa	tion, 2018
Resources			
1.	ps://nptel.ac.in/courses		
2.	ps://www.electrical4u.com/electrical-engineering-articles/illuminat	ion-engineering	g/
3.	Standards : https://bis.gov.in		

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Cour	Co.	1.		Car	NI			Perio	ds Per	Week	Credit		Max	imum N	Aarks	
Cour	se Co	le		Col	irse na	ame		L	Т	Р	С	CA		ESE	,	Fotal
U19	EEV2	8	Powe	r Swit	ching	Conve	erters	3	0	0	3	40		60	10	0
Course	Obje	ctive	The st	tudents Unde Impa Fami	s shoul erstand rt requ liarize	d mad the so iired sl and th	e to oft swit cills to ne swit	ching analyz ching	concep ze the sequen	ots of p Switch ce of P	ower co ed Mode Power co	nverters Power S nversion	Supplie	es.		
			At the	e end o	f the c	ourse,	the stu	ident s	hould	be able	to,				Kno	owledge Level
		1	CO1:U	Underst	and re	sonan	t conve	erter sy	stems							K2
	_		CO2:	Under	stand t	he swi	tched	mode	supplie	es.						K2
Course	e Outc	ome	C <b>O3:</b> A	Analyze AC- D	e and u C con	underst versio	and to	achie	ve the	improv	ement of	f efficier	ncy in			K4
			CO4:E	Design	and si	mulate	mode	rn inve	erters f	or vari	ous gene	ric load	and dr	ives.		K4
		-	CO5:S	elect d	levice nder va	and ca	lculate operati	perfo	rmanco des	e paran	neters of	multi fo	rm			K4
Pre-re	quisite	es	Powe	r Elect	ronics	, Conti	ol Sys	tems								
CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – CO/PSO Ma												pping				
					Pro	gramm	e Outco	omes (I	Pos)					P	SOs	
Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2	PSO 3	PSO4
CO1         3         3         2         1         1         1         2         0         1         0         1         3         2										2	2					
CO 2	2	1	2	2	1	2	2	3	1	1	1	2	2	2	1	1
CO 3	CO3     2     2     1     1     3     1     1     2     1     1     2     1     1     1									1	2					
CO 4	<b>X04</b> 2 1 1 2 1 1 1 1 2 1 1 1 2 2 1 1 2 1 1 2 1 1 2 1 1 1 2 1 1 1 2 1 1 1 2 1 1 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1										2	1				
CO 5	3	2	2	1	1	1	2	2	1	1	1	1	2	2	1	1
Course Assessment Methods																
Direct	: 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3	1. Co 2. A 3. Ei	ontinuo ssignm nd-Sem	ous As ent nester e	sessme examir	ent Tes nations	st I, II o	&III								
	1.Co	urse -	- end s	urvey												

Content	of the Syllabus		
Unit –	I Soft Switching Converters	Periods	9
Switching 1 operation; F DC-AC con	oss, basic principles of hard and soft switching. Soft switching the Performance comparison hard switched and soft switched converted averter	echniques. ZVS, rs.AC-DC conve	, ZCS, quasi resonance rter, DC-DC converter,
Unit –	II Switched Mode Power Supplies	Periods	9
DC Power multiple ou	supplies and Classification; Switched mode DC power supplies - tputs; Closed loop control and regulation.	with and witho	ut isolation, single and
Unit –	III AC-DC Converters	Periods	9
Switched n techniques - input-outpu	node AC-DC converters. synchronous rectification - single and - high input power factor. reduced input current harmonic distortion t isolation.	d three phase t n improved effic	topologies - switching iency with and without
Unit –	IV DC- AC Converters	Periods	9
inverters - a source inver	application of multilevel inverters – PWM techniques for MLI – rters – Filters.	Single phase &	Three phase Impedance
topologies comparison	and operation - with and without resonance link - converter with matrix converter with DC link converters.	with dc link c	converter; Performance
Text Book	7 <b>5</b>	I otal I ci lous	43
1	Rashid M.H., "Power Electronics Circuits, Devices and Applic Impression 2021	cations ", Pearso	n, fourth Edition, 10th
2	Jai P. Agrawal, "Power Electronics System Theory and Design",	Pearson Educati	on, First Edition, 2015.
3	Bimal.K.Bose "Modern Power Electronics and AC Drives", Pear	son Education, S	Second Edition, 2003
4	P.S.Bimbra, "Power Electronics", Khanna Publishers, Eleventh	Edition, 2003	
Reference	28		
1	Philip T. Krein, "Elements of Power Electronics" Indian edition	Oxford Universit	y Press-2017
2	Bin Wu, Mehdi Narimani, "High-Power Converters and AC Driv	ves", Wiley, 2nd	Edition, 2017.
3	M. K. Kazimierczuk and D. Czarkowski, "Resonant Power Conv	erters", 2nd Edit	ion, Wiley 2011.
4	M Singh, K Khanchandani, "Power Electronics", McGraw hill E	ducation, Second	l edition, 2017.
5	Muhammad H. Rashid, Power Electronics   Devices, Circuits and 2017.	Applications, Fo	urth Edition, Pearson
E-Resour	ces		
1			
_	https://1lib.in/book/3555381/8d9744		
2	https://1lib.in/book/3555381/8d9744 https://1lib.in/book/2712535/4ccc78		

	Q		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205         B.E.       Programme Code       102       Regulation													TUPHeiner COTFEE					
	Progra	amme	B.F	E.Programme Code102Regulation										I	2019						
	Department			ECT GIN	RICA EERI	AL AN NG	ND EL	ECTF	RONIC	CS .				,							
Course Code				C	Course	e Nan	ne		Peri V	ods P Veek	er	C	Credit		Ma	ximum	num Marks				
	U19EEV31									Т	Р		С		CA	ESI	E Total				
UIS	U19EEV31			nmı gine	unica ering	tion			3	0	0		3	40		100					
(	Cours Dbjectiv	e ves	The	<ul> <li>The students should be</li> <li>To acquire knowledge on various analog and digital modulation techniques</li> <li>To study the principles behind information theory and coding</li> <li>To learn various digital communication techniques</li> <li>To gain knowledge in radio communication techniques</li> </ul>																	
			Att	At the end of the course, the student should be able to,																	
	Cours	e	CO	<b>CO1:</b> Apply analog and digital communication techniques.																	
	Outcon	ne	CO	<b>CO2:</b> Use data and pulse communication techniques.																	
			CO	CO3:Analyze Source and Error control coding.																	
			CO	<b>CO4:</b> Utilize multiuser radio communication techniques.																	
Pre	e-requis	sites																			
	(3/2/	1 indics	CO / PO Mapping ates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												oping						
	(0, 2,				<u>P</u>	rogra	amme	Outco	omes (I	POs)						PSOs					
	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	РО 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4				
	CO 1	3						3				3	3	3			3				
	CO 2	3						3				3	3	3			3				
	CO 3	3						3				3	3	3			3				
CO 4 3							3				3	3	3			3					
<b>CO 5</b> 3								3				3	3	3			3				
Cot	irse Ass	essmen	t Met	thod	S																
Di	rect           1.         Co           2.         As           3.         En           direct         1.	ontinuo ssignme id-Sem ourse –	us As ent ester e end S	sess exan	ment ' ninatio	Test I ons	, II &	III													

Content of the syllabus														
Unit -	- I ANALOG MODULATION	Periods	9											
Amplitude	Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and c	lemodulators –	- Angle modulation –											
PM and FM	M – PSD, modulators and demodulators – Super heterodyne receiver	S												
Unit -	II PULSE MODULATION	Periods	9											
Sampling I	Process, PAM, PWM, PPM, Quantization – Line coding – PCM, DP	CM, DM, and	ADPCM And ADM,											
Channel V	Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing													
TT •4	<b>DIGITAL MODULATION AND</b>	D • 1	0											
Unit - III     Distribution of the first of														
Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI –														
Pulse shap	ing – Duo binary encoding – Cosine filters – Eye pattern, equalizers													
Unit - IV         INFORMATION THEORY AND CODING         Periods														
Measure of	f information – Entropy – Source coding theorem – Shannon–Fano	coding, Huffma	an Coding, LZ Coding											
– Channel	capacity - Shannon-Hartley law - Shannon's limit - Error control co	odes – Cyclic c	odes, Syndrome											
calculation	n – Convolution Coding, Sequential and Viterbi decoding													
Unit _	- V SPREAD SPECTRUM AND MODERN	Periods	9											
	COMMUNICATION SYSTEMS	1 crious	,											
Spread Spe	ectrum: PN sequences – properties – m-sequence – DSSS – Processi	ng gain, Jamm	ing – FHSS –											
Synchroniz Modern Co	Zation and tracking.	Channel assign	ment and handover											
techniques	- Overview of Multiple Access schemes.	channel assign	intent and handover											
1														
Tort Dool	1	otal Periods	45											
1 ext Book	UT		- TMU 2007											
1.	H Taub, D L Schling, G Sana, Principles of Communication	on Systems 5	o/e, 11viH 2007											
Ζ.	S. Haykin "Digital Communications" John Wiley 2005.	······································	Deserve											
3.	Education 2009	ems, o Eau	ion, Pearson											
Reference	es													
1	B.P.Lathi, "Modern Digital and Analog Communication Syst	tems", 3rd edi	ition, Oxford											
1.	University Press, 2007													
2.	H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006													
2	B.Sklar, "Digital Communications Fundamentals and Applications" 2/e Pearson Education													
3.	2007.													
4.	Rappaport T.S, "Wireless Communication Principles and Pra	ctice", 2 nd Ed	lition, Pearson											
	Education, 2007	man erre eth m												
5.	Taub and Schilling "Principles of Communication systems" -	- TMH. 4''' Eo	dition											
E-Resour		7												
	rces													
1.	https://nptel.ac.in/courses/117/105/117105143/	· · · · · · · · · · · · · · · · · · ·												

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	2		VI	VEK.	ANAN Autono	I <b>DHA</b> mous I Ela	<b>COLI</b> Institutio	L <b>EGE</b> on, Affil avam, T	<b>OF E</b> liated to	NGIN o Ann ngode	NEE a Un	<b>RING F(</b> iversity, C 7 205	<b>DR WO</b> I hennai)	MEN	TÜ	ISO 5601.2015		
Prog	gramn	ne	B.E.				<u> </u>	Prog	ramm	e Co	de	102	Regu	ation		2019		
Dep	artme	nt I	ELEC ENGI	TRIC NEEF	CAL A RING	ND E	LECT	RONI	CS			Sen						
Course	;		Cou	rse Na	ame		Pe	eriods Wee	Per k		Credit		Ma	Marks				
								L T P		Р	С	C	CA		То	otal		
U19E	EV32	(	Comj	puter	Arc	hitec	ture	3	0		0	3	40		60	1(	00	
Cou Objec	irse ctives	]	<ul> <li>The students should be made to</li> <li>To make students understand the basic structure and operation of computer</li> <li>To familiarize the students with arithmetic and logic unit and imp of fixed point and floating-point arithmetic operations</li> <li>To expose the students to the concept of pipelining</li> </ul>														ition	
		I	At the end of the course, the student should be able to,														Knowledge Level	
C			<b>CO1</b> : Design arithmetic and logic unit.														К3	
Outc	ome	(	<b>CO2:</b> Design and analyze pipelined control units Evaluate performance of memory systems.														K3	
		(	<b>CO3:</b> Understand fixed point and floating-point arithmetic operations														K3	
		(	<b>CO4:</b> Understand the hardware-software interface														K2	
		1	<b>CO5:</b> Understand Hierarchical memory system including cache memories and virtual memory														K2	
Pre-																		
requisit	tes																	
(3)	/2/1 in	licate	s strer	oth of	CO/I	PO M	apping	5 ong 2	- Medi	um	1 - W	/eak		CO/PS	O Mapp	oing	]	
				8	Progra	amme	Outcor	nes (PO	Os)					I	PSOs			
COs	РО	РО	РО	РО	РО	РО	РО	РО	PO	РО	PO	) PO	PSO	PSO	PSO	PSO	_	
<u> </u>	1	2	3	4	5	6	7	8	9	10 1	1	1 12	1	2	3	4	-	
CO 2	1	2	1	-		1	-	1	1	-	5	1	-	1	1	1	-	
CO 3	1		1		1	2		1	2			1	1			2	-	
CO 4	1		2			2		3	1	3	2	1	1			2	]	
CO 5	1				1	2		2	2			1	1			1		
Course A	Assess	ment	Metl	nods														
Direct																		
1.	Cont	inuou	s Ass	essme	ent Tes	st I, II	&III											
2.	Assig End	gnmei -Seme	nt ester e	xami	nation	S												
Indirec	t	2011																
1.	Cour	se – e	end Su	irvey														

Content of the syllabus															
Unit _	Unit - I     OVERVIEW & INSTRUCTIONS     Periods     9       Fight ideas - Components of a computer system - Technology     Performance     Power well     Uniprocessors to														
Fight idea	Components of a computer system Technology Perform	Power wal	Uniprocessors to												
multiproce	sors: Instructions — operations and operands — representing in	structions Logic	al operations control												
operations	Addressing and addressing modes	istructions – Logica	ai operations – control												
operations	- Addressing and addressing modes														
Unit - IIARITHMETIC OPERATIONSPeriods9															
ALU – Addition and subtraction – Multiplication – Division – Floating Point operations – Sub word parallelism															
Unit – I	II PROCESSOR AND CONTROL UNIT	Periods	9												
Basic MIP	S implementation – Building data path – Control Implementat	ion scheme – Pipel	ining – Pipelined												
Data path a	and control – Handling Data hazards & Control hazards – Exc	eptions													
Unit - l	V PARALLELISM	Periods	9												
Instruction	-level-parallelism – Parallel processing challenges – Flynn"s o	lassification – Har	dware multithreading												
– Multi con	e processorsclustering-GPU.														
Unit –	V MEMORY AND I/O SYSTEMS	Periods	9												
Memory h	erarchy – Memory technologies – Cache basics – Measuring	and improving cach	ne performance –												
Virtual me	mory, TLBs – Input/output system, programmed I/O, DMA and	nd interrupts, I/O p	rocessors.												
		<b>Total Periods</b>	45												
Text Book	s														
1.	David A. Patterson and John L. Hennessey, "Computer Orga Morgan Kauffman / Elsevier, 2014	nization and Desig	gn", Fifth edition,												
2.	William Stallings "Computer Organization and Architecture"	'Seventh Edition,	PHI/Pearson, 2006												
Reference	s														
1.	V.CarlHamacher, Zvonko G. Varanesic and Safat G. Zaky, "Graw-Hill Inc, 2012.	Computer Organis	ation", VI edition, Mc												
2.	William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2009.														
3.	Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.														
4.	M.Moris Mano"Computer System Architecture", 3rd Edition, PHI / Pearson, 2006.														
5.	John P. Hayes"Computer Architecture and Organization", M	c Graw Hill Intern	ational editions, 1998.												
E-Resourc	es														
1.	https://nptel.ac.in/courses/106/106/106106134/														
2.	https://www.tutorialspoint.com/control-unit-and-cpu														

,			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205																
Prog	ramme	e	B.E.			Prog	amme	Code			102	Regula	tion		2019				
Depa	rtmen	t	ELEC ENGI	TRIC NEER	AL AI ING	ND EI	LECT	RONI	CS		S	emester							
Course			Course Name						ds Per	Week	Credit Max			imum Marks					
Cours		ie							Т	Р	С	CA		ESE	Total				
U19I	EEV3.	3	Intell	igent t	echni	ques		3	0	0	3	40		60	100				
Course	Objec	tive	<ul> <li>The students should made to</li> <li>Understand the fundamental concepts and characteristics and methodologies of intelligent systems.</li> <li>Understand the power and usefulness of intelligent techniques</li> <li>Know the design of artificial intelligence systems, evolutionary computation algorithms, uncertainty representation and reasoning mechanisms</li> </ul>																
At the end of the course, the student should be able to,										0,				Knov	wledge evel				
			CO1: Understand fundamental concepts and characteristics of Intelligent systems																
Course	Outco	ome	CO2: Understand the concepts in Fuzzy logic system													K1			
			CO3: Analyze and understand artificial intelligence systems													X1			
			CO4: Analyze the intelligent system approaches in real-life electrical engineering problems													K3			
			C <b>O5:</b> 4	Apply	the Int	elliger	ıt syste	ems in	real-ti	me app	lications				K2				
Pre-req	uisite	S	Contr	ol Syst	ems														
	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – CO Weak										CO/P	PSO Mapping							
Cos					Pro	gramm	e Outc	omes (I	Pos)		1	T		PSOs					
COS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO12	PSO1	PSO2	PSO3	PSO4			
CO 1	2	2	2	1	1	1	1	2	-	1	-	1	2	2	2	2			
CO 2	2	1	2	2	1	1	2	3	1	1	1	2	2	2	1	1			
CO 3	2	2	1	1	2	1	1	2	1	1	2	1	1	1	1	2			
CO 4	2	1	1	2	1	1	1	1	2	1	1	1	2	2	2	1			
Course	CO 5       2       2       2       1       1       2       2       1       1       1       2       2       1       1         Course Assessment Methods       Image: Course Assessment Asses																		
Direct	Direct 1.Continuous Assessment Test I, II &III 2.Assignment 3 End-Semester examinations																		
Indire	ct	1.	Course	e – enc	l surve	y													
Content	of the syllabus																		
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Unit -	- I Knowledge-based intelligent systems	Periods	9																
Concepts a	nd theory. Knowledge representation techniques. Structure of a rule-based	l expert syst	em. Forward and																
backward c	haining inference techniques.	I																	
Unit –	- II Fuzzy systems	Period	s 9																
Concepts o	f Fuzzy reasoning. Membership Functions and Fuzzy sets. Fuzzy rules. D	efuzzificatio	on methods. Fuzzy																
inference. I	Building a fuzzy expert system.																		
Unit –	III Artificial neural networks (ANN)	Period	s 9																
Concepts o Network Ti	f ANN. Neuron and perception. Multilayer neural networks. Forward and raining. Hopfield network.	Backward I	Propagation. Neural																
Unit –	IV Evolutionary computation	Period	s 9																
Concepts o	f Evolutionary computing. Genetic unit algorithms. Chromosomes, fitnes	s function, c	ross-over and																
mutation. E	Evolutionary Programming.	T																	
Unit –	- V Applications of intelligent systems	Period	s 9																
lications in	Control and Utilization - Intelligent process controlDC/AC four quad	lrant drive	control -																
Intelligent	robot control and Utilization.		-																
	Tot	al Periods	4 5																
Text Boo	ks																		
1	Lin, C., Lee, G., Neural Fuzzy Systems, Prentice Hall International	Inc. 2000.																	
2	Rajashekran, S. and Vijaylaksmi Pai, G.A., Neural Networks, Fuzzy	Logic and	Genetic Algorithm																
2	Synthesis and Applications, Prentice Hall of India Private Limited, 2004	,																	
3	Zurda, J.M., C++ Neural Networks and Fuzzy Logics, BPS Publication	2001.																	
Reference	es																		
1	K.Y. Lee and M.A. El-Sharkawi, Modern Heuristic Optimization Techn to Power Systems, Wiley-IEEE Press, 2008	iques: Theo	ry and Applications																
2	M.Negnevitsky, Artificial Intelligence-A Guide to Intelligent Systems, A	AddisonWes	ley, 2011																
3	nnersj Staffan, Intelligent computer systems in engineering design, Spring	gerLink eboo	oks, Springer,2016																
4	Handbook of research on advanced hybrid intelligent techniques and appl Hershey, PA: Information Science Reference 2016	ications, Inf	oSci-Books,																
5	ubhojit Dawn, Valentina Emilia Balas Anna Esposito Sadan Gope Editor Applications in Science and Technology, Springe	rs.,Intelligen er 2020.	t Techniques and																
E-Resour	rces																		
1	https://qsstudy.com/benefits-of-using-intelligent-techniques-for-knowled	lge-manage	ment/																
2	https://www.javatpoint.com/artificial-neural-network																		
3	https://www.techtarget.com/whatis/definition/intelligent-system																		

	VIVE	KANANDHA COLLI (Autonomous Institution Elayampalay	TÜVFhaland Ketti Fel								
Programme	B.E.	Programm	ne Co	de		102	Regulation		2019		
Department	ELECT ENGINI	RICAL AND ELECT EERING	RON	ICS		Se	emester				
Course Code	(	Course Name	Р	eriods Week	Per	Credit	Ma	ximum M	arks		
			L	Т	Р	С	CA	ESE	Total		
U19EEV34	Bio Me Instrur	edical nentation	3	0	0	3	40	60	100		
Course Objective	The stud • To • To • To • To	dents should made to o Introduce Fundame study measurement of o understand the basic o have a basic knowle	ntals f cert c prir edge	of Bion ain imp nciples in life a	medica oortant in ima assistii	al Engine electrica ging tech ng and the	ering l and non-eleo niques e rapeutic dev	ctrical par	ameters		
	At the e	nd of the course, the	stude	ent shou	ıld be	able to,			Knowledge Level		
Course	CO1:In	terpret the basic prine	ciples	s and pl	nenom	ena of bi	o medical eng	gineering	K2		
Outcomo	CO2: M	nents.	К3								
Outcome	CO3:Re bio sign	rrough	K3								
	<b>CO4:</b> Summarize the basic principles in medical imaging techniques.										
	<b>CO5:</b> Illustrate the physiological assist devices. K3										
Pre-requisites	-										

(3/	<b>CO / POMapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping					
Programme Outcomes (POs)														PSOs				
COs	COs         PO         PO								PO 12	PSO 1	PSO 2	PSO 3	PSO 4					
CO 1	3	1				2		1					2		2			
CO 2	3	2	1	1	1	2		1					1		2			
CO 3	3	2	1	1	1	2		1					2 1					
CO 4	3	3 1 2 1											2		2			
CO 5	3	2	1	1	1	2		1					3		3			

(	Course Assessment Methods											
I	Direct											
	1	Continuous Assessment Test I, II &III										
	2	Assignment										
	3	End-Semester examinations										

#### Indirect

Content of	the syllabus									
Unit – l	HUMAN PHYSIOLOGICAL SYSTEMS	Periods	9							
Cell and its	s structure – Resting and Action Potential – skeletal system - ci	rculatory sys	tem - Nervous system and							
its fundan	nentals – Cardiovascular systems- Respiratory systems –C	omponents c	of bio medical system -							
Biomechan	nics of soft tissues - Basic mechanics of spinal column and limbs	s -Physiologic	cal signals and transducers							
- Transduc	ers – selection criteria – Piezoelectric, ultrasonic transducers - 1	emperature								
measureme	BIO MEDICAL NON ELECTRICAL SIGNAL									
Unit - I	I MEASUREMENT	Periods	9							
Measureme	ent of blood pressure - Cardiac output - Heart rate - Heart sound	- Pulmonary	function measurements							
– spirome	ter – Photo Plethysmography, Body Plethysmography – H	Blood Gas a	nalyzers, pH of blood –							
measureme	ent of blood pCO2, pO2, finger-tip oximeter - ESR, GSR measu	rements.	1							
Unit – Il	II BIO MEDICAL ELECTRICAL SIGNAL MEASUREMENT	Periods	9							
Electrodes – Limb electrodes –floating electrodes –disposable electrodes - Micro, needle and surface electrodes – Amplifiers, Preamplifiers, differential amplifiers, chopper amplifiers –Isolation amplifier - ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical										
Unit - I	<b>BIO MEDICAL IMAGING SYSTEMS</b>	Periods	9							
Radio grap	hic and fluoroscopic techniques - X-ray machine - Computer t	omography –	MRI – Ultrasonography–							
Endoscopy	-Thermography-Differenttypesofbiotelemetrysystems-Retinal	maging–								
Imaging ap	pplication in Biometric systems.		1							
Unit – V	ROBOTIC DEVICES	Periods	9							
Pacemaker	s – Defibrillators – Ventilators – Nerve and muscle stimulators	– Diathermy -	– Heart –							
Lung mach	hine - Audio meters - Dialyzers - Lithotripsy - ICCU patie	nt monitoring	g system - Nano Robots -							
Robotic su	rgery – Advanced 3D surgical techniques- Orthopedic prosthese	s fixation.								
	Т	otal Periods	45							
Text Book	S									
1.	Leslie Cromwell, "Biomedical Instrumentation and Measurem Delhi, 2007.	ent", Prentice	e hall of India, New							
2	Joseph J.carr and John M. Brown, "Introduction to Biomedica"	l Equipment T	Fechnology", John							
۷.	Wiley and sons, New York, 4th Edition, 2012.									
3.	Khandpur R.S, "Handbook of Biomedical Instrumentation", ,	Tata McGraw	-Hill, New Delhi, 3rd							
	Edition, 2014.									
Reference	S									
1.	John G. Webster, "Medical Instrumentation Application and L York, 1998.	esign", John	Wiley and sons, New							
2.	Duane Knudson, "Fundamentals of Biomechanics", Springer,	2nd Edition, 2	2007.							
3.	Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Car Techniques, Springer, 1st Edition, 2011.	e Systems, To	echnology and							
4.	Andrew G.Webb, "Principles of bio medical instrumentation" Press United Kingdom 2018	l st Edition, Ca	ambridge University							
5.	Arumugam M., "Bio Medical Instrumentation", 2 nd Edition, A	nuradha Agei	ncies, Kumbakonam,							
E-Resourc	es									
1.	https://nptel.ac.in/courses/109/104/109104029/									
2.	http://biomedikal.in/2009/12/lecture-notes-on-biomedical-inst	rumentation/								
3	https://nptel.ac.in/courses/108/105/108105001/									
	<u>mps., npter.ac.m/ courses/100/105/100105071/</u>									

			v	IVEF	KANA (Autor	NDH nomous E	A CO s Institu Elayamp	LLEG ition, A	<b>E OF</b> ffiliate	<b>ENG</b> d to A	INEE nna Ui ode – 6	ERING F niversity, 0 37 205	<b>OR W</b> Chennai	OMEN )	I	TÜVRhei	ISO 9001:2015	
Pr	ogramme	e	<b>B.</b> ]	Е.				Pro	gram	nme (	Code	102	Re	gulatio	n		2019	
De	epartmen	ıt	ELEC ENGI	TRIC NEEI	CAL A	AND H	ELEC	ΓRON	ICS				S	emeste	r			
Co	urse Coc	le		Cou	ırse N	Jame			Perio W	ods Po 'eek	er	Credit		Maximum			Marks	
								Ι		Т	Р	С		CA	ES	SE	Total	
U1	9EEV3	5	Robo	tics A	and C	Contro	ol		3	0	0	3	40		60	)	100	
0	CourseThe students should made toObjective• Study the various components of robots• Understand the advantages and limitations of robots• Design their own robot as their final project																	
	At the end of the course, the student should be able to,														Knowledg	ge		
CO1:Introduces students to the basic principles of robotics, engineering design and computer science. The topics will cover fundamental topics related to engineering processes, design, computer science and robotics.														K1				
C	Course OutcomeCO2: Be selective on sensors and plan accurate control end effectors movements.													K1				
			CO3: robots	The to s that	opics perfo	will ł rm di	nelp st fferen	udents t tasks	s und s, thei	erstai r lim	nd the	techniq ns and ac	ues use dvanta	ed to de ges.	esign		K3	
			CO4:	Reev	aluate	e thei	r robo	tic des	signs	using	the r	iew conc	cepts s	tudied			K5	
			CO5:	Progr	am th	e rob	ot to c	apture	e high	reso	lutior	images	for op	eratior	IS		K4	
Pre	requisit	es	Basic	conce	epts of	f Elec	tric Ci	rcuits,	Sens	ors ar	id Coi	ntrol Eng	gineerir	ıg				
	(3/	/2/1 i	ndicate	s strer	ngth of	CO /	PO M elation	<b>apping</b> ) 3-Stro	<b>g</b> ong, 2	– Me	dium,	1 - Weal	x		CO/PSO	Э Марј	ping	
	-					Progr	amme	Outcon	nes (I	POs)				1	F	SOs		
	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	P( 9	) P( 10	) PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
	CO 1	3	2										2	3		2		
	CO 2	3	3	2									2	3	2	2		
	CO 3	3	3	2									2	3	2	3		
	CO 4	3	2		2								$\frac{2}{2}$	3		2		
	05			I		I	I								I			
Cou Din	rse Asse rect 1. Cor 2. Ass 3. End	ntinu signn d-Sei	ent Met ous As nent nester	<b>thods</b> sessm Exam	nent T inatio	est I,	11 &11	[										
Inc	lirect 1 Cou	urse	– end S	urvey	1													

Content of	the syllabus		
Unit –	I BASICS OF ROBOTICS	Periods	9
Briefhistor	y-Typesofrobots-ClassificationofRobots-RobotComponents-Deg	reesoffreedom	-Asimov's laws of
robotics –	work cell – Robot Workspace – Joints, Coordinates and Reference	frames – Rob	ot Characteristics
Unit - I	I ROBOT MECHANICS	Periods	9
Power and	torque - Acceleration and velocity - Design models for ground m	obile robots –	Design models for
mechanic a	urms and lifting systems – Fundamentals of kinematics.		
Unit – I	II ROBOT DRIVE SYSTEMS AND END EFFECTORS	Periods	9
Pneumatic	Drives-Hydraulic Drives-Mechanical Drives-Electrical Drives –	- Servo motor	s – DC and AC Salient
Pneumatic	and Hydraulic- Grippers. Magnetic Grippers, Vacuum Grippers: 7	wo Fingered a	and Three Fingered
Grippers; I	nternal Grippers and External Grippers; Selection and Design Con	siderations	and ThigeTed
Unit - I	V SENSORS, CONTROL AND KINEMATICS	Periods	9
Requireme	nts of a sensor, Position sensors – Resolvers, Optical Encoders	s, Lighting Ap	pproach, Range Finders,
LaserRang	eMeters, AnalogSensors, Sensingdistanceanddirection–LineFollow: Direct and inverse Kinematics – Hill Climbing techniques	ingAlgorithms	-Feedback
Unit –	Machine VISION	Periods	9
Camera, F	rame Grabber, Sensing and Digitizing Image Data- Signal	Conversion, I	mage Storage, Lighting
Technique	s, Image Processing and Analysis- Two- and Three- Dimension	ional Image T	ypes- Applications-
Inspection	Identification, Visual Serving and Navigation.	Total Dariada	15
Text Book	s	rotar rerious	45
I CAL DOOR	Saeed Benjamin Niku "Introduction To Robotics Analysis Cont	rol Applicatio	ons Second
1.	Edition John Wiley & Sons. 2011	ioi, rippilouite	5115, 500011d
2.	R Mittle, I Nagrath, "Robotics and Control", McGraw Hill Educa	ation ,July 201	7.
3.	John J. Craig, "Introduction to Robotics Mechanics and Control"	, Second Editi	on, Addison
	Wesly Longman Inc. International Student edition, 1999.		
Reference	S	-1 O-f- 111	
1.	2006.	sal, Oxford Un	liversity Press,
2	Robert Towers, Larry Ross, Stephen Fardo, James Masterson," R	Robotics Techr	nology:
	Theory and Industrial Applications"2nd edition, Good heart-Wile	cox Publisher,	2010.
3.	Julian W Gardner, Micro Sensor MEMS and Smart Devices, Joh	n Wiley & Soi	ns, 2001
4.	P.A. Janaki Raman, Robotics and Image Processing an Introduct	ion, Tata McG	raw Hill
	Mikell P. Groover, Mitchell weiss, Roger N. Nagel, Nicholas G.	Odrev Industr	ial Robotics
5.	Technology programming and Applications, 1986	Surey, mausu	la Robolies,
E-Resourc	es		
1.	http://nptel.ac.in/courses/112101099/		
2.	https://nptel.ac.in/courses/112/101/112101098/		
3.	https://nptel.ac.in/courses/112/107/112107289/		
Λ	https://ocw.mit.edu/courses/mechanical-engineering/2-12-introdu	action-to-robo	tics-fall-2005/lecture-
4.	notes/		

	VIV	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme	B.E.		Progra	mme (	Code	102	Regulation		2019				
Department	ELECT ENGIN	RICAL AND ELECTI EERING	RONIC	S			Semester						
Course Code		Periods Per WeekCreditMaximum					Periods Per Week Credit Maximum Mar						
			L	Т	Р	С	CA	ESE	Total				
U19EEV36	Moder	dern Control Theory         3         0         0         3         40         60							100				
Course Objective	The stu	dents should made to Explain the concepts and design of control Explain and apply co Study and analyze no Analyze the concept Apply the comprehent end of the course, the s	of basic system ncepts of on linear of stabi nsive kn	c and r is. of state r syster lity of lity of should	noder e varia ns. nonlin ge of be at	n control ables anal near syste optimal t ole to,	system for the ysis. ems and catego heory for Cont	e real tin prization trol Sys	me analysis n. stems. <b>Knowledge</b>				
Course	<b>CO1:</b> U	nderstand the basic co	oncepts	of state	es and	state mo	dels	am	K2				
Outcome	CO2:D CO3: Id analysis	dentify and analyze no	on-linea	r syste	ms us	ing descr	ibing function		K4				
	CO4: A design	nd	K4										
	<b>CO5:</b> Formulate an optimal control problem and design optimal control signal. K5												
Pre-requisites	Control Systems												

(3/	<b>CO / PO Mapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak											CO/PSO Mapping					
Programme Outcomes (POs)													PSOs				
COs	Os PO								PO 12	PSO 1	PSO 2	PSO 3	PSO 4				
CO 1	3	2										2	3				
CO 2	2	3	2									2	3	2			
CO 3	2	2 3 2 2								2	3	2	2				
CO 4	2 3 3 2 2									2	3						
CO 5	3	3										2	3	2	2		

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus									
Unit –	I MATHEMATICAL PRELIMINARIES	Periods	9							
Fields, Vec Scalar Pro- operators –	tors and Vector Spaces – Linear combinations and Bases – Line luct and Norms – Eigen-values, Eigen Vectors and a Canoni- The concept of state – State Equations for Dynamic systems– No	ar Transformat cal form repre on-uniqueness o	ions and Matrices – sentation of Linear of state model –							
State diagra	ums for Continuous-Time State models.	1								
Unit - I	I STATE VARIABLE ANALYSIS	Periods	9							
Linear Con State Equat – Control Observabil	tinuous time models for Physical systems– Solutions of Linea ions – State transition matrix and its properties. General concept ability and observability tests for Continuous-Time Invariant ty ofState Model in Jordan Canonical form	r Time Invaria of controllabilit t Systems– Con	nt Continuous-Time ty and Observability ntrollability and							
Unit – I	II NON LINEAR SYSTEMS	Periods	9							
Introductio Phenomeno Linear syst Non-Linear	n – Non Linear Systems - Types of Non-Linearities – Saturatio on etc;– Singular Points – Introduction to Linearization of non ems – Describing function–describing function analysis of nonline systems through describing functions.	n – Dead-Zone linearsystems, ear systems – S	e -Backlash – Jump Properties of Non- tability analysis of							
Unit - I	V STABILITY ANALYSIS	Periods	9							
Linear con Variablegra through Po	Linear continuous time invariant systems by Lyapunov second method –Generation of Lyapunovfunctions– Variablegradientmethod–Krasooviski"smethod.Statefeedbackcontrollerdesign through Pole Assignment – State observers: Full order and Reducedorder.									
Unit –	V OPTIMAL CONTROL	Periods	9							
fundamenta variations Linear Qua	l concepts, functional, variation of functional – fundamental th – boundary conditions – constrained minimization – formulat dratic regulator.	ion using Han	rem of Calculus of niltonian method –							
		<b>Total Periods</b>	45							
Text Book	5									
1.	M.Gopal"Modern Control System Theory" John Wiley & Sons, 199	93								
2.	Ogata, K., Modern Control Engineering, Prentice 🗆 Hall of Indi	a Private Limit	ed 2001.							
References										
1.	Sinha, N.K., Control System, New Age International (P) Limited	d, Publishers 20	002.							
2.	Kuo, B.C., Automatic Control System, Prentice - Hall of India I	Private Limited	2002.							
3.	Nagrath, I.J. and Gopal, M., Control System Engineering, New A Limited, Publishers 2003.	Age Internation	al (P)							
4.	N K Sinha, Control Systems- New Age International - 3rd editi	on.								
5.	Donald E. Kirk, Optimal Control Theory an Introduction, Prenti- edition.	ce – Hall Netw	ork series – First							
E-Resource	s									
1.	https://nptel.ac.in/courses/108/106/108106024/									
2.	http://www.nptelvideos.in/2012/11/advanced-control-system-dea	sign_27.html								

C.			VIV	VEKA (A	NAN utonon	<b>DHA</b> nous Ir Elay	<b>COLL</b> nstitutio	<b>EGE (</b> n, Affili	<b>OF EN</b> ated to ruchen	GINE Anna gode –	E <b>ERI</b> Unive 637 2	<b>ING FO</b> ersity, Ch 205	R WOM ennai)	1EN		ED 50012015		
Programn	ne		B.E.				<u> </u>	Prog	amme	e Cod	e	102	Regu	lation	-	2019		
Departme	nt	]	ELEC ENGII	TRIC NEER	'RICAL AND ELECTRONICS       EERING								Sen	nester				
Course Co	ode			Cou	rse Na	ame		Periods Per Week				Credit	Maximum N			Aarks		
								L	Т	F	,	С	C	A	ESE	Tota	al	
U19E	EV37	7	]	PLC	& SC	ADA		3	0	C	)	3	40		60	100	)	
Course       Objective       • Introduce the programmable logic controllers with the programmin different applications         • Educate SCADA and distributed control systems       • Educate Operator interfaces and DCS applications													ng for					
			At the	end o	of the	cours	se, the	studen	t shoi	ıld be	able	e to,				Knowl Lev	edge el	
Car		•	<b>CO1:</b> Gain knowledge on the basics of automation system.															
Cou Oute	rse	(	CO2:	Analy	yze tł	neory	of op	eratio	n of I	PLC a	and S	SCAD	4			K3	;	
Uuit	Unic	(	CO3:	Deve	elop p	orogr	ammi	ng wit	h PL	Ċ, SC	AD	A and	DCS.			K4	ļ	
		(	CO4:Impart the knowledge of centralized monitoring and distributed control															
		(	CO5:	App	ly PL	LC, S	CAD	A and	DCS	in in	dust	trial pro	cess co	ontrol		K3	;	
Pre-req	uisite	s											- <b>1</b>				_	
(3/	2/1 in	dicate	es stren	igth of	CO / I f corre	PO M lation	apping ) 3-Stro	<b>g</b> ong, 2 –	Medi	um, 1	- We	eak	(	CO/PSO	О Марр	ing		
				-	Progra	amme	Outcon	mes (PC	Ds)					F	PSOs			
COs	PO 1	PO 2	PO 3	PO	PO 5	PO	PO 7	PO	PO	PO	PO	PO 12	PSO 1	PSO 2	PSO 3	PSO		
CO 1	3	2	-	2	2	2	2	-	-	3	3	-	3	2	2	2	-	
CO 2	3	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3	-	
CO 3	3	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3	1	
CO 4	3	3	3	3	3	3	2	-	-	3	3	-	3	3	3	3		
CO 5	3	2	2	2	2	3	2	-	-	3	3	-	3	2	2	2	1	
Course A	Assess	smen	t Meth	nods	ont To	ot I II	P-111											
2. 3.	Assig End-	gnme Seme	nt ester e	xamir	nation	s												
Indirec	t																	

Content of	the syllabus		
Unit –	I PROGRAMMABLE LOGIC CONTROLLERS (PLCS)	Periods	9
An overvie	w and PLC hardware components: Programmable Logic Controll	ers - Parts of a	PLC - Principles of
operation ·	PLCs versus Computers - PLC size and application – The I/O	section – Dise	crete I/O modules –
Analog I/C	modules – Special I/O modules – The CPU – Memory design – I	Memory types	– Programming
Unit -	I PLC PROCRAMMINC	Periods	Q
Basics of I	I LC I ROOKAINIMING     C programming: Processor memory organization Programscan	PI C program	ning languages
–Relay typ	e instructions–Instruction addressing–Interna lrelay instructions–Instructions addressing–Interna lrelay instructions–Interna leader diagr	Programming F am – Modes of	EXAMINE IF
Unit –	II PROGRAMMING TIMERS AND COUNTERS	Periods	9
Programm	ng timers: Mechanical timing relay – Timer instructions – On	delav timer in	struction – Off delay
timer instruction counter – I	action – Retentive timers - Cascading timers. Programming counter Down counter – Cascading counters – Combining counter and tim	ers: Counter in er functions.	structions – Up
Unit - I	VADVANCED PLC PROGRAMMING AND APPLICATIONS	Periods	9
Program c manipulati shift regist - ON/OFF	ontrol instructions: Master control reset instruction – Jump is on instructions: Data manipulation – Data compare instructions. er instructions. Process control and Data Acquisition systems: Clo liquid heating system	nstruction and Math instruct sed loop conta	l subroutines. Data ions. Sequencer and iner filling process
Unit –	V SCADA	Periods	9
Definition operation a computers	of SCADA – Applicable processes – Elements of SCADA nd Control using SCADA - Development from telemetry – Deper	systems – SC idence on com	ADA Architecture - munications &
		Total Periods	45
Text Book	<u>5</u>		
1.	Frank D. Petruzella, —Programmable Logic Controllers ^{II} , 3rd E Delhi, 2010.	Edition, TataM	cGraw Hill, New
2.	Stuart A. Boyer, —SCADA: Supervisory Control and Data Act USA, 2009.	quisition ^{II} , 4th I	Edition, ISA Press,
Reference	3		
1.	DilipPatel—IntroductionPracticalPLC(ProgrammableLogicCont GRIN Verlag 2009.	roller)Program	ming
2.	Mini S.Thomas, John D.McDonald, Power System SCADA and	Smart Grids, G	CRC Press 2019.
3.	GaryA.Dunning—IntroductiontoProgrammableLogicControllers Publications.2006.	ThomsonLear	ming
4.	KSManoj—IndustrialAutomationwithSCADA:Concepts,Commpress 2019.	unicationsandS	Security Notion
5.	James Northcote-Green, Robert G. Wilson. —Control and Autor Distribution Systems ^{II} , CRC Press, 2006.	nation of Elect	trical Power
E-Resourc			
1.	http://jjackson.eng.ua.edu/courses/ece485/lectures/		
2.	https://electrical-guru.com/subject.aspx?id=3&code=6EE5A&	kunitid=3⊤	picid=18
3.	https://www.watelectrical.com/scada-applications-in-power-s	ystem/	

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Programme Code       102       Regulation       20         ELECTRICAL AND ELECTRONICS       Semester         Course Name       Programme Code       102       Regulation       20         ELECTRICAL AND ELECTRONICS       Semester         Course Name       Projos Per Week       Credit       Maximum Marks         ENGINEERING       Cedit       Maximum Marks         Intellectual Property Rights to Students who are going to pla major role in development and management of innovative projects in industries.       The knowledge on trademarks and registration aspects         The knowledge on trademarks and registration aspects         Regulation trademarks and registration aspects         The fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.         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Programme Code         Programme Code         Periods Per<br>Week       Cre         Course Name       Periods Per<br>Week       Cre         The Students should made to         •       The students should made to       •       The students should made to         •       The students should made to       •       The students should made to         •       The fundamental aspects of Intellectual property Rigimajor role in development and management of innov       •       The knowledge on copyrights and its related rights and         •       The knowledge on copyrights and its related rights and       •       The knowledge on trademarks and registration aspect         •       The current trends in IPR and Govt. steps in fostering       At the end of the course, the student should be able to,         CO1:Introduce fundamental aspects of Intellectual prope<br>who are going to play a major role in development and m<br>innovative projects in industries.       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Programme Code       102       Regulation       20         ELECTRICAL AND ELECTRONICS       Semester         Course Name       Programme Code       102       Regulation       20         ELECTRICAL AND ELECTRONICS       Semester         Course Name       Projos Per Week       Credit       Maximum Marks         ENGINEERING       Cedit       Maximum Marks         Intellectual Property Rights to Students who are going to pla major role in development and management of innovative projects in industries.       The knowledge on trademarks and registration aspects         The knowledge on trademarks and registration aspects         Regulation trademarks and registration aspects         The fundamental aspects of Intellectual property Rights to students who are going to play a major role in development and management of innovative projects in industries.         The knowledge on trademarks and registration aspects         CO1:Introduce fundamental aspects of Intellectual property Rights to stud |

Content of th	ne syllabus		
Unit – I	<b>Overview of Intellectual Property</b>	Periods	9
Introduction Copyright, T and Tradition International 1886, the United 1970, the TR	and the need for intellectual property right (IPR) - Kinds of Interade Mark, Design, Geographical Indication, Plant Varieties and La nal Knowledge – Trade Secret - IPR in India : Genesis and developerty Rights: Paris Convention, 1952, the WIPO Convention, 1967, IPS Agreement, 1994	ellectual Property yout Design – Ger opment – IPR in a ion, 1883, the Ber 7,the Patent Co-op	Rights: Patent, netic Resources abroad - Major ne Convention, eration Treaty,
Unit - II	Patents	Periods	9
Patents - Ele Patentable S Restoration of office and Ap	ements of Patentability: Novelty, Non Obviousness (Inventive Step ubject Matter - Registration Procedure, Rights and Duties of Pa of lapsed Patents, Surrender and Revocation of Patents, Infringemer opellate Board	s), Industrial Appli atentee, Assignmer at, Remedies & Per	cation - Non - nt and licence, nalties - Patent
Unit – III	Copy rights	Periods	9
Nature of Co films and sou licence of co copyrights	pyright - Subject matter of copyright: original literary, dramatic, musi and recordings - Registration Procedure, Term of protection, Owners pyright - Infringement, Remedies & Penalties – Related Rights - Dist	ical, artistic works; hip of copyright, A inction between rel	cinematograph Assignment and lated rights and
Unit - IV	Trade marks	Periods	9
holder and a appellateboar	rd	nalties - Trademar	ks registry and
Unit – V	Current Contour	Periods	9
Opportunitie	s in IP - IPR in current scenario with case studies	– Govt. Schemes 1	n IPR – Career
	Total Per	riods	45
Text Books			
1. I.	earning India Private Limited.	Management. India	a, IN: Cengage
2. N	Jeeraj, P., & Khusdeep, D. (2014). Intellectual Property Rights. India, I	N: PHI learning Pr	ivate Limited.
1. A	huia, V.K. (2017). Law relating to Intellectual Property Rights. India.	IN: Lexis Nexis.	
E-Resources			
1. S	ubramanian, N., &Sundararaman, M. (2018). Intellectual Property Rig rom http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf	ghts – An Overview	v. Retrieved
2. V h	Vorld Intellectual Property Organisation. (2004). WIPO Intellectual pr ttps://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_48	operty Handbook. ] 9.pdf	Retrieved from
3. J	ournal of Intellectual Property Rights (JIPR): NISCAIR		
4. C	Cell for IPR Promotion and Management ( <u>http://cipam.gov.in/</u> )		
5. V	Vorld Intellectual Property Organisation (https://www.wipo.int/about-	ip/en/)	
6. C	Office of the Controller General of Patents, Designs & Trademarks (htt	p://www.ipindia.ni	c.in/)

Ç.	2		VIV	VEKA (A	NAN	<b>DHA</b> nous Ir Elay	COLL stitution	<b>EGE (</b> n, Affili vam. Ti	<b>)F EN</b> ated to ruchen	GINI Anna gode –	E <b>ER</b> Univ - 637	ING FO ersity, Ch 205	<b>R WOM</b> ennai)	IEN	TÜVRheinlan CERTIFED	ISO 8001:2015	
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Course	e Code			Cou	rse Na	ame		Pe	eriods Wee	Per k		Credit		Max	ximum l	Marks	
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U19EE	COE1	E	Electr	on D	evice	8		3	0	(	)	3	40		60		100
Cou Obje	irse ctive	1	he st	<ul> <li>The construction, operation and characteristics of solid state switching of</li> <li>The operation of voltage amplifiers</li> <li>The performance of power amplifiers and feedback amplifiers.</li> <li>The construction and operation of oscillators and multi vibrators.</li> <li>The performance of wave shaping circuits.</li> </ul>													
		A	At the	the end of the course, the student should be able to, O1: Analyze the characteristics of various semiconductor devices.													
C		(	<b>O1:</b> Analyze the characteristics of various semiconductor devices. <b>O2:</b> Design and analyze the performance of BJT based voltage Amplifiers.														K3
Cou Oute	irse		$\frac{202:1}{202:1}$	Desig	ers.		K3										
Oute	ome		O3: Analyze the performance of power amplifiers and feedback amplifiers. O4: Apply the Oscillator and Multi vibrator circuits for waveform														K4
		g	<b>O4:</b> Apply the Oscillator and Multi vibrator circuits for waveform eneration														<b>K</b> 4
		a a	eneration CO5: Design a voltage regulator using rectifiers for power supply applications and construct the wave shaping circuits.														K4
Pre-req	uisites	В	Basic	conce	pts an	d und	erstand	ling of	semic	condu	ctor	device					
(3/	/2/1 ind	icates	s stren	igth of	CO / I f corre	PO M lation	apping ) 3-Stro	g ong, 2 -	- Medi	ium, 1	- W	eak		CO/PSO	) Mappi	ing	1
					Progra	amme	Outcor	nes (PO	Os)					Р	SOs		
COs	PO	PO	РО	PO	РО	PO	РО	PO	PO	PO	PO	PO 12	PSO	PSO	PSO	PSO	
CO 1	3	2	-	4	- -	0	-	8 -	-	- 10	-	12	3	-	-	-	_
CO 2	2	-	3	-	-	-	-	-	-	-	-	1	3	-	-	-	1
CO 3	2	2	1	-	-	-	-	-	-	-	-	1	3	-	-	-	]
CO 4	2	1	3	-	-	-	-	-	-	-	-	1	3	-	-	-	4
CO 5	2	2	3	-	-	-	-	-	-	-	-	1	3	-	-	-	
Course A	Assessi	nent	Metl	hods													
Direct 1. 2. 3. Indirec 1.	Conti Assig End-S et Cours	ntinuous Assessment Test I, II &III signment d-Semester examinations urse – end Survey															

Content of	f the syll	abus		
Unit –	·I	Semiconductor Devices	Periods	9
Constructi	on, Ope	ration and characteristics of PN Junction Diode, Zener diod	le, BJT, MOSF	FET and UJT,
Photodiode	e, Photo	Transistor, LED.		
Unit –	II	Voltage Amplifiers	Periods	9
Biasing of CMRR	BJT-RO	C Coupled Amplifier - Differential amplifier using BJT -Di	fferential and (	Common mode gain,
Unit – I	III	Power and Feedback Amplifiers	Periods	9
Performan	ce anal	ysis of Class A, Class B, Class C and Class D - Basi	c concepts of	feedback amplifiers-
Topologies	s - Effec	et of negative feedback on input and output resistances, gain	n stability, diste	ortion, bandwidth.
Unit –	IV	Oscillators and Multi vibrators	Periods	9
Oscillators	s, Barkha	ausen Criterian, RC phase shift oscillators, Wien Bridge an	d Hartley oscil	lators, Colpitts
oscillators	and UJ	Γ based saw tooth oscillator, Astable, Monostable, Bistable	Multivibrators	- operation.
Unit –	V	Power Supply and Wave shaping Circuits	Periods	9
Performan	ce analy	sis Half wave rectifier and full wave rectifier, Filters -Serie	es and Shunt V	oltage Regulator -
Clippers and	nd Clam	pers.		
		]	<b>Fotal Periods</b>	45
Text Book	<b>KS</b>			
1	1. Jaco	bb. Millman, Christos C.Halkias, Electronic Devices and C	ircuits, 3rd Edi	tion ,Tata McGraw
1.	Hill P	ublishing Limited, New Delhi.		
2.	David	A. Bell, Electronic Devices and Circuits,5th Edition,Oxfor	d University P	ress,
Reference	es			~
1.	N.P.D	eshpande, Electronic Devices and Circuits, 1stEdition, Tata	McGraw Hill I	Publishing
	Limite	ed, New Delhi,2013.		
2.	Thom	as L Floyd, Electronic Devices, Prentice Hall of India, New	7 Delhi,2011.	
E-Resourc	es			
1.	<u>EC825</u>	52: Electronic Devices Important Questions, Question Bank	k, 2 Marks (aur	newsblog.net)
2.	Electro	onic Devices – Chapter Notes and Important Questions for	IIT JEE 2019	(jagranjosh.com)
3.	Electro	onic Devices & Circuits - Electronic Engineering (MCQ) q	uestions & ans	wers (careerride.com)
4.	Electro	onic Devices and Circuits Questions and Answers - Sanfou	ndry	

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Programme	B.E.		Progra	umme (	Code	102	Regulation		2019			
Department	ELECT ENGIN	RICAL AND ELECTI EERING	RONIC	S			Semester					
Course Code	(	Course Name	Per	riods Pe Week	er	Credit	Maxi	imum N	Iarks			
			L	Т	Р	С	CA	ESE	Total			
U19EEOE2	Electric	cal Safety	3	0	0	3	40	60	100			
Course Objective	<ul> <li>The students should made to</li> <li>Learn the basic concepts of the electrical safety rules, and regulations.</li> <li>Learn the Expanding skills in identifying the presence of electrical hazards,</li> <li>Learn the Testing procedure for electrical safety equipment and Energy Control Programs</li> <li>Learn the importance of grounding and maintenance.</li> </ul>											
Course	CO1:De	evelop skills in invest lectrical accidents, fire	igative es and e	technic explosi	jues f ons.	for determ	nining the caus	e of	K2			
Outcome	CO2:Ur	nderstand to Select app igh voltage equipmen	propriat t.	e safet	y met	hod for lo	ow, medium ar	nd	K2			
	<b>CO3:</b> A	nalyze and apply vari	ous gro	ounding	and	bonding t	echniques.		K2			
	CO4: Assess and provide solutions to a practical case study. K2											
	<b>CO5:</b> U	Inderstand the Electrica	ıl safety	on me	dical e	equipmen	t.		K2			
Pre-requisites	Basic co	oncepts and understand	ing of r	nagneti	c field	ls						
		CO / PO Mapping					CO/PS	O Mapp	oing			

(3/	/2/1 in	dicate	s stren	igth of	CO / I f corre	PO M lation	<b>apping</b> ) 3-Stro	ong, 2 –	Medi	um, 1	- Wea	ık	(	CO/PSO	) Mappi	ng
	Programme Outcomes (POs)													P	SOs	
COs	PO 1	O         PO         PO </th <th>PSO 2</th> <th>PSO 3</th> <th>PSO 4</th>												PSO 2	PSO 3	PSO 4
CO 1	3	3 2 2 2 2													2	
CO 2	3	3	2		2	2						2	3	2	2	
CO 3	3	3	2		2	2						2	3	2	3	
CO 4	3	3 2 2 2													2	
CO 5	3	3 2 2 2													2	

- Direct
  - 1. Continuous Assessment Test I, II &III
  - 2. Assignment
  - 3. End-Semester examinations

Indirect

Content of	f the syllabus		
Unit –	I INTRODUCTION AND HAZARDS OF ELECTRICITY	Periods	9
Introduction Summary	on – Hazard Analysis: Primary and Secondary hazards- Arc, Bla of Causes - Protection and Precaution - Injury and Death protective of or new installations: Power system Domestic and Industry (Qua	ast, Shocks - ( e strategies – I litative treatm	Causes and Effects - E Rules 1956 – ent only)
Unit -	II ELECTRICAL SAFETY EOUPMENT	Periods	<b>9</b>
General in external pr safety equi frequency	aspection and Testing procedure for electrical safety equipment rotection: Flash and Thermal protection - Head and Eye protection ipment for internal protection: Over voltage, Short circuit, Earth Fa – Electrician's Safety Kit and Materials.	– Electrical sa – Insulation p ault, Leakage c	afety equipment for protection. Electrical purrent, High/Low
Unit –	III SAFETY PROCEDURES	Periods	9
Introduction systems - I safety grout Shock avo	on - Six-Step Safety Method - Job briefings - Energized or De-ener Energy Control Programs - General Energy Control Programs -Loc ands - Barriers and Warning signs - Tools and Test equipment - Fie idance techniques- One-minute safety audit.	gized - Safe sy kout- Tag out eld marking of	vitching of power –Placement of potential hazards –
Unit - I	IV GROUNDING AND ELECTRICAL MAINTENANCE	Periods	9
Need for I Earth Test Maintenan	Electrical Equipment grounding - System grounding - Equipmen ing for electrical equipment's in Power house and Industry - Eight ice requirements for specific equipment and location - IEC and UL	t grounding- Step Maintena standard.	Гуреs of Earthing – ince program –
Unit –	V VOLTAGE SAFETY SYNOPSIS AND MEDICAL SAFETY MANAGEMENT	Periods	9
Equipment Electrical Isolation, I Safety Aug	t's grounding - Safety equipment's and safety procedures for low safety around electronic circuits - Electrical safety for medical ec EMI and Harmonics - Accident Prevention- Accident Investigation dits.	voltage and h uipment like First Aid- Re	1gh voltage system- Over current safety, escue Techniques -
		Total Periods	45
Text Book	ΣS		
1.	John Cadick, Mary Capelli-Schellpfeffer, Dennis neitzel, "Electr Hill Publishing Company Ltd., 3rd Edition, 1994.	ical Safety Ha	ndbook", Mcgraw
2.	Edition,2012.	McGraw-Hill I	Education, 4th
Reference		1.22.02.0	
1.	Mohamed A El-Sharkawi, "Electric Safety: Practice and Standar	ds", CRC pres	s, New York, 2013.
2.	CRC press, New York, 2014.	istainability, ai	nd Stewardship",
3.	Ray A. Jones and Jane g. Jones, "The Electrical Safety Program Association, Quincy, 2011.	Guide", Nation	hal Fire Protection
4.	James R. White "Electrical Safety: A Practical Guideto OSHA at Technical Publishers, 2015	nd NFPA 70E	American
5	Peter E. "Principles of Electrical Safety" Sutherland · 2014		
E-Resour	ces		
1.	E-Book: Johncadick, Marycapelli-schellpfeffer, Dennisneitzel, " McGraw Hill publishing company Ltd., 3rd Edition, 1994.	Electrical Safe	ty Handbook",
2.	https://installist.files.wordpress.com/2009/12/electrical-safety-ha	ndbook.pdf	
3.	https://www.accessengineeringlibrary.com/content/book/978126	0134858	
4.	Video Link: Electrical Safety in the Workplace Seminar DVD - I Association. http://www.nfpa.org/training-and-events/archived/tr videos	NFPA Nationa raining-videos	l Fire Protection /electrical-safety-

	VIVE	CKANANDHA COLL (Autonomous Institutior Elayampala	<b>EGE O</b> l n, Affiliat yam, Tiru	F ENG ed to Ar	I <b>NEE</b> na Un le – 63	<b>RING FO</b> iversity, Ch	<b>R WOMEN</b> ennai)	TÜVRhair	150 KG12015				
Programme	B.E.		Progra	mme (	Code	102	Regulation		2019				
Department	ELECT ENGINI	RICAL AND ELECTI EERING	RONIC	S			Semester						
Course Code	(	Course Name	Per	iods Po Week	er	Credit	Maxi	imum N	larks				
			L	Т	Р	С	CA	ESE	Total				
U19EEOE3	Energy	Auditing	3	0	0	3	40	60	100				
Course Objective	The stuc	<ul> <li>Fhe students should made to</li> <li>Understand energy scenario and general aspects of energy audit.</li> <li>Learn about methods and concept of energy audit</li> <li>Understand the energy utilization pattern including wastage and its manage</li> </ul>											
	At the e	nd of the course, the s	student	should	be al	ole to,			Knowledge Level				
Course	<b>CO1</b> : U	nderstand the basic co	oncepts	of ene	rgy a	udit			K2				
Outcome	CO2: E system e	<b>CO2:</b> Explain different types of energy audit, maximizing and optimizing system efficiency.											
	CO3: pr	CO3: prepare and present energy audit report											
	CO4: Id	<b>CO4:</b> Identify energy saving potential of thermal and electrical systems K2											
	<b>CO5:</b> D	<b>CO5:</b> Discuss Energy audit instruments, Procedures and Techniques K2											
<b>Pre-requisites</b>													

(3/	/2/1 in	dicate	s stren	gth of	CO / I corre	PO M lation	<b>apping</b> ) 3-Stro	ong, 2 –	Medi	um, 1	- Wea	ık	(	CO/PSO	) Mappi	ng
	Programme Outcomes (POs)												Р	SOs		
COs	PO 1	PO         PO<												PSO 2	PSO 3	PSO 4
CO 1	3	3 3 - 2 2 2 2 3 3 -													2	2
CO 2	3	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3
CO 3	3	3	3	3	3	3	3	-	-	3	3	-	3	3	3	3
CO 4	3	3	3	3	3	-	3	3	3	3						
CO 5	3	3	2	2	2	-	3	2	2	2						

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

### Indirect

1. Course – end Survey

# Content of the syllabus

## Unit – I ENERGY AUDIT CONCEPTS

NeedofEnergyaudit–Typesofenergyaudit–Energymanagement(audit)approach–understandingenergycosts – Bench marking – Energy performance – Matching energy use to requirement – Maximizing system efficiencies -

Periods

Optimizing the input energy requirements -Duties and responsibilities of energy auditors- Energy audit instruments – Procedures and Techniques.

9

Unit -	II ENERGY AUDIT OF MOTORS	Periods	9
Classificati	on of Motors, Parameters related to Motors, Efficiency of a Motor, Er	nergy Conservat	ion in Motors, BEE
Star Rating	and Labelling.		
Unit – I	III ENERGY AUDIT OF LIGHTING SYSTEMS	Periods	9
Fundament	als of Lighting, Different Lighting Systems, Ballasts, Fixtures (Lumin	aries), Reflecto	rs, Lenses and
Louvres, L	ghting Control Systems, Lighting System Audit, Energy Saving Oppo	ortunities	
Unit - I	<b>W</b> ENERGY AUDIT OF HVAC SYSTEMS	Periods	9
Introductio	n to HVAC, Components of Air - Conditioning System, Types of A	Air – Condition	ing Systems, Human
Comfort Zo	one and Psychrometry, Vapour – Compression Refrigeration Cycle, En	nergy Use Indic	es, Impact of
Refrigerant	s on Environment and Global Warming, Energy – Saving Measures	in HVAC, Star	Rating and Labelling
Unit –	V ENERGY AUDIT OF BOILERS AND FURNACES	Periods	9
Energy Au	tit of Boilers: Classification of Boilers Parts of Boiler Efficiency of	a Boiler, Role o	f excess Air in
Boiler Effi	ciency. Energy Saving Methods. Energy Audit of Furnace: Parts of a F	urnace, classifie	cation of Furnaces.
Energy sav	ing Measures in Furnaces, Furnace Efficiency.		
	[	<b>Fotal Periods</b>	45
Text Book	S		
1.	Smith, C. B., Energy Management Principles, Pergamum, 2007		
2.	Handbook of Energy Audit, Sonal Desai, Mcgraw Hill Education	Private Ltd.,	
Reference	S		
1.	Turner, W. C., Doty, S. and Truner, W. C., Energy Management Press, 2009.	Hand book, 7tl	edition, Fairmont
2.	Energy Conservation guide book Patrick/Patrick/Fardo (Prentice	hall1993)	
3.	De, B. K., Energy Management audit & Conservation, 2nd Edition	on, Vrinda Pub	ication, 2010.
4.	Industrial Energy Conservation Manuals, MIT Press, Mass, 1982		
5.	Industrial Energy Management and Utilisation -L.C. Witte, P.S. S (Hemisphere Publication, Washington, 1988)	Schmidt, D.R.	Brown
E-Resourc	es		
1.	https://iare.ac.in/sites/default/files/iare_EAM_lecture%20notes	s.pdf	
2.	https://beeindia.gov.in/sites/default/files/1Ch3.pdf		
3.	http://behineh-sazan.ir/wp-content/uploads/2017/01/Thumann- Younger-William-J-Handbook-of-Energy-Audits-9th-Edition-	-AlbertNieh Fairmont-Pres	us-Terry s-Inc-2013r.pdf

	VIVI	EKANANDHA COLL (Autonomous Institution Elayampala	<b>EGE O</b> l n, Affiliat yam, Tiru	F ENG ed to Ar	INEE ma Un le – 63	<b>RING FO</b> iversity, Ch 7 205	<b>R WOMEN</b> ennai)		ISO 8061-2015				
Programme	B.E.	· ·	Progra	amme (	Code	102	Regulation		2019				
Department	ELECT ENGIN	RICAL AND ELEC' EERING	TRONI	CS			Semester						
			Per	riods Pe Week	er	Credit	Max	imum M	larks				
Course Code	(	Course Name	L	Т	Р	С	CA	ESE	Total				
U19EEOE4	Energy Techno	Storage logies	60	100									
Course Objective	The stud •	lents should made to Explore the fundame	entals, te	chnolo	gies a	and applic	cations of ener	gy stora	ıge				
	At the e	nd of the course, the	student	should	be at	ole to,			Knowledge Level				
Course	CO1: R sto	ecall the historical peorage	erspectiv	ve and	techn	ical meth	ods of energy		K1				
Outcome	CO2:Ex	xpalin the technical m	nethods	of ener	gy st	orage			K2				
	<b>CO3:</b> D	etermine the perform	ance fa	ctors o	f ener	gy storag	e systems.		K5				
	CO4: Io	CO4: Identify applications for renewable energy systems. K3											
	<b>CO5:</b> E	xplain the Hydrogen	fuel cel	ls and	flow l	oatteries			K3				
Pre-requisites	-												

(3/	'2/1 in	dicate	s stren	gth of	CO / I	PO M lation	apping ) 3-Stro	ong, 2 –	Medi	um, 1	- Wea	k	(	CO/PSO	) Mappi	ng
	Programme Outcomes (POs)												P	SOs		
COs	PO 1	PO         PO<													PSO 3	PSO 4
CO 1	2															
CO 2	2	2	1									2	2			
CO 3	2	2	1									2	2	1	1	
CO 4	2	2	2			2	2	1	1							
CO 5	2	2	2			2	2	1	2	2						

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus											
Unit – I	Storage: Historical Perspective, Introduction And Changes	Periods	9									
Storage Nee	ds - Variations in Energy Demand - Variations in Energy Supply	- Interruption	s in Energy Supply									
- Transmissi	on Congestion - Demand for Portable Energy - Demand and scal	e requirements	s - Environmental									
and sustaina	bility issues.		-									
Unit – I	Technical methods of storage	Periods	9									
Introduction	: Energy and Energy Transformations, Potential energy (pumped	l hydro, compi	ressed air, springs) -									
Kinetic ener	'gy (mechanical flywheels) - Thermal energy without phase c	nange passive	(adobe) and active									
(water) - Th	al oil) Electrochamical operate (hetterios, fuel cells) Electrost	inical energy (	nyurogen, methane,									
gasoline, coal, oil) - Electrochemical energy (batteries, fuel cells) - Electrostatic energy (capacitors), Electromagnetic energy (superconducting magnets) - Different Types of Energy Storage Systems												
Unit – II	I Performance Factors of Energy Storage Systems	Periods	9									
Energy capt	ure rate and efficiency - Discharge rate and efficiency - Dispatch	ability and loa	nd flowing									
characteristi	cs, scale flexibility, durability – Cycle lifetime, mass and safety -	- Risks of fire,	explosion, toxicity									
- Ease of ma	terials, recycling and recovery - Environmental consideration an	d recycling , N	Ierits and demerits									
of different	types of Storage	• •										
Unit – IV	Application consideration	Periods	9									
Comparing	Storage Technologies - Technology options- Performance fac	ctors and meti	rics - Efficiency of									
Energy Syst	tems - Energy Recovery -Battery Storage System: Introduction	on with focus	on Lead Acid and									
Lithium - Cl	nemistry of Battery Operation, Power storage calculations, Reven	sible reactions	, Charging patterns,									
Battery Mar	nagement systems, System Performance, Areas of Application	of Energy S	torage: Waste heat									
recovery, So	plar energy storage, Green house heating, Power plant application	is, Drying										
	orprocessindustries, energy storage in automotive applications in hyb	Dominala	venicies									
Umt - v	Hydrogen fuel cells and flow batteries	Periods	9									
Properties, proper	conomy and Generation Techniques, Storage of Hydrogen, Ene power calculations - Operation and Design methods - Hybrid En power needs, options - Level 1: (Hybrid Power generation ns:need,operationandMerits;Level2:(HybridPowerGeneration)Ba	rgy generation ergy Storage: ) Bacitor "Ba citor+FuelCell	Managing peak and attery + Capacitor" orFlow									
Battery oper	ation-Applications: Storage for Hybrid Electric Vehicles, Regen	erative Power,	capturing methods.									
		Total Periods	45									
Text Books												
1.	Robert A.Huggins"Energy Storage Fundamentals, Materials and	Applications '	'second edition									
References			1									
1.	Detlef Stolten, "Hydrogen and Fuel Cells: Fundamentals, Techno 2010.	logies and Ap	plications", Wiley,									
2.	Jiujun Zhang, Lei Zhang, Hansan Liu, Andy Sun, Ru-Shi Liu, "E Energy Storage and Conversion", John Wiley and Sons, 2012	Electrochemica	l Technologies for									
3.	Francois Beguin and Elzbieta Frackowiak ,"Super capacitors", V	/iley, 2013.										
4.	Doughty Liaw, Narayan and Srinivasan, "Batteries for Renewab Electrochemical Society, New Jersy,2010.	e Energy Stor	age", The									
E-Resource	S											
1.	http://www.springer.com/gp/book/9783662532744											
2.	http://www.springer.com/gp/book/9783319212388											

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Prog	gramn	ne	B.E.					Progr	amm	e Coo	le	102	Regul	ation	I	2019	
Dep	artme	nt F	ELEC' ENGIN	TRIC NEER	AL A AING	ND E	LECT	RONIC	CS				Sem	nester			
Course	e Code	,		Cou	rse Na	ame		Pe	riods Wee	Per k	C	Credit		Maxi	mum M	arks	
								L	Т	]	P	С	CA	4	ESE	Tota	al
U19EE	COE5	I	Bioma	ass Ei	nergy	Syst	ems	3 0 0 3 50 50								100	)
Cou Obje	irse ctive	]	<ul> <li>I he students should made to</li> <li>Give an overview of biomass energy source</li> <li>Create an understanding of biomass derived fuel system</li> <li>Generate understanding on energy utilization of bio-based fuel.</li> </ul>														
		A	At the end of the course, the student should be able to,       Knowledge         Level       Level														
		C E	C <b>O1:</b> 7 Energy	lo ide y plar	entify ntation	an ap 1 and	opropri Charae	ate me	ethod cs.	of er	nergy	conten	t of var	ious b	io- fuels	K2	2
Cou Outc	irse come	( 1 s	CO2:T iving tore s	o de orgar unlig	velop iisms, ht in 1	a cle whic the fo	ar idea h inclu rm of o	i on va ides pl chemic	rious ants, al en	orga anim ergy.	nic m als, ai	aterial nd their	derived byproc	from lucts th	recently nat can	K5	i
		(	C <b>O3:</b> T	lo eva	luate	phys	ical, a	nd agr	oche	mica	ul con	versio	n metho	ods.		K2	2
		t	C <b>O4:</b> T o biog	Fo rea gas, w	lize t hich	he apj is gas	propria derive	ate met ed fron	hod c 1 a ch	of mo emic	st nar al rea	row ser ction ir	nse it is 1 gasific	a sync ation.	onym	K2	2
		( V	C <b>O5:</b> T	To giv s bion	re an c nass e	overvi nergy	ew of t conve	he proo rsion ro	duction outes a	n of and th	bio-fu neir er	el, bio-g nergy ut	gas alon ilizatior	g with 1.		K3	;
Pre-req	uisite	s E	Basic c gas, bio	conce o-dies	pts of sel pov	biom wer ge	ass ene eneratio	rgy sou on.	urces	and u	nderst	tanding	of conv	ersion	methods	include	bio-
(3/	/2/1 in	dicate	s stren	gth of	CO / I corre	PO M lation	<b>apping</b> ) 3-Stro	5 ong, 2 –	Medi	um, 1	- We	ak	(	CO/PSO	Э Маррі	ng	
					Progra	amme	Outcor	nes (PC	Ds)					F	SOs		
COs	РО 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
CO 1	3	2	3	1	3	2	2		2		1	1	3	1	2	1	
CO 2	3	1	2	1	1	3	1				2	1	1	2	1	2	
CO 3	2	2	2		2		2	1			1	3	2	3	3		

Course Assessment Methods
Direct

1. Continuous Assessment Test I, II & III

2. 3.

- Assignment End-Semester examinations
- Indirect

CO 4

CO 5

Course – end Survey 1.

Content of	the syllabus		
Unit –	I INTRODUCTION	Periods	9
Biomass en	ergy sources, energy content of var	ious Bio – fuels, Energy plantation, origin	of Biomass photo
synthesis p	ocess, Biomass Characteristics, sus	stainability of Biomass.	
Unit - I	I BIO POWER PLANTS A CONVERSION METHOD	ND BIOMASS DS Periods	9
Bio Power	generation routes, Basic Thermody	namic cycles in Bio power generation; Bray	ton cycle, Sterling
cycle, Ran Thermo ch	ine cycle, Co-generation cycle. Bio mical, Biochemical- explanation, a	mass based steam power plant. Biomass co and flowchart.	onversion methods-
Unit – I	II PHYSICAL & AGROCH	EMICAL CONVERSION Periods	9
Briquetting heat, Dome	Pelletization, Agrochemical, fuel stic cooking & heating.	Extraction, Thermo chemical Conversion:	Direct combustion for
Unit - I	<b>V BIOMASS GASIFICATIO</b>	ON Periods	9
Chemical Fluidized producer g	eaction in gasification, Producer ed gasifiers. Liquefaction: Liquef s in I C Engines.	gas& the constituents, Types of gasifiers faction through pyrolysis & Methanol syn	. Fixed bed gasifiers nthesis, application of
Unit –	BIO- GAS AND BIO- DII GENERATION	ESEL POWER Periods	9
Ethanol as	an automobile fuel, Ethanol produ	action & its use in engines.Bio Diesel fror	n edible & non-edible
oils, Produ	ction of Bio diesel from Honge &	z Jatropha seeds, use of bio diesel in I C	engines, Performance
analysis of	diesel engines using bio diesel.		
		Total Period	ls 45
Text Book	\$		
1.	Sorensen B.," Renewable Energy,	Fourth Edition, Academic press, 2010.	
2.	Mukunda H. S.," Understanding C	lean Energy and Fuels from Biomass, Wile	y India,2011
3.	Erik Dahlquist," Biomass as Energ 2013.	gy Source Resources, Systems and Applicat	tions, "CRC press,
4.	Vladimir Strezov, Hossain Md. An	nawar," Renewable Energy Systems from B	Biomass:
	Efficiency, Innovation and Sustain	nability," CRC press, 2019.	
Reference			
1.	Klass D. L. (1998);Biomass for Re Press, USA.	enewable Energy, Fuels, and Chemicals, Ac	cademic
2.	Higman C. and Burgt M v d (2003	();Gasification, Elsevier Science, USA.	
3.	Rosillo-Calle F. and Francisco R.	(2007); The Biomass AssessmentHandbook	: Bioenergy
	for a Sustainable Environment, Ea	rthscan	
4.	Mittal K. M. (1996); Biogas system	ms: Principles and Applications, New Age I	International.
5.	Stassen H. E. Quaak P. and Knoef Combustion and Gasification Tech	H. (1999); Energy from Biomass: A Revie nologies, World Bank Publication.	w of
E-Resourc	es		
1.	https://nptel.ac.in/courses/103/103	/103103206/	
2.	https://oyc.yale.edu/geology-and-g	geophysics/gg-140/lecture-34	
3.	https://lecturenotes.in/notes/21095	-note-for-renewable-energy-system-res-by-	hymavathi-ulli
4	https://che.utexas.edu/course/che3	50&384/lecture notes html	

	VIV	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205											
Programme	B.E.		Progra	mme (	Code	102	Regulation		2019				
Department	ELECT ENGIN	RICAL AND ELECTI EERING	RONIC	<b>S</b>			Semester						
Course Code		Course Name	Periods Per Week			Credit	Maxi	imum M	arks				
			L	Т	Р	C	CA	ESE	Total				
U19EEOE6	Energy System	Efficient Lighting	3	0	0	3	40	60	100				
Course Objective	The stu- • An lig • Im ana • Fa	dents should made to introduction to the hting design. part lighting fundame alysis and design of ar ctors to be considering	funda entals, r chitectu g while	mental neasur ural lig design	s of ement hting ing in	illumina t, and tec systems. adoor and	tion engineer hnology and the outdoor illum	ing and heir appl ination s	architectural lication in the chemes.				
	At the e	end of the course, the s	student	should	be at	ole to,			Knowledg e Level				
	CO1:A selectio	pply basic engineering n of lighting factors e	g to und ffecting	lerstan 3 on lig	d con hting	cept of lig scheme.	ghting system,		K3				
Course Outcome	CO2: I law of i space	dentify the criteria for lluminations. and ligh	r the se ting sys	lection stems f	of la or an	imps, mea indoor of	asurement of 1 r outdoor	ight and	К3				
	CO3:D indoor appropr	esign and Evaluate lighting and selection riate consideration.	differen 1 of lu	nt type minary	s of to n	lighting neet the	scheme desig specified need	gns for ls with	K4				
<b>CO4:</b> Perform calculations on photometric performance of light sources and luminaries for outdoor purposes.													
	<b>CO5:</b> Design special lighting scheme to meet the specified needs with appropriate consideration in monument Sports and aviation lighting.												
Pre-requisites	Basic co	oncepts and understand	ing of n	nagneti	c field	ls							

(3/	<b>CO / PO Mapping</b> (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak													CO/PSO Mapping			
Programme Outcomes (POs)													PSOs				
COs	РО 1	O         PO         PO </th <th>PSO 3</th> <th>PSO 4</th>													PSO 3	PSO 4	
CO 1	3	1	2	-	2	-	-	-	-	-	-	1	3	-	-	-	
CO 2	3	1	2	-	-	-	-	-	-	-	-	1	3	-	-	-	
CO 3	3	2	2	-	2	-	-	-	-	-	-	1	3	-	-	-	
CO 4	3	3 2 2 - 2 1												-	-	-	
CO 5	3	2	2	-	2	-	-	-	-	-	-	1	3	-	-	-	

## Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect			
1. C	ourse – end survey		
Content of	the syllabus		
Unit	I Introduction of Light:	Periods	0
Dediction	I Introduction of Light:	1 erious	tificial lighting and
total light	ng Quality of good lighting Easters affecting the lighting s	badow alara	roflaction Colour
rendering s	nd stroposcopic effect Methods of artificial lighting Lighting sys	tems_direct in	direct semi direct
semi indire	ect Lighting scheme General and localized	tems-uncet, m	direct, seini direct,
Unit -	I Light Source and measurement light:	Periods	9
Incandesce	nt electric discharge fluorescent and LED light Luminaries a	nd control cir	cuits Definition of
luminous f	lux. Luminous intensity. Lumen. Candle power. Illumination. M.H.	I.C.P. M.S.C.F	P. M.H.S.C.P. Lamp
efficiency.	Brightness or luminance. Laws of illumination. Inverse square	law and Lan	bert's Cosine law.
Illuminatio	n at horizontal and vertical plane from point source. Concept of po	olar curve, Cal	culation of
luminance	and illumination in case of linear source, round source and flat sou	irce	
Unit – I	II Design of Interior Lighting:	Periods	9
Definitions	of maintenance factor, Uniformity ratio, Direct ratio, Coeffi	cients of utili	ization and factors
affecting it	, Illumination required for various work planes, Space to mounti	ing height ratio	o, Types of fixtures
and relativ	e terms used for interior illumination, Calculation of wattage of each	ach lamp and r	no of lamps needed,
Layout of	amp luminaries, Calculation of space to mounting height ratio, Inc	lian standard re	ecommendation
and standa	rd practices for illumination levels in various areas, Special featur	e for entrance	, staircase, Corridor
lighting an	d industrial building.		-
Unit - I	V Design of Outdoor Lighting:	Periods	9
Street Ligh	nting : Types of street and their level of illumination required, '	Terms related	to street and street
lighting, T	ypes of fixtures used and their suitable application, Various	arrangements	in street lighting,
Requireme	nts of good street lighting, Selection of lamp and luminaries, Cal	culation of the	ir wattage, Number
and arrange	ement, Calculation of space to mounting height ratio, Calculation of	of illumination	level available on
road .Floo	a Lighting Types of fixtures and their suitable applications, S	Selection of la	amp and projector,
	N Development by Freedom based Lighting Sectors	<b>Period</b> s	
Different 1	Kenewable Energy based Lighting System	Terrous Constituent	<b>7</b>
Different I	Kenewable Sources of Energy - Solar, Wind, Iidal, Biomass,	Geo thermal,	fuel cell, human -
different s	x - its Finicipies & Technical Description, induction Generator	Principle, Cha	f inverter de to de
converter	L oad management - energy efficient discharge lamp and different	types of elect	ronic ballasts I FD
lamps & it	s drivers Wiring & Fittings Lightning Protection Installing M	anaging Main	taining& Servicing
off-grid sv	stems. Sustainability & Building Design & Lighting. Integration	n of different	sources of Energy.
Inter conne	ection of Renewable Energy Sources with the grid.		
		<b>Fotal Periods</b>	45
Text Book	S		
1	Gupta J. B., "Utilization of Electric Power & Electric Traction" S	S. K. Kataria&	Sons, 2nd edition,
1.	2012.		, , , ,
2.	Uppal S. L, "Electrical Power", Khanna Book Publication, 13th e	edition, 1988.	
2	Partab H. P., "Art & Science of Utilization of Electrical Engineer	ring", Dhanpat	Rai Publications,
3.	2017		,
Reference	8		
1.	Jack L. Lindsey, "Applied Illumination Engineering", Fairmont l	Pr; 2nd edition	, 1996.
2	John Matthews, "Introduction to the Design and Analysis of Buil	ding Electrical	Systems",
۷.	Springer Science & Business Media, 1993.		
3.	M.A. Cayless, "Lamps and Lighting", Routledge; 4th edition, 20	12.	
4.	Integration of Alternative Sources of Energy – F.A. Farret, M. G	. Simoes, IEEE	E Press
5.	O. E. Taylor, "Utilization of Electrical Energy", Longman, 1971.		
<u> </u>			

E-Resourc	ces
1.	Microsoft PowerPoint - L23_Lighting_intro.ppt (colorado.edu)
2.	Ch-08_gopsons.qxd (beeindia.gov.in)
3.	Energy efficiency in electrical system (slideshare.net)
4.	Illumination. (slideshare.net)
5.	What is Energy Efficient Lighting and Techniques to Implement It (electricaltechnology.org)

	VIVI	EKANANDHA COLLI (Autonomous Institution Elayampalay	EGE OI 1, Affiliato 1/2010 yam, Tiru	E ENG ed to Ar chengoo	INEE Ina Uni le – 63	<b>RING FO</b> iversity, Ch 7 205	<b>R WOMEN</b> ennai)	TÜVRisin	ISO SECTIONS IN THE INFORMATION INTERVALUE I			
Programme	B.E.		Progra	mme (	Code	102	Regulation		2019			
Department	ELECT ENGIN	TRICAL AND ELEC	CTRON	ICS			Semester					
Course Code	(	Course Name	Per	iods P Week	er	Credit	Maxi	mum M	Iarks			
			L	Т	Р	C	CA	ESE	Total			
U19EEOE7	Soft con Technic	Soft computing30034060Techniques										
Course Objective	•	Understand the conce Understand the Fuzzy Understand the Hybr	epts of A y logic a id syste	Artifici and Ge ms	al Ne enetic	ural Netv algorithn	vork ns.					
	On con	pletion of the course	e the st	udents	will	be able t	0		Knowledge Level			
	CO1: R	ecognize neural netw	orks to	build i	ntelli	gent syste	ems.		K2			
Course	CO2: A F	Apply neural networks Problems.	to solv	e class	ificati	ion and re	egression		K3			
Outcome	<b>CO3:</b> A r	apply fuzzy principles eal time issues.	to deal	with v	ulner	ability an	d tackle		K3			
	CO4:A	pply genetic algorithm particular problem.	ns to ob	tain op	otimiz	ed results	s for a		К3			
	CO5: A	apply advanced genetics o solve real world pro	ic opera blems	tors ar	id gen	etic prog	ramming		K3			
Pre-requisites									-			

(3	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 – Weak													CO/PSO Mapping					
COs	COs Programme Outcomes (POs)													F	SOs				
	PO 1	PO         PO<													PSO 3	PSO 4			
CO 1	3	3	3		1						2	2	2	1	2	1			
CO 2	3	3	3		2						2	2	2	1	2	1			
CO 3	3	3	3		2						2	3	2	1	2	1			
CO 4	3	3 3 3 1 2 3											2	1	2	1			
CO 5	3	3	3		1						2	3	2	1	2	1			

Direct

- 1. Continuous Assessment Test I, II &III
- 2. Assignment
- 3. End-Semester examinations

Indirect

Content of	the syllabus											
Unit –	I ARTIFICIAL NEURAL NETWORKS -I	Periods	9									
Introductio	on to Soft computing - Neural Networks - Model - activation	functions - ty	pes of architecture.									
Supervised	l learning: Architecture and algorithm - Perceptrons – Adaline and - Radial Basis Function Networks	Madaline – Ba	ack propagation									
Unit -	II ARTIFICIAL NEURAL NETWORKS-II	Periods	9									
Unsupervi Organizing machine –	sed Learning and Other Neural Networks – Competitive Lea g Networks – Learning Vector Quantization – Hebbian Learning – Deep neural networks.	rning Network Simulated ann	ts – Kohonen Self ealing – Boltzman									
Unit –	III FUZZY LOGIC	Periods	9									
Introduction Fuzzification Mamdanion Fuzzy Mod	on to Fuzzy Logic - Classical Sets and Fuzzy Sets - Fuzzy Re on – Defuzzification - Fuzzy if-then Rules – Fuzzy Reasonin Fuzzy Models –Sugeno Fuzzy Models –Tsukamoto Fuzzy Models delling.	lations- Memb g – Fuzzy Inf – Input Space	ership functions – Ference Systems – Partitioning -									
Unit - I	IV GENETIC ALGORITHM	Periods	9									
Simple ge mutation.S coded gene	Simple genetic algorithm – Operators of Genetic Algorithm(GA): Encoding- selection – crossover – mutation.Stopping conditionofGA–Problem solving using genetic algorithm–Schema theorem-Real coded genetic algorithm - Advantages and limitations – Applications of GA.											
Unit - VHYBRID SYSTEMSPeriods9												
Advanced Hybrid Ge Independe	Operators and Techniques in Genetic Algorithm- Parallel and netic Algorithm (HGA) – Adaptive Genetic Algorithm – Fast Mes nt Sampling Genetic Algorithm - Genetic Programming- Applicati	Distributed G sy Genetic Alg ons	enetic Algorithm - orithm -									
		Total Periods	45									
Text Book	S											
1.	S.N. Sivanandam,S.N. Deepa, "Principles of soft computing" W Edition, New Delhi,2018	iley India Pvt L	.td. 3 ¹⁴									
2.	Yegnanarayana, "Artificial Neural Networks" PHI learning Pvt I 2012	Ltd, Eastern eco	onomy New Delhi,									
Reference	S											
1.	Zimmermann H.J. "Fuzzy set theory and its Applications" Sprin	ger internationa	al edition, 2011.									
2.	James A Freeman and David M.Skapra, Neural Networks: Algor Programming Techniques, Addison-Wesley, 1991, Digital Versi	ithms, Applica on 2007	tions, and									
3.	S.N. Sivanandam S.N. Deepa, "Introduction to Genetic Algorith Heidelberg ,2008	ms",Springer-V	Verlag, Berlin									
E-Resour	ces											
1.	https://www.sciencedirect.com/topics/computer-science/soft-com	nputing-technic	que									
2.	https://nptel.ac.in/courses/117/105/117105084/											
3.	https://freevideolectures.com/course/4565/nptel-introduction-soft-computing/40											
4.	https://www.digimat.in/nptel/courses/video/106105173/L01.html											

Ç			VIV	/EKA (A	NAN utonon	<b>DHA</b> nous In Elay	COLL Istitution	<b>EGE (</b> n, Affili vam. Ti	<b>)F EN</b> ated to ruchen	MGIN Anna	E <b>ER</b> Unive - 637	<b>ING FO</b> ersity, Ch 205	<b>R WOM</b> ennai)	IEN	TÜVRheinlars	ISO 5001:2015		
Prog	gramn	ne	B.E.					Prog	amm	e Coo	le	102	Regu	lation		2019		
Dep	artme	nt H	ELEC ENGI	TRI NEE	CAL RINO	AND 3	ELEC	CTRO	NICS	5			Sen	nester				
Course	code	;		Cou	rse Na	ame		Pe	eriods Wee	s Per ek		Credit		Maximum N			Aarks	
								L	Т		P	С	C	4	ESE	T	otal	
U19EE	COE8	El In	ectri dusti	cal Sy ry	ystem	s in		3	0	) (	C	3	40		60	1	00	
Cou Obje	irse ctive	1	<ul> <li>To provide in-depth understanding of Electrical System Components, Resid Commercial Electrical Systems, Industrial Electrical Systems:</li> <li>HT connection, industrial substation, Transformer selection, Role of Engin automation, advantages of process automation</li> </ul>														al and	
		A	At the end of the course, the student should be able to,														wledge evel	
Gam		(	CO1:Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols K2 and drawings, SLD.															
Outc	ome	(	CO2:Understand various terms regarding light, lumen, intensity, candle power, lamp efficiency, and specific consumption.													]	K2	
		(	CO3:Understand various components of industrial electrical systems, Industrial loads, Switchgear selection												]	K2		
		(	CO4:	Anal	yze ar	nd sel	ect the	prope	r size	of Ti	ransf	ormer.	1 .	1 .		]	K3	
		(	205: I	Under Panel	rstand Mete	Role	of in a	automa	ation,	PLC	base	ed contro	ol systei	n desi	gn,	]	K2	
Pre-req	uisites	S E	Basic	conce	epts ai	nd une	derstar	nding o	of ind	ustria	l sys	tems						
(3/2/1	indic	ates s	streng	<b>(</b> th of	CO / I correl	<b>PO M</b> lation	appin) 3-Str	<b>g</b> ong, 2	- Me	edium	ı, 1 -	- Weak				ıpping		
~~~				Р	rogra	mme	Outco	mes (P	Os)					Р	SOs			
COs	PO	PO	PO	PO	PO	PO	PO 7	PO	PO	PO 10	PO 11	PO 12	PSO	PSO	PSO	PSO		
CO 1	3	<u>2</u> 1	2	-	2	-	-	-	-	-	-	2	3	-	-	-		
<b>CO 2</b>	3	1	2	-	2	-	-	-	-	-	-	2	3	-	-	-		
CO 3	3	1	2	-	2	-	-	-	-	-	-	2	3	-	-	-		
CO 4	3	1	2	-	2	-	-	-	-	-	-	2	3	-	-	-		
CO 5	3	l	2	-	2	-	-	-	-	-	-	2	3	-	-	-		
Course	Assess	smen	t Me	thods														
Direct																		
1. 2.	1. Continuous Assessment Test I, II &III       2. Assignment																	
3.	3. End-Semester examinations																	
Indire	Indirect																	
<u> </u>	1. Course - end Survey																	

Content of the syllabus											
Unit –	I Electrical System Components	Periods	9								
LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices											
Unit - I	IResidential and Commercial Electrical SystemsPeriods9										
Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation calculation											
Unit – I	II Illumination Systems	Periods	9								
Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting											
Unit - I	V Industrial Electrical Systems	Periods	9								
HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.											
Unit –	V Industrial Electrical System Automation	Periods	9								
Study of ba Panel Mete	sic PLC, Role of in automation, advantages of process automation ring and Introduction to SCADA system for distribution automat	n, PLC based c	ontrol system design,								
		<b>Total Periods</b>	45								
Text Book	S										
1.	S. L. Uppal, G. C. Garg, "Electrical Wiring, Estimating & costir 2008.	ıg", Khanna pu	blishers, 6th edition,								
References											
1.	K. B. Raina, "Electrical Design, Estimating & Costing", New ag	e International	, 1st edition, 2007.								
2.	2. S. Singh, R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 2nd edition, 2010.										
3. J. B. Gupta, "Utilization of Electric Power & Electric Traction", S.K. Kataria& Sons, 2nd edition, 2014.											
4.	4. H. Joshi, "Residential Commercial and Industrial Systems", Volume I, McGraw Hill Education, 2008.										
E-Resources											
1.	https://nptel.ac.in/courses/108/104/108104051/										
2.	https://nptel.ac.in/courses/108/105/108105063/										
3.	https://nptel.ac.in/courses/108/105/108105064/										

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205       Image: Constant																	
Programme <b>B.E.</b> Programme Code <b>102</b> Regulation												2019					
Dep	artme	nt F	ELEC ENGI	TRI NEE	CAL . RING	AND 5	ELEC'	TRO	NIC	S				Ser	nester	VII	
Course Code			Course Name							riods l Week	Per	Credi	it	M	aximun	1 Marks	
									L T P		С	(	CA	ESE	Total		
U19M	CFY7	, ( ]	Comprehension on Electricity- Theory and Practice I						3	0	0	0	1	00	0	100	
CourseThe students should made toObjective• Learn the basic concepts of electrical property and electrical machines• Learn the basics about Generation and Transmission• Learn the basics of Power quality issues																	
		A	At the	end o	f the c	course	e, the stu	dent	shoul	d be a	ble to,					Knowledge Level	
Соц	rse	(	C <b>01:</b> U	Jnder	stand	the b	asics of	Elec	trical	l prop	erty					K2	
Outc	ome		CO2:	Inter	pret tl	ne Ge	neratior	n of P	ower	r from	differ	ent sou	rces			K2	
		(	CO3:Classify the basics of Transmission System												K2		
		(	CO4: Construct the Earthing System											K3			
		(	CO5:Summarize the Power Quality issues and regulations											K2			
Pre-ree	quisit	es F	Fundar	nenta	l Kno	wledg	ge of Ele	ctrici	ty an	d Elec	trical	Power S	Systems	5			
(3/	2/1 in	dicate	s stren	gth of	CO / I f corre	PO M lation	apping ) 3-Stron	ng, 2 -	- Mec	lium, 1	– Wea	k	(	CO/PSO Mapping			
Cas					Progra	amme	Outcom	es (PC	Js)	-	1			1	PSOs		
Cos	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	РО 7	PO 8	PO 9	PO 10	РО 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
	3	2								+		3	3		2		
$CO_2$	3	4								+		3	3		3	+	
CO 4	3	2										3	3		2	+	
CO 5         3         2												3	3		2	+	
Course Assessment Methods																	
Direct																	
1.C	ontinu	ious A	Assess	ment	Test l	, II &	III										
2.Assignment																	
Indirect																	
1. Course-end Survey																	

Content of the Syllabus										
Unit – I ELECTRICAL PROPERTY	Periods	9								
Atomic structure - electrons properties - electrostatic field - electric current	nt- magnetism,	electromagnetic								
wave and chemical reaction between elements	wave and chemical reaction between elements									
Electrical Property:										
Conductor-metals - silver, copper, aluminum- voltage. current and resistance relationship-ohms law for dc										
and ac - specific resistance of metals-resistance based on physical dimer	nsions of condu	ctor- resistance								
variation by temperature rise due to joulean heat and atmospheric temperat	ure and temperative	ature coefficient								
of metal- free electrons in conductors- current carrying capacity based on fr	ee electrons ava	ilable - velocity								
of current and energy propagation - current carrying capacity limitation by	temperature rise	e in conductors-								
current in conductor, semiconductor, insulator, liquid and gas.	-									
Semiconductors- silicon, germanium- doping- various characteristics of die	ode and uses - S	SCR types - use								
in converter stations of HVDC.										
Insulators – insulation analogous to river banks -various type of insulator	rs – polymers -	- types -leakage								
current										
Magnetism - natural magnet - manmade magnets - magnetic property of me	tals- iron, steel-	electromagnet –								
permanent and temporary magnet - magnetic field; steady - changing/ vary	ing field. Electi	omagnetic field								
and induction – DC generator – alternator - transformer										
Unit – II GENERATION OF POWER	Periods	9								
AC Generation -fuel based- water, steam, wind turbines - turbine types - nu	ıclear – artificia	l acceleration of								
fission of uranium nucelli, mass defect – proof for $E = mc^2$ - Indian scenario	on nuclear pow	er stations.								
DC generation-solar photovoltaic cell, fuel cell- Battery-lead acid, lithiun	m ion - generat	tion of AC emf								
magnitudes - DC cell voltage - inversion of DC to AC generated emf - indu	uced emf - need	for stepping up								
generated emf to EHV level - role of transformer.										
Unit – III TRANSMISSION SYSTEM	Periods	9								
AC Transmission - sub-transmission and distribution voltages - HVDC tr	ansmission -typ	es – voltages –								
advantages - Underground cables - EHV sub- station - Types- equipment	nts – functions.	Protection and								
control - signaling and monitoring in sub-station.										
Solid, stranded and hollow conductors-stranded conductor types and size	zes- current car	rrying capacity,								
voltage regulation methods and limits -Ferranti effect- corona	5 1 1									
Unit – IV EARTHING SYSTEM	Periods	9								
Earthing and grounding - purpose of earthing - earth as conductor - guarding	ng under electri	cal lines - types								
of earthing - transient ground potential rise, touch, step, and transfer potent	ial - earth electi	ode resistance -								
soil resistivity - measurement of resistance of earth connection - limits -	lowering the e	earth connection								
resistance within limits - measurement of soil resistivity - earthing systems	INC, TNC-S	0								
Unit – V POWER QUALITY	Periods	9								
Power quality definition - power quality deficiencies - current and vo	oltage harmoni	es (pollutant to								
electricity) and their effects, current harmonic control and limits as per CEA	(Central Electr	icity Authority -								
New Deini) and INERC (Tamilinadu Electricity Regulatory Commission) regulations in consumer non-										
inear ioaus, generation resources of wind mills, solar photovoltaic and electric charging stations, effects of										
10ta	ll Periods	45								
D.D. Ketharti and I.I. Nagarath, Dasia Electrical and Electronic	. En sin serie s	Ma Crarry II:11								
2016.										
S.Kandasamy, Electricity Theory and Practice, Amity University Press, New Delhi,2021										
References										
1. 8. Lal Seksena and Kaustuv Dasgupta, Fundaments of Electrical Engineering, Cambridge, 2016										
2. ttle, Mittal, Basic Electrical Engineering, 2nd Edition, Tata McGraw-Hill Edition, 2016.										
3. S.K.Sahdev, Basic of Electrical Engineering, Pearson, 2015.										
E-Kesources										
1. ttps://nptel.ac.in/courses										

		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205														TVYNefeder CETIFED D 1004455		
Prog	ramn	ne	B.E.Programme Code102Regulation												2	2019		
Depa	nt I I	ELECTRICAL AND ELECTRONICS ENGINEERING Semester												ester		VIII		
G	<b>C</b> 1			0	•	r		Peri	ods l	Per V	Week	Credi	it	Ma	ximu	m Ma	arks	
Course	Cod	e	Course Name					L	- -	Г	Р	С	C	A I	ESE	Г	Fotal	
U19M	CFY8	(       	Comprehension on Electricity-Theory and Practice-II					3	(	C	0	0	1	00	0		100	
Course Objectiv	Course ObjectiveThe students should made to • Learn the protection and safety on electrical installations and lighting • Learn the different types of traction and lighting schemes • Learn the metering and tariff and IE act related to the consumers																	
		A	At the end of the course, the student should be able to,												Knowledge Level			
Соч	rse	(	CO1:	Under	rstand	the p	orotecti	on and	safet	y of	electric	al insta	llatio	ns		K2		
Outc	ome		<u>CO2:</u>	Sumn	narize	the treat	lightnii ion ond	ng prot	ection	n sch	iemes	200				K2		
			203:1 204· ]	Expia Illustr	in the	e tract	conser	vation	mete	ering	and tai	riff					K2 K2	
			CO5:	Sum	narize	e the	power s	system	com	muni	cation	and IE a	acts				K2	
			relat	ted to	const	umers	5	5								<b>K</b> 2		
Pre-requ	lisites	s F	Funda	menta	al Kno	owled	lge of E	Electric	ity a	nd El	ectrica	l Power	Syste	ems				
(3/2/1	indic	ates s	streng	th of	CO/I	PO M lation	<b>lappin</b> ) 3-Str	<b>g</b> ong, 2	– Me	diun	n, 1 – V	/eak		CO/P	SO M	lappi	ng	
				P	Progra	imme	Outco	mes (P	Os)						PSO	3		
Cos	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO 11	PO 12	PSO	PS	0 1	PSO	PSO	
<b>CO</b> 1	1	2	3	4	5	0	7	8	9	10	11	3	3	2		3	4	
CO 1 CO 2	3	2										3	3			2		
CO 3	3											3	3			3		
<b>CO 4</b>	3	2										3	3			2		
<b>CO 5</b>	3	2										3	3			2		
Course Assessment Methods																		
Direct																		
1.C 2.A	Contin Assign	uous ment	Asses	smen	t Test	t I, II	& III											
Indirec	et																	
1.Course – End Survey																		
Content of the Syllabus																		
Unit - IPROTECTION AND SAFETY IN LOW VOLTAGE INSTALLATIONSPeriods9										9								
Deficien	cy in	prote	ecting	g insta	allatic	ons, e	quipme	ent and	l hur	nan 1	beings	in dom	estic,	comr	nercia	l, ind	ustrial,	
agricultural services - abnormal conditions - over loading (equipment and installation), short circuit, earth fault and earth leakage, various protective schemes, rewireable fuses, <u>HPC</u> fuses, <u>MCP/MCCP</u>																		
RCD/RCCB - CEA and TNERC mandatory provision to have electrical accident - free installations/																		
premises.										io ne	ave en	curcar	acciu	uni -	nec i	instan	auons/	

Lightning phenomena, direct and indirect strokes on transmission lines, direct stroke on power stations and sub-stations, direct stroke on temple towers, high rise buildings, communication towers - protective devices - passive systems - Franklin rod, faraday cage, active attractive air terminal system - its components - air terminal, Down conductor, effectively carthed system, lightning event counter - advantages of active system - ground potential equalization with transite earth clamps	Unit – II	LIGHTNING PROTECTION	Periods	9									
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