





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

M.E-POWER SYSTEMS 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 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.

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.

MAPPING OF PROGRAMME EDUCATIONAL OBJECTIVES (PEO'S) WITH PROGRAMME OUTCOMES (PO'S)

A broad relation between the programme objective and the outcomes is given in the following table

Programme Educational		Programme Outcomes													
Objectives	PO1	PO2	PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12												
Ι	\checkmark								\checkmark						
П			\checkmark	\checkmark		\checkmark	\checkmark		\checkmark	\checkmark	\checkmark				
III									\checkmark	\checkmark		\checkmark			
IV															

Year	SEM	COURSE NAME	P01	P02	P03	P04	P05	P06	P07	P08	P09	PO10	P011	P012
		Power System Operation and Control			\checkmark	\checkmark	\checkmark	\checkmark	\checkmark				\checkmark	\checkmark
		Digital Power system Protection	\checkmark								\checkmark			
		Advanced Power System Analysis	\checkmark											
	SEM 1	Optimization Techniques	\checkmark											
		Professional Elective - I												
		Professional Elective - II												
		Audit Course -I												
8 1		Power System Simulation Lab- I	\checkmark		\checkmark						\checkmark			\checkmark
YEAR		High Voltage DC Transmission systems	\checkmark		\checkmark			\checkmark					\checkmark	\checkmark
		Restructured Power Systems	\checkmark											
		Power system Automation	\checkmark		\checkmark									
	SEM 2	Professional Elective - III												
	Ø	Professional Elective -IV												
		Audit Course -II												
		Power System Simulation Lab -II	\checkmark											
		Professional Elective - V												
5	SEM 3	Open Elective					<u> </u>							
YEAR 2	S	Project Phase -I		\checkmark										
I	SEM 4	Project Phase -II	\checkmark	\checkmark		\checkmark		\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark

	(Autonomous	DHA COLLEGE OF E Institution Affiliated to layampalayam, Tiruchen	Anna University, Che						
Programme	М.Е.	Programme Code	202	Regulation	2019				
Department		EMS ENGINEERING . AND ELECTRONIC		Semester	Ι				
	CURRICULUM (Applicable to the students admitted from the academic year 2019 - 2020 onwa								

Course	Course Name	CAT	Perio	ds / V	Veek	Credit	Max	imum N	Marks
Code	course mane	CITI	L	Т	Р	С	CA	ESE	Total
	THE	ORY							
P19PS101	Power System Operation and Control	PCC	3	0	0	3	40	60	100
P19PS102	Digital Power system Protection	PCC	3	0	0	3	40	60	100
P19PS103	Advanced Power System Analysis	PCC	3	0	0	3	40	60	100
P19MA103	Optimization Techniques	HS	3	0	0	3	40	60	100
	Professional Elective - I	PEC	3	0	0	3	40	60	100
	Professional Elective - II	PEC	3	0	0	3	40	60	100
	Audit Course -I	PAC	2	0	0	0	100	-	100
	PRAG	CTICA	L						
P19PS104	Power System Simulation Lab- I	PCC	0	0	4	2	60	40	100
	Total Credits					20	400	400	800

PCC – Professional Core Course, PEC – Program Elective Course, PAC- Program Audit Course, CA - Continuous Assessment, ESE - End Semester Examination, HS – Humanity Science

Signature of the BOS chairman, EEE

	(Autonomous	DHA COLLEGE OF E Institution Affiliated to layampalayam, Tiruchen	Anna University, Cher		SU 501/2015 TUMmanand DETERED INVEX.state D Freedo
Programme	М.Е.	Programme Code	202	Regulation	2019
Department		EMS ENGINEERING AND ELECTRONIC		Semester	П
	(Applicable to the	CURRIC students admitted from		9 - 2020 onwa	ards)

Course	Course	CAT	Perio	ds / V	Veek	Credit	Max	imum N	Aarks
Code	Name	em	L	Т	Р	С	CA	ESE	Total
	THE	ORY							
P19PS205	High Voltage DC Transmission systems	PCC	3	0	0	3	40	60	100
P19PS206	Restructured Power Systems	PCC	3	0	0	3	40	60	100
P19PS207	Power system Automation	PCC	3	0	0	3	40	60	100
	Professional Elective - III	PEC	3	0	0	3	40	60	100
	Professional Elective -IV	PEC	3	0	0	3	40	60	100
	Audit Course -II	PAC	2	0	0	0	100	-	100
	PRAC	TICAL							
P19PS208	Power System Simulation Lab -II	PCC	0	0	3	2	60	40	100
	Total Credits					17	360	340	700

PCC – Professional Core Course, PEC – Program Elective Course, PAC- Program Audit Course, CA - Continuous Assessment, ESE - End Semester Examination

	(Autonomous	DHA COLLEGE OF Institution Affiliated to layampalayam, Tiruche	o Anna	Univers	sity, (-			ISO SOIT 2 TÜVRishaad CERTIFED D HISING			
Programme	M.E.	Programme Code		202			Regulatio	n	2019)		
Department		VER SYSTEMS ENGINEERING / Semester CTRICAL AND ELECTRONICS ENGINEERING CURRICULUM										
	(Applicable to the	CURRIC students admitted from			year	2019	- 2020 on	wards)				
Course	0	Course	CAT	Perio	ds / V	Veek	Credit	Max	imum I	Marks		
Code	-	Name	CIII	L	Т	Р	С	CA	ESE	Total		
		THE	ORY									
	Professional Ele	ctive - V	PEC	3	0	0	3	40	60	100		
	Open Elective		OEC	3	0	0	3	40	60	100		
		PRA	CTIC	AL								
P19PS310	Project Phase - I	[EEC	0	0	20	10	60	40	100		
		Total Credits					16	140	160	300		

PEC - Program Elective Course, OEC - Open Elective Course,

EEC - Employability Enhancement Course, CA - Continuous Assessment,

ESE - End Semester Examination

	(Autonomous	DHA COLLEGE OF s Institution Affiliated to layampalayam, Tiruche	o Anna	Univers	sity, (TURNISHED D 150H13		
Programme	e M.E.	Programme Code		202		I	Regulatio	n	201	9	
Departmen	Department POWER SYSTEMS ENGINEERING / Semester ELECTRICAL AND ELECTRONICS ENGINEERING									T	
	(Applicable to th	CURR the students admitted from			e yeai	2019	- 2020 or	nwards	5)		
Course			<u> </u>	Perio	ds / V	Veek	Credit	Max	imum N	Marks	
Code	Cour	se Name	CAT	L	Т	Р	C	CA	ESE	Total	
		PRAC	CTICAL								

	Р	RACTICA	Ĺ						
P19PS411	Project Phase - II	EEC	0	0	32	16	60	40	100
	Total Credits					16	60	40	100

EEC - Employability Enhancement Course, CA - Continuous Assessment,

ESE - End Semester Examination

Signature of the BOS chairman, EEE

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution Affiliated to Anna University, Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	M.E.	Programme Code	20	2		Regulati	on	201	9		
Department	POWER SYST	TEMS ENGINEERING /				Semes	ter	-			
•	ELECTRICAI	AND ELECTRONICS	ENGINE	ERI	NG						
	(Applicable to the	CURRICU e students admitted from th		nic ye	ar 201	19 - 2020	onwar	ds)			
	· · · ·	PROFESSIONAL				-		,			
Course Code		Course Name	Perio	ds / V	Week	Credit	Ma	iximum l	Marks		
			L	Т	Р	C	CA	ESE	Total		
P19PSE01	Power System Reliability	n Planning and	3	0	0	3	40	60	100		
P19PSE02	Analysis of Ir	nverters	3	0	0	3	40	60	100		
P19PSE03	High Power C	Converters	3	0	0	3	40	60	100		
P19PSE04	•	Computation of etic Transients in Power	3	0	0	3	40	60	100		
P19PSE05	Power Quality	У	3	0	0	3	40	60	100		
P19PSE06	Power System	n Stability	3	0	0	3	40	60	100		
		PROFESSIONAL I	ELECTIV	VE –	Ш						
P19PSE07	Electrical Pov	ver Distribution Systems	s 3	0	0	3	40	60	100		
P19PSE08	Power System	n Economics	3	0	0	3	40	60	100		
P19PSE09	Electric and H	Iybrid Vehicles	3	0	0	3	40	60	100		
P19PSE10	Energy Mana	gement and Auditing	3	0	0	3	40	60	100		
P19PSE11	Non Convent	ional Energy Systems	3	0	0	3	40	60	100		
P19PSE12	Fuzzy System	15	3	0	0	3	40	60	100		

PROFESSIONAL ELECTIVE – III											
P19PSE13	Power Electronics for Renewable Energy	3	0	0	3	40	60	100			
P19PSE14	Advanced Digital Signal Processing	3	0	0	3	40	60	100			
P19PSE15	Dynamics of Electrical Machines	3	0	0	3	40	60	100			
P19PSE16	Soft Computing Techniques	3	0	0	3	40	60	100			
P19PSE17	Computer Aided Power System Analysis	3	0	0	3	40	60	100			
P19PSE18	Modeling and Analysis of Electrical Machines	3	0	0	3	40	60	100			
PROFESSIONAL ELECTIVE – IV											
P19PSE19	Advanced Microcontroller Based Systems	3	0	0	3	40	60	100			
P19PSE20	SCADA System and Applications	3	0	0	3	40	60	100			
P19PSE21	System Theory	3	0	0	3	40	60	100			
P19PSE22	AI Techniques	3	0	0	3	40	60	100			
P19PSE23	Power Electronics Applications to Power Systems	3	0	0	3	40	60	100			
P19PSE24	Waste Management and energy Recovery	3	0	0	3	40	60	100			
	PROFESSIONAL ELI	ECTIVE	E - V								
P19PSE25	Power electronic Drives	3	0	0	3	40	60	100			
P19PSE26	Energy conservation in Electrical systems	3	0	0	3	40	60	100			
P19PSE27	Industrial Load Modeling and Control	3	0	0	3	40	60	100			
P19PSE28	Advanced energy storage technologies	3	0	0	3	40	60	100			
P19PSE29	Power System Security	3	0	0	3	40	60	100			
P19PSE30	Smart Grid Technology and Applications	3	0	0	3	40	60	100			

OPEN ELECTIVES									
P19PSOE2	Industrial Safety	3	0	0	3	40	60	100	
P19PSOE6	Waste to Energy	3	0	0	3	40	60	100	

CA - Continuous Assessment, ESE - End Semester Examination

Audit Course: I

S.NO	COURSE	COURSE NAME	CATEGORY	L	Т	Р	С		Maximum Marks		
	CODE							CA	ESE	Т	
1	P19PSAC1	Research Methodology and IPR	AC	2	0	0	0	100	0	100	
2	P19PSAC2	Pedagogy Studies	AC	2	0	0	0	100	0	100	
3	P19PSAC3	Disaster Management	AC	2	0	0	0	100	0	100	
4	P19PSAC4	Value Education	AC	2	0	0	0	100	0	100	
		<u>Audit Course :</u>	Ш		-		-				
5	P19PSAC5	Constitution of India	AC	2	0	0	0	100	0	100	
6.	P19PSAC6	English for Research Paper Writing	AC	2	0	0	0	100	0	100	
7	P19PSAC7	Personality Development through Life Enlightenment Skills.	AC	2	0	0	0	100	0	100	
8	P19PSAC8	Online Courses	AC	2	0	0	0	100	0	100	

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Type of Courses

PCC	:	Professional Core Courses
PEC	:	Professional Elective Courses
OEC	:	Open Elective Courses
AC	:	Audit Courses
EEC		Employability Enhancement Course
HS	:	Humanities And Social Sciences
EEC		Employability Enhancement Course

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Programn		I.E.					Progra		Code	20	2	Regula	tion		2019	
Departme	nt El		RIC	AL A			EERI IRON					Seme	ster		Ι	
Course Code	:	(Cours	e Nar	ne			iods F Week	er	Cre	dit	Maximum N			Iarks	
							L	Т	Р	0	2	CA		ESE	Total	
P19PS101		ower S d Co	•	m op	eratio	n	3	0	0	3	;	60		40	100	
Course Objective Course Outcome	At CC CC CC CC CC Sys CC	• • • • • • • • • • • • • • • • • • •	Learn Analy Learn netwo nd of t nderst satior nalyz nalyz nderst netwo pply t	n the yze the n the coork the coork the coork and the n tech e the tand the tand the tand the tand the tand the tand the tang	he unit control burse, the he volt niques unit cont he contour te estin	e cont comr l meth he stur cage c	nitmen nods ar dent sh ontrol tment j ispatch	t and ad ene ould t metho proble and en	econo rgy n be ablo ods ar ems. lems. nergy	e to, nanag e to, nd read	dispatc ement ctive p	h schec system	luling of po	wer sys	hniques. stem Knowledg Level K2 K4 K4 K2 K3	
					PO Ma						_		CO/PS	SO Map	ping	
(3/2/1 i	ndicate	s stren	-				$\frac{1}{1}$ mes (PC		um, 1	- Wea	k			PSOs		
COs PO	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 2							, v	-			3	2	-			
CO 2 3	3			2							3	3	2	3		
CO 3 3	3			2							3	3	2	3		
CO 4 2											3	3				
CO 5 2	2										3	2			5	
cos 2 Course Assess Direct				t Test	I, II &	III					3	2			3	

content	of the s	yllabus		
Unit -	- I	REACTIVE POWER AND VOLTAGE CONTROL	Periods	9
Productio	on and a	bsorption of reactive power – Methods of voltage con	trol – Shunt re	eactors – Shunt
		ies capacitors – Synchronous condensers – Static VAI		inciples of
		stem compensating- Modeling of reactive compensati	-	
Unit -		UNIT COMMITMENT	Periods	9
		nit commitment – Spring reverse – Thermal unit const		
		riority list method, Dynamic programming method – I	Forward DP ap	proach,
		ation method.	Dariada	0
Unit –		GENERATION SCHEDULING	Periods	9
		ispatch problem – Thermal system dispatch problem		
		sses considered – The lambda – iteration method –		
		omic dispatch with piecewise linear cost functions – s and penalty factors – Hydro thermal scheduling usin		system effects -
Unit -		CONTROL OF POWER SYSTEMS	Periods	9
		and reactive power control system operating states by		-
		ergy control centre – SCADA System – Functions - n		
		MS System	iointoring data	acquisition
Unit -		STATE ESTIMATION	Periods	9
		hood weighted least squares estimation: Concepts –	Matrix formul	ation – Example
		st squares states estimation :state estimation of an A		
				, press 10000000 01
states est	timatior	on an AC network – States estimation by orthogon		
		on an AC network – States estimation by orthogon advanced topics : detection and identification of ba	nal decomposi	tion algorithm -
Introduct	tion to	advanced topics : detection and identification of ba	nal decomposi d measuremen	tion algorithm - nts, estimation of
Introduct quantities	tion to s not be	advanced topics : detection and identification of ba	nal decomposi d measuremen	tion algorithm - nts, estimation of
Introduct quantities	tion to s not be	advanced topics : detection and identification of ba eing measured , network observability and pseudo n tate estimation.	nal decomposi d measuremen	tion algorithm - nts, estimation of
Introduct quantities	ion to s not be stems s	advanced topics : detection and identification of ba eing measured , network observability and pseudo n tate estimation.	nal decomposi ad measurement neasurements -	tion algorithm - nts,estimation of - Application of
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Introduct quantities power sy Text Boo 1. 2. Reference 1.	ion to s not be stems s ks Kotha Comp Chaka 3rd E es Kund Hadi	advanced topics : detection and identification of bac eing measured , network observability and pseudo n tate estimation. ri.D.P and Nagrath.I.J, -Modern Power System Analysis any Limited, New Delhi, 4th Edition, 2011. rabarti and Halder, —Power System Analysis: Operation and dition, 2010. ur.P, -Power System Stability and Controll, Tata McGraw H Saadat, —Power System Analysisl, 11th Reprint, 2007. by.L.L, —The Electric Power Engineering, Hand Bookl, C	hal decomposi d measurements heasurements Total Periods , Tata McGraw d Controll, Prent Hill Publisher, U RC Press and II	tion algorithm - nts,estimation of - Application of 45 - Hill Publishing tice Hall of India, ISA, 2006. EEE Press, 2001.
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	VIVE	EKANAND (Autonomo	us Institu		ated t	o An	na Ur	iversi	ity ,Chenn			TÜVRheinlan EETITFED	SD 501/216
Programme	M.E.			Pro	gran	nme	Cod	e	202	Regula	ation		2019
Department		SYSTEMS ICAL AND ERING								Seme	Semester		
Course Code		Course N	lame		P		ds Pe eek	er	Credit	Maximum Mark			arks
		L T P C										ESE	Total
P19PS102	Digital Power system Protection300340The students should made to											60	100
Objective	IllustrFacilitAnaly	about the v ate concept tate the con- ze distance iarize the c	ts of dig acepts of and car	ital prote synchro rier prot	ection onous ectio	n scl s gei on ar	heme nerat nd Co	e of t or an oordi	ransmiss nd transf nation.	sion line. ormer pro			
	At the end	d of the cou	urse, the	student	shou	ıld b	e abl	e to,					Knowledge Level
Course	CO1: Illu	strate funda	amental	knowled	lge a	bou	t var	ious	protectio	on schem	es.		K2
Outcome	CO2: Apply familiarity about the digital protection of transmission lines.												
	CO3: Develop acquire knowledge in synchronous generator and transformer Protection.												
	CO4: Analyze proficient in man-machine interface and protection schemes. CO5: Discuss the PC based application studies in digital protection.												
	CO5: Dis	cuss the PC	C based	applicati	on st	tudie	es in	digit	al protec	ction.			K6
Pre- requisites	Protection	n and Switc	chgear.										
_			PO Map							CO	PSO N	Aappi	ng
(3/2/1 in COs	ndicates strer			-Strong, 2 utcomes (ım, 1	– We	eak		PSC)s	
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CO 5 3		1				2	2	1	2	3	2		2
Course Asses	sment Meth	ıod											
Direct													
1. Contin	nuous Asses nment		I, II & II	Ι									
 Assign End-S 	emester exa	minations							_				
2. Assign 3. End-S Indirect	emester exa												

	f the syllabus		
Unit –	I NUMERICAL PROTECTION	Periods	9
	on- Block diagram of numerical relay- sampling theorem - correlat		nce wave- Least
Error Squ	ared (LES) technique- digital filtering and numerical over- current	protection.	
Unit –	II DIGITAL PROTECTION OF TRANSMISSION LINE	Periods	9
	on- protection scheme of transmission line- distance relays-		
	scheme based upon fundamental signal - hardware design -		
	on line based upon travelling wave phenomenon - new rela	aying scheme	using amplitude
compariso			
Unit –	GENERATOR AND POWER TRANSFORMER	Periods	9
	on-Faults in synchronous generator - protection schemes of synch		
	of synchronous generator - Faults in a transformer- schemes us	sed for transfor	mer protection –
digital pro	ptection of transformer.	1	
Unit –	IV DISTANCE AND OVER CURRENT RELAY, SETTING AND COORDINATION	Periods	9
	al Instantaneous IDMT over current relay – Directional multi-Zon		
-	Co-ordination of distance relays - Co-ordination of over current rel		
	achine interface subsystem - Integrated operation of national p	ower system ·	- Application of
computer			
Unit –	-V PC APPLICATION IN SHORT CIRCUIT STUDIES FOR DESIGNING RELAYING SCHEME	Periods	9
Types of f	faults- assumptions- development of algorithm for SC studies – PC	based integrate	d a ofteriora for SC
		Daseu miegraie	a software for SC
Studies -	Transformation to component quantities- SC studies of multip		
	Transformation to component quantities- SC studies of multiprelays for high voltage long transmission lines.		
protective	Transformation to component quantities- SC studies of multip relays for high voltage long transmission lines.	hase systems -	– Ultra high spec
protective	Transformation to component quantities- SC studies of multiple relays for high voltage long transmission lines. ks Singh L.P., —Digital ProtectionI, Second edition New Age Interr	hase systems -	- Ultra high spec 45
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Programme Department	M.E		VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 M.E Programme code 202 Regulation													
Department						Progra	amme	code	20	2	Regula	tion		2019		
	ELEC	POWER SYSTEMS ENGINEERING / ELECTRICAL AND ELECTRONICS ENGINEERING									Seme	ster		I		
Course Code		Cours	e Nar	ne			iods F Week	er	Credit Maxi		Maxin	mum Marks				
P19PS103	Advan Analys	LTPCCAESEAdvanced Power System30034060										Total 100				
Course Objective	The stu	Perfo Expl	orm st ore th	eady : e nua:	state a nces c	of estin	nation	of dif	ferent	t states	power s of a po ation s	ower s	ystem.			
At the end of the course, the student should														Knowled		
Course	CO1:	CO1: To construct models of power system components and apply them														
Outcome	CO2: To solve ac and dc load flow for single and there phase systems															
	CO3: To analyze the faults in the power system networks CO4: To apply the concepts of optimization in power system															
								-				1 /1	1	K6		
		CO5: To explain the concept of state estimation in power system and the role of statistics in state estimation.														
Pre-requisites	Power	Syster	n Ana	alysis												
(3/2/1 ind	icates stre				appin		- Medi	um 1	- Wee	k	(CO/PS	O Map	ping		
COs	ieutes stre					$\frac{1}{1}$ mes (P		uiii, i	wea	ĸ]	PSOs			
РО	PO PO	PO	PO	PO	РО	PO	PO	PO 10	PO	PO	PSO	PSO	PSO	PSO		
1 CO1 3		4	5 1	6 2	7 1	8	9	10	11	$\frac{12}{3}$	1 3	2 1	3	4		
CO 2 2	3 2	3		1		1			2	2	2	1	3			
CO 3 3	2 3	3		1					1	2	3		2	2		
CO 4 3 CO 5 3		2	1	2					2	3	2	2	2	3		
	3 2	2	2	1					2	3	1	3	1	2		
Course Assessm Direct	ent Meth	ods														
1. Continu 2. Assignm				I, II 8	è III											
3. End-Se Indirect	mester ex	amina	tions													
	- end sur	vey														
Content of the s	yllabus															
					220						Perio	1.		9		
Unit – I Network modeli	NETW															

Unit - I		LOW ANALYSIS		Periods	9
			Decoupled method, AC-I		
-			extension to multiple and		
Unit – I				Periods	9
	 Analysis of ba circuit faults 	lanced and unbalanced t	hree phase faults – fault	calculations –	Short circuit
Unit - I		OPTIMIZATION		Periods	9
losses - Se			ems – generalized strate rmulation of optimal p		
Unit – V	STATE E	STIMATION		Periods	9
		f least squares – statisti – power system state est	cs – errors – estimates - imation	- test for bad d	lata – structure and
]	Fotal Periods	45
Text Books				·	
1.	L.P. Singh., <u>A</u> Ltd; 6th ed. Ed	2	n Analysis and Design	i', New Acade	emic Science
2.	Syed A. Nasar, CRC Press, 202	—	ower Systems', 1st Ed	ition, Kindle	Edition
References					
1.	Grainger, J.J. ar 2003.	id Stevenson, W.DPov	wer System Analysis' Ta	ta McGraw hil	l, New Delhi,
2.	Hadi Saadat, _Po	ower System Analysis', 7	Tata McGraw hill, New	Delhi, 2002	
3.	Arrillaga, J and J York, 1997	Arnold, C.P., Computer	analysis of power system	ms' John Wile	y and Sons, New
4.	Pai, M.A., _Com 2006	nputer Techniques in Pov	wer System Analysis', Ta	ata McGraw H	ill, New Delhi,
5.	Greenwood, Alla	an, _Electrical Transients	s In Power Systems, Wil	ey India Pvt.Lt	d, 2 nd ED,2010.
E-Resource	5				
1.	https://nptel.ac.in	/courses/108105067/			
2.	https://www.vidy 2014-15-Edition	arthiplus.com/vp/Thread-	PS7101-Advanced-Power	r-System-Analy	sis-QB-VEC-
3.	https://circuitglob	e.com/power-system.htm	1		

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Prograi	mme	M.E.				I	Program	nme Co	de	202	Reg	ulation	2019				
Departi	ment		TRIC	CAL A	MS ENG ND ELE						Se	emester			I		
Course Co	ode		Cour	se Nam	ie	Per		Per Wee	k (Credit C		Maxi CA	imum Marks ESE Total				
P19MA1	03	Optim	nizatio	on Tech	niques	3				3		<u>40</u>	60			10tar 100	
Course Objective		• • •	Ana Iden Iden Pote	lyze an htify tes htify the entially	the eler d interpr ting of h formula understa	ret stat typothe ation a and for	istical esis fo nd gra tward a	data us r all size phical s and bac	ng a e of s oluti cwar	ppropr samples on of 1	iate pr s. inear J	obabili	ty distr				
		At the	end of	f the cou	urse, the	studen	t shoul	d be abl	e to,				Knowl	edge L	evel		
Course		CO1:	Inculc	ate the		K1, K2											
Outcome		CO2:]	Enable	e to ide		K2, K3											
		CO3:	Abilit	y to tes	t the hyp	oothesi	s using	g suitab	e sta	tistical	test.		K2, K4				
		CO4:]	Incorp	oorate T	ranspor	tation	and As	ssignme	nt pr	oblems	5.		K2, K3				
			C	gnize D ng metl	ynamic j 10d.	progra	mming	g applica	ation	s using	cargo)		K3,	K5		
Pre-requisi	ites																
	COs	(3/2/	/1 indic	cates str	ength of	correla		Strong,			1 - W	eak		CO/I Map PSOs	ping		
	.05	Programme Outcomes (POs) PO 1 PO 2 PO 3 PO 4 PO 5 PO 6 PO 7 PO 8 PO 9 PO 10										PSO	PSO	PSO			
C	201	3	3) 11	12 2	1	2	3	
C	CO 2	3	3		\vdash								2				
	203	3	3										2				
С	204	3 3									2						
	CO 5	3	3										2		1	1	

Course Assessment Methods

Direct

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

Course - end survey

Indirect

content o	f the syllabus		
Unit -	- I RANDOM VARIABLES	Periods	9
Random V	Variables-Probability Function-Moments-Moment Generation F	unction and their Pr	operties-
Binomial-	Poisson-Geometric, Uniform, Exponential and Normal Distribu	tions	
Unit -	II TWO DIMENSIONAL RANDOM VARIBLE	Periods	9
	ributions-Marginal and Conditional distributions-Functions of tw	wo dimensional rand	lom variables-
Regressio	n curve-Correlation		
Unit –		Periods	9
	initions:- (Population, Sampling, Tests of Significance, Testing	• •	• •
	e Hypothesis, Level of Significance, Types of Errors) – Testing		ng: t'-Test,]
	Square Test (ψ^2) - Test for Independence of Attributes & Good	lness of Fit.	
Unit -		Periods	9
	on-Graphical solution-Simplex Method -Transportation and Ass		
Unit –		Periods	9
	Programming-principle of optimality-forward and backward rec nethod)-Problems of dimensionality.		ions (Cargo
		Total Periods	45
Text Boo			
1.	Montgomery, D.C. and Runger, C.G., Applied Statistics and I Edition, Wiley Students Edition, Wiley, 2016.	Probability for Engi	neers, 6 th
2.	Ravichandran, J., Probability and statistics for Engineers, 1 st I		
3.	Fox, R.L., Optimization methods for Engineering Design', A	Addition Wiley, 198	1
Reference			
1.	Gupta S.C. and Kapoor V.K, Fundamentals of Mathematical Sons, 2001.	Statistics, 1 st Edition	n, Sultan an
2.	Devore, J.L., Probability and Statistics for Engineering and Learning, 2011.	the Sciences, 8 th Ec	lition, Cengage
3.	Johnson, R.A., Miller, I. and Freund, J., Miller & Freund's Pre 8 th Edition, Pearson Education, 2010.	obability and Statist	ics for Engineer
	Rao S.S., Engineering Optimization, Theory and practice, 4th	Edition. John Wiley	T D 0
4.	2009.		v & Sons, Inc.
4. 5.			
	2009.Taha, H.A., Operations Research: An Introduction, 9th Edition		
5.	2009.Taha, H.A., Operations Research: An Introduction, 9th Edition		
5. E-Resour	2009. Taha, H.A., Operations Research: An Introduction, 9 th Edition		

ProgrammeM.E.Programme Code202Regulation2019DepartmentPOWER SYSTEMS ENGINEERING / ELECTRICAL AND ELECTRONICS ENGINEERINGSemesterICourse CodeCourse NamePeriods Per WeekCreditMaximum MarksP19PS104Power System simulation lab -I00326040100Course ObjectiveThe students should made to • Analyze simulation results and effective documentationKnowledge LevelCourse ObjectiveThe students should made to • Analyze simulation results and effective documentationK4Course OutcomeAt the end of the course, the student should be able to, methodsKnowledge LevelC01: Solve the algebraic and differential equations by various methodsK4C02: Form the Y bus by using various methodsK4C03: Analyze the load flow study for AC/DCK4Pre-requisitesProgramme Outcomes (POs)PSOP0P0P0P0P0P0P0P0P0P0P0P011221C013211C022321C033221C043221C0532112C0532112C0532112C0532112C0532						mous	Institu		ffiliat	ed to	Anna	a Uni	NG FOR versity ,C 7 205						
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Dep	partme	ent	ELE	CTR	ICAL	ANI		Sama							er I			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Course	e Cod	e		Cou	ırse N	Jame		I			r	Credit		Max	kimum N	Marks		
P19PS104 Simulation lab -I 0 0 3 2 60 40 100 Course Objective The students should made to • Analyze simulation results and effective documentation • Analyze simulation results and effective documentation Course Outcome At the end of the course, the student should be able to, tethods Knowledge Level C01: Solve the algebraic and differential equations by various methods K4 C02: Form the Y bus by using various methods K4 C03: Analyze the load flow study for AC/DC K4 Pre-requisites Programme Outcomes (POs) PSOs Po PSO														CA	ESE	Total			
Objective Analyze simulation results and effective documentation Course Outcome At the end of the course, the student should be able to, Knowledge Level Col: Solve the algebraic and differential equations by various methods K4 Co2: Form the Y bus by using various methods K4 CO3: Analyze the load flow study for AC/DC K4 CO3: Analyze the load flow study for AC/DC K4 CO3: Analyze the load flow study for AC/DC K4 CO3: Analyze the load flow study for AC/DC Fore requisites Pre-requisites Program of correlation 3-Strong, 2 – Medium, 1 - Weak Prosperity CO3 Po Po <th< td=""><td>P19P</td><td colspan="13"></td><td>50</td><td>40</td><td>100</td></th<>	P19P														50	40	100		
Course Outcome CO1: Solve the algebraic and differential equations by various methods K4 CO2: Form the Y bus by using various methods K4 CO3: Analyze the load flow study for AC/DC K4 Pre-requisites CO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak PO CO3 3 4 5 6 7 8 9 10 11 12 1 2 3 4 CO1 3 2 1 1 1 3 2 1 1 CO2 2 3 2 2 1 1 3 2 1 1		Course The students should made to													1				
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Сог	ırse		At the	e end	of the	cours	e, the st	tudent	t shou	ld be	able	to,		K	Inowledg	ge Level		
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Pre-requisites CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak CO/PSO Mapping COs Programme Outcomes (POs) PSOs PO				CO2:	Form	the Y	bus l	oy using	g vari	ous n	netho	ds				K	4		
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CO 4 3 2 3 1 2 1 1					2						1				2	2	1		
			2													1	1		
		5	3							1	-			-	2	÷			

Direct

1. Pre lab &Post lab test

2. End-Semester examinations Indirect

1. Course - end surveyContent of the syllabus

S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Power flow analysis by Newton- Rapshon method	CO2	PO2,PO5, PSO2,PSO3,PSO4
2.	Power flow analysis by fast decoupling method	CO2	PO2,PO5, PSO2,PSO3,PSO4
3.	Power flow analysis by Gauss Seidal method	CO2	PO2,PO5, PSO2,PSO3,PSO4
4.	Simulation of IGBT Inverters.	CO1	PO2,PO5, PSO2,PSO3,PSO4
5.	Simulation of Thyristor Converters.	CO1	PO2,PO5, PSO2,PSO3,PSO4
6.	Transient Stability Studies.	CO1	PO2,PO5, PSO2,PSO3,PSO4
7.	Short Circuit Studies.	CO3	PO2,PO5, PSO2,PSO3,PSO4
8.	Load Forecasting and Unit Commitment.	CO3	PO2,PO5, PSO2,PSO3,PSO4
9.	Economic dispatch using lambda-iteration method	CO1	PO2,PO5, PSO2,PSO3,PSO4
			Total period : 45

	VIV	EKANAN (Autonor	nous Ins	titution,		ted to A	nna Ui	nivers	sity ,Cher		EN	т	50 501 2015 Unimented Carrieto D 1 506425
Programme	M.E.				Progr	amme	Code	;	202	Regul	ation		2019
Departmen	ELEC	ER SYST TRICAL NEERIN	AND						I	Sem	lester		II
Course Code		Course N	lame			riods Week		(Credit			mum M	
	High	Voltage D			L	Т	Р		С	CA		ESE	Total
P19PS205		mission s		5	3	0	0		3	40)	60	100
Course Objective		ident shou Introduce Familiar Expose t preventio	ld be ma e the stu ize the s he stude	ade to, idents student	s with t	he HV	DC co	nvei	rters and	their co	ntrol sy	ystem	
Course		end of the	course	-									Knowledg Level
Outcome	-	Inderstand			-		-	er tai	nsmissic	on techn	ology		K2
		Applying (Analyzing		-				1	dnowon	aantral	airaui	ta	K3 K4
		Design the		-					u power	control	circui	ls.	K4 K6
		Modeling	-						amics S	imulatio	on		K6
Pre-requisites		electronic					0	5					
(3/2/1 indi	cates streng	gth of corr		3-Stro	ng, 2 –		m, 1 -	We	ak	C) Mappi	ing
COs		Progr	ramme	Outcon	nes (PC)s)					Р	SOs	
PO 1	PO PO 2 3	PO PO 4 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1 3	3 3	1			1			2	2	2	1	1	1
CO 2 3 CO 3 3	2 3 3 3	2			1			$\frac{2}{2}$	23	22	1	1	1
CO 4 3 CO 5 3	2 3	1			1			2	3	2	1	1	1
COS 3	3 3	1			1			2	3	2	1	1	1
Course Assessn Direct		ods essment To	est I, II	& III									
1.Contir2.Assign3.End-SIndirect	ment emester ex		15										
1.Contir2.Assign3.End-SIndirect1.Course	ment emester ex - end sur		15										
1. Contir 2. Assign 3. End-S Indirect 1. Course Content of the second seco	ment emester ex - end sur yllabus	vey											
1. Contin 2. Assign 3. End-S Indirect 1. Course Content of the s Unit – I	ment emester ex - end sur yllabus DC PC	vey	RANS							Perio			9 stion of D
1. Contin 2. Assign 3. End-S Indirect 1. Course Content of the s Unit – I	ment emester ex - end sur yllabus DC PC ompariso stem – Pla	vey DWER T on of AC a	RANS and DC r HVD	transi C trans	missio smissio	n – Ap on – M	plicat loderi	ion	of DC t	ransmis	ssion – smissi		-
1.Contin2.Assign3.End-SIndirectIndirect1.CourseContent of the sUnit – IIntroduction - C	ment emester ex - end sur yllabus DC PC ompariso	vey DWER T on of AC a	RANS and DC	trans	missio	n – Ap	plicat	ion	of DC t	ransmis	ssion –		-

Signature of the BOS chairman, EEE

Unit – I	III	CONVERTER AND HVDC SYSTEM CONTROL	Periods	9
1		s of DC Link control – Converter control characteristics – S		2 0
		urrent and extinction angle control – Starting and stoppin	g of DC link-	Power control –
Unit -		ollers– Telecommunication requirements HARMONICS AND FILTERS	Periods	9
		neration of harmonics – Design of AC filters – DC filters –		-
Unit –		SIMULATION OF HVDC SYSTEMS	Periods	<u>9</u>
		stem simulation: Philosophy and tools – HVDC system sal Dynamics Simulation.	simulation – N	Modeling of HVDC
]	Fotal Periods	45
Text Book	KS			
1.		ar .K .R., _HVDC Power Transmission Systems ', New ag, 2016.	e international	(P) Ltd, New
2.		aga .J, _High Voltage Direct Current Transmission', Peter F nn, 1998.	Pregrinus Lond	lon, Second
Reference				
1.		rd Wilson Kimbark , _Direct Current Transmission [•] , Vol 1 on, Sydney,1971.	, Wiley Interso	cience, Newyork,
2.		sh Das Begamudre , _Extra High Voltage AC Transmission New Delhi,2006.	Engineering	Wiley Eastern,
3.		Ison .C and Hingorani N.G., _High Voltage Direct Current London,	Power Transm	issionl, Garraway
4.	Kund	ur.P, -Power system stability and controll, McGraw Hill, 199	94.	
5.	Sunil	S. Rao EHV-AC, HVDC Transmission & Distribution Eng	ineering Paper	back – 1993
E-Resourc	ces			
1.	https:/	//easyengineering.net/hvdc-power-transmission-systems-by-pa	diyar/	
2.	https:/	//drive.google.com/file/d/1xKdq5ReLaNURTbfdIX6LtGidpW	y8hhM8/view	
3.	https:/	//www.sciencedirect.com/science/article/pii/S20965117183007	720	

	VIVE	KANANDHA COLLEGE O (Autonomous Institution, Affilia Elayampalayam, Tiru	ted to	Anna U	Univers	ity ,Chenr			NO NO 2015 CINE Without Cine Carried Carried Carried
Programme	M.E.	Prog	gram	me Co	ode	202	Regulation		2019
Department		SYSTEMS ENGINEERING ICAL AND ELECTRONICS ERING					Semest er		II
Course Code		Course Name Periods Per Week Credit Maximu							Marks
			L	Т	Р	C	CA	ESE	Total
P19PS206	Restruct	ured Power systems	3	0	0	3	40	60	100
Course Objective	 Fundar challer Attain 	nts should made to mental knowledge on restructunges. knowledge about congestion restriction restricti	nanag	ement	t and th	e pricing	g of transmission		
Course		of the course, the student show		-					Knowledge Level
Outcome	CO1: Unde	erstand Comprehend the proce	ss inv	olved	in rest	ructuring	of power Mark	tets.	K2
Outcome		yze the concepts of transmissi				-			K3
		pret knowledge in congestion		-			ancillary.		K2
	CO4: Anal	lyze the various schemes of tra	nsmi	ssion p	oricing.				K3
	CO5: Disc	uss List the requirements to re	form	the Inc	dian po	wer sect	or.		K5
Pre- requisites	Power sys	stem analysis							

(3/	/2/1 inc	dicates	s stren				apping 3-Stro		Medi	um, 1	– Wea	ak	CO/PSO Mapping						
COs				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	2	1		2	1	2	3			3			
CO 2	3	2	2	3		2	2		2				2	2					
CO 3	3	3		2		1	3	2		2	2	3	1	3	2				
CO 4	2			2		2	2	2				2	2			1			
CO 5	3	2	2				1			2	1	3	3	2	3	2			

Course Assessment Methods

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	FUNDAMENTALS OF POWER MARKETS	Periods	9
	indamentals and structure of Restructured Power Market – Marke		U
pool markets -	Independent System Operator (ISO) - components - Role of	ISO - Operati	ing Experiences of
Restructured Ele	ectricity Markets in various Countries (UK, Australia, Europe and	US).	

Unit –	II TRANSMISSION CHALLENGES	Periods	9
	on -Transmission expansion in the New Environment - Role of trans		
	- Total Transfer Capability (TTC) – Computational procedure - Margi	ins – Available	e transfer capability
(ATC) - F	rinciples – Constraints - Methods to compute ATC.		
Unit –	ANCILLARY SERVICES	Periods	9
Managem	f Congestion Management – Methods to relieve the congestion - Inter a ent – Generation Rescheduling - Locational Marginal Pricing (LMP) ncillary Services.		
Unit –		Periods	9
Transmiss method – '	ion pricing methods - Postage stamp - Contract path - MW-mile – MV racing method - Short run marginal cost (SRMC) – Generator Rampin	A mile – Distril 1g and Opportu	bution Factor nity Costs.
Unit –	V INDIAN POWER MARKET	Periods	9
in Indian	enario – Regions – Salient features of Indian Electricity Act 2003 – Repower Sector – Availability based tariff – Necessity – Working Mecleration of two type of Indian Power Exchange.		
		Total Periods	45
Text Boo	ζS		
1.	M. Shahidehpour and M. Alomoush, —Restructuring Electrical P Inc., 2001.	ower Systems	I, Marcel Decker
2.	M. Shahidehpour, H. Yamin and Z. Li, —Market Operations in E Wiley & Sons, Inc., 2002.	lectric Power	SystemsI, John
Reference	2S		
1.	Kankar Bhattacharya, Math H.J. Bollen and Jaap E. Daalder, —O Systems ^I , Kluwer Academic Publishers, 2001.	peration of Re	estructured Power
2.	Loi Lei Lai, -Power system Restructuring and Regulation, John	Wiley sons, 2	2001.
3.	Steven Stoft, Power System Economics: Designing Markets for I Sons, 2002.	Electricity, Jo	hn Wiley and
4.	Daniel Kirschen and Goran Strbac, —Fundamentals of Power Syst Sons, Ltd, 2004.	em Economics	John Wiley and
5.	Sally Hunt, Making competition work in electricity, , John Wille	ey and Sons In	c. 2002.
	<u> </u>		
E-Resour	ces		
E-Resour 1.	ttps://www.academia.edu/33475490/LAI-Power_System_Restru	cturing_and_I	Deregulation.pdf
		cturing_and_I	Deregulation.pdf

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Progr	amme	M	.E.			Prog	ramm	e Code	e		202	2	Regula	tion		2019
Depar	rtment	EL	-	R S TRICA TEER	AL	EMS ANI	DI	GINEI ELECI	FRON	ICS		Sem	ester			II
Course (Code		C	Course	e Nan	ne]	Periods			Cree				num M	larks
Course	30 40				o i (uii			L	Т	Р	C		CA		ESE	Total
P19PS	207	Au	toma			d be m		3	0	0	3		40		60	100
Course Objective	9		•	Unde the co	erstan onting	d pow gencie	ver sys es		curity	conc			-		advanta ods to	rang
		At														Knowledg
Cour		CO	1:U	nders	tand	and de	esign	of plc a	autom	ation.						K3
Outco	me							unicat			e of Pl	LC				K2
		CO	O3: Understand about operation and Control using SCADA O4: Analyze about Substation Automation											K3		
																K6
D	• • •					ut Dis	stribut	ion Au	itomat	ion						K6
Pre-requi	sites	PL	ιC &	SCA	DA											
(3)	2/1 indi	icates	stren	oth of	CO/]	PO Ma	apping	g ong 2 -	- Medii	ım 1	- Weak		CO)/PSO	Mappi	ing
COs	2, 1 ma	eutes	Strong					mes (PC		, 1					PSOs	
	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO 12	PSO	PSO	PSO	PSO
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CO 1				2	2							2	2	2		
CO 2	3											$\frac{2}{2}$	2	2		
CO 2 CO 3	3 3		3		2							2	2	2		
CO 2	3 3 3	2	3	2	2							2	2	2		2
CO 2 CO 3 CO 4 CO 5	3 3 3 3			2	2							2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As	3 3 3 3				2							2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As Direct	3 3 3 3 55855500	ent M	Ietho	ds		I, II &	& III					2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A	3 3 3 3	ent M ous A nent	Ietho	ds sment	t Test	. I, II &	& III					2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A	3 3 3 3 ssessme ssignm	ent M ous A nent	Ietho	ds sment	t Test	I, II &	& III					2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A 3. E Indirect	3 3 3 3 ssessme ssignm	ent M ous A nent nester	Ietho Assess r exai	ds sment minat	t Test	I, II &	& III					2	2	2		2
CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A 3. E Indirect	3 3 3 3 ssessmo ontinuo ssignm nd-Sen urse - e	ent M ous A nent nester end su	Ietho Assess r exai	ds sment minat	t Test	I, II &	& III					2	2	2		2

Structure of PLC - Control program – Programming: Simple Relay Layouts and Schematics - PLC Connections - Ladder Logic Inputs - Ladder Logic Outputs.

Unit -	II COMPONENTS OF AUTOMATED SYSTEMS	Periods	9
Maintena	Transducers and Actuators: Forgotten cost - Special consider nce. Remote Terminal Unit: Communication interface – Protoc ntrol- Data Storage – Applications		
Unit –		Periods	9
	n of SCADA – Applicable processes – Elements of SCADA sy and Control using SCADA - Development from telemetry – I ters		
Unit -	IV SUBSTATION AUTOMATION	Periods	9
	on – function of substation Automation System - trends of substate substation monitoring and control – remote metering.	tion Automation -	intelligent,
Unit –	V DISTRIBUTION AUTOMATION	Periods	9
	Distribution Automation – Characteristics of Distribution Auto Distribution feeder – fault isolation and restoration.	mation – Feeder J	Automation –
		Total Periods	45
Text Boo	ks		
1.	Dilip Patel –Introduction Practical PLC (Programmable Logi GRIN Verlag 2009.	c Controller) Prog	gramming
2.	Mini S.Thomas, John D.McDonald, Power System SCAD 2019.	A and Smart Gri	ds, CRC Press
Reference	es		
1.	Gary A. Dunning –Introduction to Programmable Logic Cont Publications.2006	rollers Thomson	Learning
2.	James Northcote-Green, Robert G. WilsonControl and Aut Distribution Systems ^I , CRC Press, 2006.	omation of Electr	rical Power
3.	Dr. M.K. Khedkar, Dr. G.M. Dhole –Electric Power Distribu Publications, Ltd.	tion Automation -	-Laxmi
4.	K S Manoj –Industrial Automation with SCADA: Concepts, Notion press 2019.	Communications	and Security
E-Resour	ces		
1.	http://jjackson.eng.ua.edu/courses/ece485/lectures/		
2.	https://electrical-guru.com/subject.aspx?id=3&code=6EE5A	&unitid=3&topic	id=18
3.	https://www.watelectrical.com/scada-applications-in-power-		

ProgrammeM.E.Programme Code202Regulation2019DepartmentPOWER SYSTEMS ENGINEERING / ELECTRICAL AND ELECTRONICSSemesterIIDepartmentPOWER SYSTEMS ENGINEERING / ENGINEERINGSemesterIICourse CodeCourse NamePeriods Per WeekCred itDispectPower System Simulation lab -II00326040100Course ObjectiveOutcomeKimulation lab -II00326040100Course ObjectiveOutcomeCourse inulation results and effective documentationCourse OutcomeCO / PO Mapping (3/2/1 indicates strength of correlation) $3\cdot Strong, 2 - Medium, 1 - WeakProgramme Co/PO Mapping(3/2/1 indicates strength of correlation) 3\cdot Strong, 2 - Medium, 1 - WeakCO/PO Mapping(3/2/1 indicates strength of correlation) 3\cdot Strong, 2 - Medium, 1 - WeakProgramme Co/PO Mapping1CO/PO Mapping(3/2/1 indicates strength of correlation) 3\cdot Strong, 2 - Medium, 1 - WeakPSOProgramme Outcomes (Pos)PSOPoor PO $	<u>G</u>			VI			nous I		, Affili	ated to	Anna	a Univ	RING FO versity ,Ch 7 205		MEN				
DepartmentELECTRICAL AND ELECTRONICSSemesterIISemesterIICourse NamePeriods Per WeekCred itMaximum MarksCourse NamePeriods Per WeekCred itMaximum MarksPloyer System0032Gred itPower System00Simulation tab -II0Course CourseMaximum MarksThe students should made toKnowledge 	Pro	gram	me	M.E	4.		Pı	ogrami	ne Co	de			202	Reg	ulation		2019		
Course NameCourse NameCourse NameCourse NameCourse NameCourse NameCourse SystemCourse Simulation lab -IIOOCourse Simulation lab -IIOOOCourse Simulation lab -IIOOCourse Simulation results and effective documentationCourse ObjectiveAt the end of the course, the student should be able to,Knowledge LevelCourse Course Course Course Course Course, the student should be able to,Course Course Course Course Course Course and analyze simulation results and effective documentationK44CO1 : Analyze simulation results and effective documentationK44CO2 : Exhibit professional behaviorForerequisitesVererequisitesForerequisitesCO/PO MappingCO/PO MappingCO/PO MappingCO/PO MappingCO/PO MappingCO/PO MappingCO/PO PO P	Dej	partm	ent	ELE	CTR	ICAL	ANI							Se	mester	II			
P19PS208Power System Simulation lab -II00326040100Course ObjectiveThe students should made to • Analyze simulation results and effective documentation••Analyze simulation results and effective documentationCourse OutcomeAt the end of the course, the student should be able to, CO1 : Analyze simulation results and effective documentationK4CO2 :Exhibit professional behavior CO3 :Acquire expertise in usage of modern toolsK4CO3 :Acquire expertise in usage of modern toolsPSOsPre-requisitesProgramme Outcomes (POs)PSOP0 CO1P0 2P0 3P0 2P0 3P0 2P0 3P0 4P0 5P0 7P0 9P0 9P0 9P0 9P0 9P0 9P0 9P0 9P0 2P0 3P3 4P3 4DirectDirectIndirect	Course	e Cod	e		Co	urse N	Jame			We	ek		it	~			-		
P19PS208Simulation lab -II00326040100Course ObjectiveThe students should made to • Analyze simulation results and effective documentationKnowledge LevelCourse OutcomeAt the end of the course, the student should be able to, CO1 : Analyze simulation results and effective documentationK4CO2 :Exhibit professional behavior CO3 :Acquire expertise in usage of modern toolsK4Pre-requisitesCO/PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 - Medium, 1 - WeakCO/PSO MappingCOsProgramme Outcomes (POs)PSOsPSOsPoPo 1Po Po Po Po Oot3221123Coi3221112Oi32211221DirectIPre lab &Post lab test 2.End-Semester examinationsIIIIIIDirectIPre lab &Post lab test 2.End-Semester examinationsIIIIIIIIDirectIPre lab &Post lab test 2.End-Semester examinationsIIIIIIIIDirectIIIIIIIIIIIIDirectIIIIIIIIIIIDirect <th< td=""><td></td><td></td><td></td><td></td><td>~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~</td><td></td><td></td><td></td><td>L</td><td>,</td><td>Т</td><td>Р</td><td>C</td><td>C.</td><td>A</td><td>ESE</td><td>Total</td></th<>					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				L	,	Т	Р	C	C.	A	ESE	Total		
Simulation 120 -11Course ObjectiveThe students should made to • Analyze simulation results and effective documentationCourse OutcomeAt the end of the course, the student should be able to,Knowledge 	P19F	PS208			-				0		0	3	2	6	0	40	100		
Objective • Analyze simulation results and effective documentation Course Outcome At the end of the course, the student should be able to, CO1 : Analyze simulation results and effective documentation K4 CO2 :Exhibit professional behavior K4 CO3 :Acquire expertise in usage of modern tools K4 CO3 :Acquire expertise in usage of modern tools K4 Pre-requisites Programme Outcomes (POS) PSOs PO PO PO PO PO PO PO PO PO PSOs Oot 1 3 2 1 1 1 2 3 4 Oot 2 2 3 2 1 1 1 2 2 2 1 Ot 4 3 2 2 1 1 2 1 2 1 2 1 1 2 1 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Ŭ</td><td></td><td>v</td><td>U</td><td>-</td><td>Ŭ</td><td>•</td><td></td><td>100</td></th<>									Ŭ		v	U	-	Ŭ	•		100		
Course OutcomeIn the end of the course, the student should be able to,LevelCourseCO1 : Analyze simulation results and effective documentationK4CO2 :Exhibit professional behaviorK4CO3 :Acquire expertise in usage of modern toolsK4CO3 :Acquire expertise in usage of modern toolsK4CO/PO Mapping(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - WeakCO/PSO MappingCO/PSO Mapping(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - WeakOsProgramme Outcomes (POs)PSOsPOPOPOPOPOPOPSOPSOO132111211O22322111221O3322111211Of 32211121DirectIndirectIndirect				The s					ı resu	lts ar	nd et	ffect	ive docu	umenta	tion				
OutcomeCO1 : Analyze simulation results and effective documentationK4CO2 :Exhibit professional behaviorK4CO/20 :Exhibit professional behaviorK4CO/PO MappingCO/PSO Mapping(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - WeakCO/PSO MappingCO/PSO MappingCO/PSO Mapping(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - WeakCO/PSO MappingCO/PSO MappingCO/PSO MappingO PO	Со	urse		At the end of the course, the student should be able to,												Kı	Knowledge Level		
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Direct 1. Pre lab &Post lab test 2. End-Semester examinations		3	-	_							1			2		1	-		
 Pre lab &Post lab test End-Semester examinations Indirect	20 5		3	2	2					1					2		1		
1. Course - end survey	1. 2.	Pre End	-Sen	nester	exan		ons												
		(Ollr	se - e	ena su	rvey														

	Content of the syllabus	-	
S.No	LIST OF EXPERIMENTS	Course Outcome	Program Outcome & Program Specific Outcome
1.	Load frequency dynamics of single and two area power system.	CO1	PO3,PO4,PO5, PSO2,PSO3
2.	Load flow analysis of a given power system with STATCOM.	CO3	PO3,PO4,PO5, PSO1,PSO2,PSO3
3.	Simulation of facts controllers.	CO1	PO3,PO5 PSO2,PSO3
4.	Determination of power angle curve for non-salient pole synchronous machines.	CO1	PO3,PO4,PO5, PSO2,PSO3,PSO4
5.	Swing curve for sustained fault and critical clearing angle & time.	CO1	PO3,PO5, PSO2,PSO3
6.	Small signal stability analysis of multi-machine system.	CO3	PO3,PO5, PSO2,PSO3
7.	Transient analysis of single machine infinite bus (SMIB) system with STATCOM.	CO3	PO2,PO3,PO5, PSO2,PSO3
8.	Write a program for best first search.	CO1	PO2,PO3,PO5, PSO2,PSO4
9.	Study the electromagnetic transients in power systems.	CO2	PO3,PO5, PSO1,PSO4
			Total period : 45

Programe	M.E.				Pr	ogram	me Co	de			202	Re	gulatio	n	2019					
Department	POW ELEC AND	TRI	CAL		ENG	INEE	RING	÷/			S		mester I							
a a 1									er wee	ek	Credit		Ma	ximum I	Marks					
Course Code				rse N			L	Т	Р		С	(CA	ESE	Tota					
P19PSE01	Power Reliat	oility					3	0	0		3		40	60	100					
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	At the	end o	of the	cour	se, th	e stude	ent sho	ould b	e able	to,	-				nowledge Level					
Course	CO1 :	Estin	nate t	he tre	end of	powe	r cons	ımpti	on by	end u	iser.				K6					
Outcome											ng of po straints			ower	K5 K3					
			umpt						0											
		Unde		d the	funda						execute on subs			ans.	K6 K2					
	Power Systems Operation and Control																			
Pre- requisites	Power	Syste			CO / PO Mapping 1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak															
requisites		-						- Medi	ium. 1	- Wea	ık			PSOs						
requisites		-	gth of	corre	lation)		ong, 2 -		ium, 1	- Wea	ık		Р	SOs						
(3/2/1 COs	indicates	streng	gth of H PO	corre Progra PO	lation) imme PO	3-Stro Outcor PO	ong, 2 - nes (P0 P0	Ds) PO	РО	РО	РО	PSO 1	PSO	PSO	PSO					
(3/2/1 COs	indicates	strenş	gth of I	corre Progra	lation) imme	3-Stro Outcor	ong, 2 - nes (P0	Ds)				PSO 1 2			PSO 4					
(3/2/1 COs P CO 1 CO 2	indicates D PO 2 3 3 3	strens PO 3 3	gth of H PO	corre Progra PO 5	lation) imme PO 6	3-Stro Outcor PO	ong, 2 - nes (P0 P0	Ds) PO 9	РО	РО	PO 12 1 2	1 2 2	PSO	PSO 3						
(3/2/1 COs P CO 1	indicates D PO 2 3 3 5 5	streng PO 3	gth of H PO	corre Progra PO 5 3	lation) imme PO 6	3-Stro Outcor PO	ong, 2 - nes (P0 P0	Ds) PO	РО	РО	PO 12 1	1 2	PSO 2	PSO						

-		ssessment Methods		
Dir				
		ontinuous Assessment Test I, II & III		
		ssignment nd-Semester examinations		
	irect			
		Irse - end survey		
Con	tent o	f the syllabus		
Uni	t – I	LOAD FORECASTING	Periods	9
		of forecasting - Load growth patterns and their importance in planning - L		
		multiple regression techniques - Weather sensitive load forecasting -	- Determination	of annual
		g – Use of AL in load forecasting.	D 1	0
		GENERATION SYSTEM RELIABILITY ANALYSIS	Periods	9
		ic generation and load models – Determination of LOLP and expected valution of reliability of isolated and interconnected generation systems.	ies of demand no	ot served –
Unit	– III	TRANSMISSION SYSTEM RELIABILITY ANALYSIS	Periods	9
Dete	erminis	stic contingency analysis - Probabilistic load flow - Fuzzy load flow	probabilistic tra	ansmission
syst			6 1 1	. 1
		analysis – Determination of reliability indices like LOLP and expected value EXPANSION PLANNING	es of demand no Periods	t served. 9
				-
		epts on expansion planning – Procedure followed for integrate transmission n India – Capacitor placement problem in transmission system and radial dis		
		DISTIBUTION SYSTEM PLANNING OVERVIEW	Periods	9
Intro	oductio	on, sub transmission lines and distribution substations – Design of primary	v and secondary	system –
		n system protection and coordination of protective devices.	,	5550011
		Total P	Periods	45
Tex	t Book	S		
1.	J. Na	grath and D.P. Kothari: Power System Engineering 2/e, MGH. 2011		
2.	C. L.	Wadhwa: Electrical Power Systems, New age international Ltd. Third Editi	ion 2009	
3.	A. S.	Pabla: Electrical Power System Planning, Mcmillan India Ltd. 2012		
Ref	erence	S		
1.	Proce	eding of work shop on —Energy system planning & manufacturing, CI.		
2.		van R.L., —Power system planningl, McGrawHill.Inc,. US 1997.		
3.	Roy]	Billinton and Allan Ronald, —Power System Reliabilityl, Gardon & Breach	, Newyork, 1970)
4.		llic, F. Faliana and L. Fink: Power System Restructuring Engineering and E	conomics, Kulw	ar
		emic Publisher. 2010		
5.	L. L.	Lie: Power System Restructuring and Deregulation, John Willey & Sons U	K. 2001	
E-R	esour	ces		
1.	<u> </u>	//nptel.ac.in/courses/108102047/		
2.	https:	://swayam.gov.in/nd1_noc19_ee62/		
3.	https:	//www.classcentral.com/course/swayam-power-system-analysis-14243		

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205											So ana zan Transant Canzal O marca		
Program	nme	Μ	.E.]	Program	mme	Code	20)2 I	Regula	tion		2019
Departn	Department		POWER SYSTEMS ENGIN ELECTRICAL AND ELEC ENGINEERING								Semester		П			
Course (Code		(Cours	e Nar	ne		١	iods P Veek		Cre			Maxin	aximum Marks	
								L	T	P	(CA		ESE	Total
P19PS	E02				nvert		_	3	0	0	3	3	40		60	100
Course Objective		 The student should be made to, Understand the distinct operation of various inverter circuits. Design the various type of inverter circuits and apply the circuits practical applications. Develop the various inverters in simulation and hardware. 														
Course Outcome			At the end of the course, the student should be able to,												Knowledge Level	
			CO1: Apply voltage control and harmonic reduction techniques in inverters CO2: Develop control strategies for three phase voltage source inverters												ers	K3
					-		-					-				K3 K4
			CO3: Distinguish the modes of operation for current source inverters CO4: Construct various types if multilevel inverters												K4 K2	
		CO5: Design resonant inverters for various applications											K6			
Pre-requi	isites			-								Device	es			
		•	CO / PO Mapping cates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak										CO/PSO Mapping PSOs			
	/2/1 inc	licates	s stren		Programme Ou			comes (POs)						1		
(3/ COs														_		
COs	PO 1	licates PO 2	PO 3		Progra PO 5	PO 6	PO 7	PO 8	Ds) PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
COs CO 1	РО	РО	PO 3 2	PO 4	PO 5	PO	РО	РО	РО	-	-	-	1 3	PSO	PSO 3	
COs CO 1 CO 2	PO 1 3	PO 2 2	PO 3	PO 4 3	PO	PO	РО	РО	РО	-	-	-	1 3 2	PSO 2	PSO 3	4
COs CO 1	PO 1	PO 2	PO 3 2	PO 4	PO 5	PO	РО	РО	РО	-	-	-	1 3	PSO	PSO 3	
COs CO 1 CO 2 CO 3	PO 1 3	PO 2 2	PO 3 2	PO 4 3	PO 5	PO	PO 7	РО	РО	-	11	-	1 3 2	PSO 2	PSO 3 1	4
COs CO 1 CO 2 CO 3 CO 4 CO 5 Course As Direct 1. (C)	PO 1 3 2 ssessm	PO 2 2 1 2 1 2 1 1 2 1 0 0005 2	PO 3 2 2 1 2 1 2 4 etho Asses	PO 4 3 2 2 2 ds	PO 5 1 2 3	PO	PO 7	PO 8	PO 9		11	-	1 3 2	PSO 2 2 2 1	PSO 3 1	4
COs CO 1 CO 2 CO 3 CO 4 CO 5 Course As Direct 1. CO 2. A 3. H	PO 1 3 2 ssessm	PO 2 2 1 2 1 2 1 uous . ment,	PO 3 2 2 1 2 1 2 Metho Asses Mini	PO 4 3 2 2 ds smen proje	PO 5 1 2 3 t Test ect, qu	PO 6	PO 7	PO 8	PO 9		11	-	1 3 2	PSO 2 2 2 1	PSO 3 1	4
COs CO 1 CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A 3. H Indirect	PO 1 3 2 2 ssessm Contin Assign End-Se	PO 2 2 1 2 1 1 2 1 1 uous . ment, pemeste	PO 3 2 2 1 2 4 etho Asses Mini er exa	PO 4 3 2 2 ds smen proje minat	PO 5 1 2 3 t Test ect, qu	PO 6	PO 7	PO 8	PO 9		11	-	1 3 2	PSO 2 2 2 1	PSO 3 1	4
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COs CO 1 CO 2 CO 3 CO 4 CO 5 Course As Direct 1. C 2. A 3. H Indirect	PO 1 3 2 ssessm Contin Assign End-Se	PO 2 2 1 2 1 1 2 1 1 uous . ment, emesto e - end	PO 3 2 2 1 2 4 etho Asses Mini er exa surve	PO 4 3 2 2 ds smen proje minat	PO 5 1 2 3 t Test ect, qu tions	PO 6	PO 7	PO 8	PO 9		11		1 3 2	PSO 2 2 2 1	PSO 3 1	4

Unit -	II THREE PHASE VOLTAGE SOURCE INVERTERS	Periods	9				
	e and 120 degree conduction mode inverters with star and delta co three phase inverters: single, multi pulse, sinusoidal, space vector						
Unit –		Periods	<u>9</u>				
Operation	of six-step thyristor inverter – inverter operation modes – load – c	commutated	inverters – Auto				
	l current source inverter (ASCI) - current pulsations - comparison	of current	source inverter				
	ge source inverters.	1					
Unit -	IV MULTILEVEL INVERTERS	Periods	9				
	l concept – diode clamped – flying capacitor – cascade type multile vel inverters - application of multilevel inverters	evel inverte	rs - Comparison				
Unit –	V RESONANT INVERTERS	Periods	9				
	d parallel resonant inverters - voltage control of resonant inverters DC – link inverters	s – Class E	resonant inverter –				
	То	tal Periods	45				
Text Boo	ζS						
1.	Rashid M.H., —Power Electronics Circuits, Devices and Application Edition, New Delhi, 2004.	ons ", Prentie	ce Hall India, Third				
2.	M.D.Singh, K.B.Khanchandani, —Power Electronics, 2nd Edition Tata McGraw Hill Education, 2008.						
Reference	25						
1.	Jai P.Agrawal, —Power Electronics Systems, Pearson Education, S	Second Editi	on, 2002.				
2.	Bimal K.Bose — Modern Power Electronics and AC Drives ^{II} , Pearson Education, Second Edition, 2003.						
3.	P.C.Sen, —Power Electronics ^{II} , 1st Edition, Tata McGraw Hill India, 2007.						
4.	P.S. Bimbra, -Power Electronicsl, Khanna Publishers, 2012, New Delhi.						
5.	Ned Mohan, Tore M. Undeland, William P.Robbins, —Power Electronics: Converters, Applications and Design ^I , Wiley student education, Third Edition.						
E-Resour							
1.	http://nptel.ac.in						
2.	http://www.sciencedirect.com						
3.	http://www.researchgate.net						

	VIVI		nomoi	is Insti	tution,	GE OF Affiliate m, Tiruc	d to An	na Uni	versity	-	WOME mai)	N		Cotteen Virbunded Cotteen
Programme	M.E.			Prog	ramm	e Code	;		202	2	Regula	tion		2019
Department	POWE ELECT ENGIN	RICA	L AN						•		Seme	ester		I
Course Code		Cours	e Nar	ne	-	Ţ	iods P Week		Crea				num M	
P19PSE03	High P		0			L 3	T 0	P 0	C 3		$\frac{CA}{40}$		ESE 60	Total 100
Course Objective	The stu • Un • Un	dent s dersta dersta	hould nd the nd the	l be m e requ e diffe	ade to ireme erent t	o ents of l opolog	nigh p ies inv	ower i	rated c l for th	nese				100
	At the e													Knowledge Level
Course Outcome	Conver	ters				e		2			C power			K2
	CO2: 7 loads	o ana	lyze o	of pow	ver sei	micond	uctor	switcl	ned cir	rcuit	s with di	fferen	t	K3
					ē			OC pov	wer co	onvei	rter syste	ems.		K3
	CO4: \													K3
Pre-requisites	CO5: A			vertei	W111	be anal	yzed							K3
_	icates stre		CO /1		appin) 3-Str		- Medi	um, 1	- Weak	c	(CO/PS	O Map	ping
COs			Progra	amme	Outco	mes (PO	Ds)						PSOs	
PO 1	PO PO 2 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
CO1 3		3	3										2	2
CO 2 3 CO 3 3			3							3			2	2 2
CO 4 3			5				3			5			2	2
CO 5 3										3			2	2
2. Assign	ious Asse	ssmen		I, II &	z III									
Indirect														
1. Course	- end surv	/ey												
Content of the s	yllabus													
Unit – I	AC TO	DC (CON	VER	ΓERS						Perio	ds		9

Unit -	II POWER SEMICONDUCTOR SWITCHED CIRCUITS	Periods	9
Analysis of circuit.	of power semiconductor switched circuits with R, L, RL, RC loa	ds, d.c. motor load	d, battery charging
Unit –	III DC TO DC CONVERTERS	Periods	9
•	and design of DC to DC converters- Control of DC-DC converte s, Buck-Boost converters, Cuk converters	rs, Buck converte	rs, Boost
Unit -	IV INVERTERS	Periods	9
	ase and Three phase inverters, Voltage source and Current source minimization in inverters	e inverters, Voltag	ge control and
Unit –	- V AC TO AC POWER CONVERTER	Periods	9
	C power conversion using voltage regulators, choppers and s, introduction to Matrix converters.	-	
		Total Periods	45
Text Boo	oks		
1.	High-Power Converters and AC Drives (IEEE Press Series on Bin Wu (Author), Mehdi Narimani (Author), Publisher: Wile 17, 2017)	•	
2.	RashidM.H.,_ Power Electronics-Circuits, Devices and Applied Delhi, 2009.	cations', Prentice	Hall India, New
3.	High–Power Converters and AC Drives, Bin Wu (Author), Pu March 2006)	blisher: Wiley-Bl	ackwell (31
Reference	ces		
1.	Ned Mohan, Undeland and Robbin, _Power Electronics: conv John Wiley and sons. Inc, Newyork, 2006.	erters, Application	n and design',
2.	P.CSen., Modern Power Electronics', Wheeler publishing Co 2005	ompany, 1st Editio	on, New Delhi,
3.	Modular Multilevel Converters: Analysis, Control, and Applic Dekka ; Bin Wu ; Navid Zargari, Wiley-IEEE Press 2018	cations, Sixing Du	; Apparao
4.	Modern Power Electronics and AC Drives 1st Edition by Bim (October 22, 2001)	al K. Bose , Prent	ice Hall; 1 edition
5.	Power Electronics: Converters, Applications, and Mohan (Author), Tore M. Undeland (Author), William P. Rob (October 10, 2002)		Edition by Ned iley; 3 edition
E-Resour	ces		
1.	http://site.iugaza.edu.ps/malramlawi/files/RASHID_Power_Elec	tronics_Handbook	pdf
2.	https://easyengineering.net/power-electronics-by-bimbhra/		

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Programme	Μ	.E			Pro	gramm	ne Cod	e			202	Regula	tion		2019
Department	EL	ЕСТ		AL A		NGIN ELECT						Seme	ster		I
Course Code			Cour	se Na	ame		P	Period We	ek		Credi				n Marks
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Course Objective	• (• L	Jnde earn	rstanc about	l the v t mod	leling	us type and co	mputa	ationa	l aspe	cts ti	ansier	is in pow nts comp nead lines	utatio		
	At t	the er	nd of 1	the co	ourse,	the stud	dent sh	ould l	be abl	e to,					Knowledge Level
Course			-			equatio									K3
Outcome						er volta	ges du	e to li	ghtnir	ng in	power	system a	ind the	;	K2
Outcome	CO	3: Ex	over xplain d ski	the p	arame	eters in	transn	nission	1 lines	and	the eff	fects of g	round		K2
	form	nulas	for c	able p	baram	eters.			-			and appr			K4
						ulties in transie		missic	on line	e para	imeters	s and the	princi	ple	K5
Pre-requisites						and Co									
(3/2/1 ind	icates	stren				apping) 3-Stro		- Medi	um, 1	- We	ak	(CO/PS	O Map	oping
COs						Outcor]	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	2	2	2		1	, 	1	, ,	1		1	3		3	2
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Course Assessm Direct 1. Continu 2. Assign 3. End-Se	ious A ment	Asses	sment		I, II &	& III									
Indirect															
1. Course															

Content o	v	REVIEW OF TRAVELLING WAVE	<u>т</u> т	
Unit -	– I	PHENOMENA	Periods	9
		tributed Parameters – Wave Equation – Reflection, Refraction		of Travelling
waves at t	the line	terminations – Lattice Diagrams – Attenuation and Distort	ion.	
Unit -	II	LIGHTNING, SWITCHING AND TEMPORARY OVERVOLTAGES	Periods	9
Lightning	overvo	ltages: interaction between lightning and power system- gr	ound wire volta	ge and voltage
		switching overvoltage: Short line or kilometric fault, ener		
		methods of control; temporary overvoltages: line dropping,	load rejection; v	voltage induced b
fault; very	y fast tra	ansient overvoltage (VFTO).		
Unit –	ш	PARAMETERS AND MODELING OF	Periods	9
		OVERHEAD LINES		-
bundle co on multi transform	nductor -phase ation, n	parameters for simple configurations: series resistance, in rs : equivalent GMR and equivalent radius; modal propaga transposed transmission lines, α - β - 0 transformation modal impedances; analysis of modes on un transposed lines	ation in transmis and symmet	ssion lines: mode rical component
effect; tra	nspositi	ion schemes	1 1	
Unit -	IV	PARAMETERS AND MODELING OF	Periods	9
		UNDERGROUND CABLES eatures of underground cables: technical features, electrical		
impedanc	e and a	les; cable types; series impedance and shunt admittance o dmittance matrices for three phase system formed by three nulas for cable parameters.		
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Unit - Features of	- V of a typi	COMPUTATION OF POWER SYSTEM TRANSIENTS ical line parameter evaluation program; constructional featu		
Unit – Features of line parar bundling electroma	- V of a typi neters; of con gnetic t	COMPUTATION OF POWER SYSTEM TRANSIENTS	ures of that affect ctors elimination ts: features an lules: basic solution	t transmission n of ground wire d capabilities o tion methods; cas
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Unit –	II SAGS AND INTERRUPTIONS	Periods	9
Voltage va	ariations, Voltage sags and short interruptions – flicker- lo	nger duration variations	– sources –
range and	impact on sensitive circuits-standards - solutions and miti	gations - equipment and	techniques.
Unit –	III TRANSIENTS AND PROTECTION	Periods	9
	- origin and classifications - capacitor switching transien	t - lightning-load switch	ing – impact
on users -	protection – mitigation.		
Unit –	IV HARMONICS	Periods	9
Harmonic	s - sources - definitions & standards - impacts - calculation	on and simulation – harn	nonic
power flow	w – mitigation and control techniques – filtering – passive	and active.	
Unit –	V APPLICATIONS	Periods	9
	ality conditioners – shunt and series compensators-D S wer quality conditioners-case studies.	Statcom–Dynamic voltag	ge restorer-
I	1	Total Periods	45
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1.	Roger. C. Dugan, Mark. F. Mc Granagham, Surya Santo Systems Qualityl, McGraw Hill,2003.	oso, H.WayneBeaty, —E	lectrical Power
2.	Bhim Singh, Ambrish Chandra, Kamal Al-Haddad, Pov	wer Quality Problems &	Mitigation
	Techniques Wiley, 2015.		C
Reference	28		
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2.	J. Arrillaga, N.R. Watson, S. Chen, —Power System Qu Wiley),2000.	ality AssessmentI, (New	York:
3.	Math H.J.Bollen, —Understanding Power Quality Probl IEEE Press, New York, 2000.	ems: Voltage Sags and I	nterruptions ,
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3.	https://books.google.co.in/books/about/Electrical_Power fcCNvTiYC&redir_esc=y	r_Quality_Control_Tech	niq.html?id=6xR

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	CO4:	Under		volta	ge stab	oility p	robler	n and	issues	5				K2
	CO5:	Apply	differ	ent n	nethod	s to im	prove	stabi	lity of	powe	er systen	n		K3
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Content o	of the sy	llabus		
Unit – I		POWER SYSTEM STABILITY	Periods	0
Unit – I		CONSIDERATIONS		9
		bility considerations – definitions-classification of stability		
•		achine representation - classical model - load modeling con	ncepts - modelin	g of excitation
•		ng of prime movers.		
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		y - swing equation-equal area criterion - solution of swin		
		unge -Kutta method - critical clearing time and angle		
-		machine stability – extended equal area criterion - transient		
Unit –		SMALL SIGNAL STABILITY	Periods	9
Small sign	nal stabi	ility – state space representation – eigen values - modal ma	trices – small sig	gnal stability of
		nfinite bus system – synchronous machine classical mode		
		- effect of excitation system-small signal stability of multi		
Unit -		VOLTAGE STABILITY	Periods	9
		- generation aspects - transmission system aspects - load a		
		sis with static loads - load ability limit - sensitivity analys	is - continuation	power flow
analycic		ity mechanisms – examples		
Unit – Methods of fast valvir	of impro ng - higl	METHODS OF IMPROVING STABILITY oving stability – transient stability enhancement – high speed h speed excitation systems- small signal stability enhancem		
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Unit –		GENERAL CONCEPTS	Periods	9
		nmercial distribution systems – Energy losses in distribution		
		tion – comparison of O/H lines and underground cable sy	stem .Networl	k model – power
Unit -		and loss calculations. DISTRIBUTION FEEDERS	Periods	9
		em, reliability analysis – reliability concepts – Markov m		-
		bility performance-	louer – distribu	IIIOII IIEIWOIK
Unit –		DISTRIBUTION PLANNING	Periods	9
Distributio	n syster	n expansion -planning – load characteristics – load forecasting	g – design conce	pts – optimal
		ion – design of radial lines – solution technique.	-	
Unit - I	-	SYSTEM ANALYSIS	Periods	9
		- Application of shunt capacitance for loss reduction – Ha	armonics in the	e system – static
		oss reduction and voltage improvement.	D · 1	
Unit –		PROTECTION	Periods	9
		on - requirement - fuses and section analyzers-over cu	urrent. Under	voltage and unde
frequency	^v protec	tion – coordination of protective device.		
			Fotal Periods	45
Text Book	ks			
1.	Tura	n Gonen, -Electric Power Distribution Engineering, 3rd E	dition, CRC P	ress,2014
2.		s A. Momoh, Electric Power Distribution, Automation, P on, CRC Press,2007	rotection, and	Control 1st
Reference	es			
1.	Pabla	, A.S., "Electrical Power Distribution System", 5th edition	on,Tata McGra	aw hill, 2004.
2.	Tuva	r Goner, "Electrical Power Distribution System Engineer	ing", McGraw	hill, 1986.
	Sterl	ng, M.I.H., -Power System Controll, Peter Peergisus, 200)6	
3.		ing, MI.I.H., -Power System Controll, Peter Peergisus, 200		
3. 4.	1	<u> </u>		
	Coop	er, -Electrical Distribution System Protection 1st edition,	2005	, 2014
4.	Coop Abd	<u> </u>	2005	, 2014
4. 5.	Coop Abde	er, -Electrical Distribution System Protection 1st edition,	2005	, 2014
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Course Outcome	econor	^		electric	city po	ower m	arket							K4
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	CO4:	Evaluat	e the	reactiv	ve pov	ver and	losses							K5
	CO5:			power	syste	m ecor	omic	plann	ing ,I	Load fo	orecasti	ng an	d	K5
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	he syllabus		
Unit – I	POWER SYSTEM RESTRUCTURING	Periods	9
market powe -Long run-	ture and operation- objective of market operation, electricity mar er, key components in market operation. Demand forecasting -Tyj Relationship between short run and long run costs, perfect comp istic, Determination of market price, price discrimination.	pes, techniques	s. Costs: Short run
Unit – II	ELECTRICITY PRICE	Periods	9
	ity, ancillary services in electricity power market, automatic gene ssets valuation and risk analysis- Introduction, VAR for gener- nation.		
Unit – III	TRANSMISSION CONGESTION MANAGEMENT AND PRICING	Periods	9
competitive	n cost allocation methods, LMP, FTR and congestion Managemen power market, available transfer capability, distributed generation		
Unit – IV	REACTUVE POWER MARKET MANAGEMENT	Periods	9
power requi	wer requirements under steady state voltage stability and dynamic rements to covet transient voltage stability, system losses and arket forces shaping of reactive power, reactive power requireme GENERATION SYSTEM CHARACTERISTICS ,	loss reduction	methods, power
Unit – V	COST AND RELIABILITY ANALYSIS	Periods	9
	c operation of power plants- choice of power plants- hydro, there	nal and nuclea	a sine of alout
reliability: le	t curves. Economic planning – generation system- cost analyst oad forecasting-generation system reliability – co-ordination n	is. Load forec	asting and system
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P19PSE09		ectri ehicl		d Hy	brid		L 3	T C		P 0	C 3		C. 4		ESE 60	Total 100		
Objective	Δ f	• the	De syst	sign o tem.	of hyb	ectric v orid an	d elect	ric ve				H۷	DC co	onverte	ers and t	heir contr Knowled		
Course Outcome	CC	D1 : U	Under	rstand	l matł							nd c	haract	eristics	s of	Level K2		
Outcome							of topo	logies	of p	owe	r flow	con	trollers			K3		
	CC	D3: A	Analy	zing t	he co	ncepts	of hyb	rid ve	hicle	es of	electri	c tra	action s	systems	3.	K4		
	ele	ectric	c mot	or dri	ves									hybrid		K6		
Pre-requisite)5: [Mode	eling a	and Pl	lan and	l desig	n app	ropi	rate	vehicl	e m	anager	nent sy	vstem.	K6		
(3/2/1 in	licates s	streng				apping) 3-Stro		- Medi	um,	1 - W	Veak		(CO/PSO	O Mapp	ing		
COs				-		Outcor									SOs			
PO 1	PO 1 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10				PSO 1	PSO 2	PSO 3	PSO 4		
CO1 3	3	3		1			1			2	2 2	2	2	1	1	1		
CO 2 3	2	3		2			1			2			2	1	1	1		
CO 3 3 CO 4 3	3	3		2			1			2			2	1	1 1	1		
$\begin{array}{c c} CO 4 & 3 \\ \hline CO 5 & 3 \end{array}$	2	3		1			1			2			2	1	1	1		
3	5	5		1			1	I				,	2	1	1	1		
Course Assess	ment N	Aeth	ods															
	inuous . gnment		essme	ent Tes	st I, II	& III												

3. End-Semester examinations

Indirect

1. Course - end survey

Content of the syllabus

Unit – IINTRODUCTIONPeriods9

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies. Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

Unit -	II	TOPOLOGIES	Periods	9
Basic cor	ncept c	f hybrid traction, introduction to various hybrid drive-t	rain topologie	es, power flow
introduct	ion to	d drive-train topologies, fuel efficiency analysis. Basi various electric drive-train topologies, power flow efficiency analysis.		
Unit –	III	ELECTRIC DRIVES	Periods	9
of DC M control o	lotor of f Perm	electric components used in hybrid and electric vehic drives, Configuration and control of Introduction Mo nanent Magnet Motor drives, Configuration and contro stem efficiency.	otor drives, c	onfiguration and
Unit -	IV	ELECTRIC HYBRID VEHICLES	Periods	9
motor, si supportin	izing g subs		technology,	Communications
Unit –		APPLICATIONS OF HYBRID VEHICLES energy management strategies used in hybrid and electronic strategies used in hybrid and electronic strategies and strategies used in hybrid and electronic strategies are strategies and strategies are strategies ar	Periods	9
	ntation	y management strategies, comparison of different e issues of energy strategies.	energy manaş Total Periods	gement strategies 45
1.		al Bose, _Power electronics and motor drives', Elsevier, 200	6	
2.		ern Electric, Hybrid Electric, and Fuel Cell Vehicles, 3rd Ed		Ebrahim
Reference			, , , , , , , , , , , , , , , , , , , ,	Dorumin
1.	Sira	-Ramirez, R. Silva Ortigoza, _Control Design Techniques in nger,2006	Power Electro	onics Devices',
2.		-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, Sliding mode verters', CRC Press, 2011	control of swite	ching Power
3.	Ion I	Boldea and S.A Nasar, Electric drives', CRC Press, 2005		
4.		ric and Hybrid Vehicles: Design Fundamentals, Second Edi	· •	
5.		cular Electric Power Systems: Land, Sea, Air, and Space Ve lis)),Ali Emadi	hicles (Power	Engineering
E-Resour	ces			
1.	https pdf	://www.bharathuniv.ac.in/colleges1/downloads/courseware_ee	e/Notes/CE3/Bl	EE033%20E&HV.
2.	httn	//www.ieahev.org/about-the-technologies/hybrid-electric-vehic		
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Programme	M.E.				Progra	mme	Code	202	2	Regula	tion		2019
Department	ELEC' ENGIN			D ELE	CTRON	NICS			•	Seme	ester		I
Course Code		Course	e Name	;		iods F Week	er	Crea	lit	-	Maxir	num M	arks
					L	Т	Р	C		CA		ESE	Total
P19PSE10	Energy Auditi		agemei	nt and	3	0	0	3		40		60	100
Course Objective	 Com mana Under 	prehen agemer erstand	d energ nt in ele variou	be able t gy mana ectrical s is energy energy	gement systems y conser	vation	meth	ods us	eful i	in a part	ticular	indust	ry.
	At the e	end of t	he cour	se, the s	tudent sl	nould b	e able	e to,					Knowledge Level
Course	CO1 : I	dentify	the de	mand su	ipply ga	p of e	nergy	in Ind	ian s	cenario			K2
Outcome													K5
Outcome	energy	CO2: Carry out energy audit of an industry/Organization. CO3: Formulate the energy flow diagram of an industry and identify the energy wasted or a waste stream.											
	energy.			iate ene									K6
	techniq	ue ado	pted.	echno ec		feasib	ility c	of the e	energ	y conse	rvatio	n	K6
Pre-requisites	Utilizat	ion of	Electri	cal Ener	·gy								
(3/2/1 indi	cates stre	ngth of	correlat		trong, 2 -		um, 1	- Weak	ζ			SO Map	ping
COs			-	nme Outc								PSOs	
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CO 2	2	1	1	2								3	
CO 3 1	2 2	1	2	1 2						1	1		
CO 4 CO 5 1	3 2 3 2	1	2	1 3 1 1						1	1		3
Course Assessme	ent Meth	ods											
Direct													
2. Assignn				11 & III									
3. End-Ser	nester ex	aminati	ions						_				
	- end surv	vev											
Content of the sy		- ,											
Unit – I	BASIC	PRIN	CIPL	ES OF	ENERG	Y AU	DIT			Perio	ds		9
Energy audit- De profiles, energy c process industry	onservat	ion scł	nemes-	energy	audit of								

Unit - I		ENERGY MANAGEMENT	Periods	9
		gy management – Organizing energy management program		
list for top		toring, reporting –Energy manager, qualities and functions gement.	, language , qi	uestionnaire- Check
Unit – I	II	ENERGY EFFICIENT MOTORS	Periods	9
	speed			
Unit - I	V	POWER FACTOR IMPROVEMENT, LIGHTING AND ENERGY INSTRUMENTS	Periods	9
harmonics	on PF	ethods of improvement, location of capacitors, Power facto motor controllers – Good lighting system – Design and pra- struments – Watt meter, data loggers, Thermocouples, pyro	actices, lighting	g control – Energy
Unit – V	V	ECONOMIC ASPECTS AND ANALYSIS	Periods	9
		sent worth method – Power factor correction, lighting – on investment.	Applications	of life cycle cost
Text Books	s		I otal Perious	45
1.	-	gy Management Supply and Conservation, Dr. Clive Beggs,	Butterworth H	leinemann, 2002
2.		book of Energy Audits, Albert Thumann, Fairmont Press; 9		
References			,	
1.	Murp	hy W.R and G.Mckay Butter worth, -Energy Managemen	tl, Heinemann	publications.
2.	Paul	o Callaghan, -Energy Managementl, Mc-Graw Hill Book Co	ompany – I st ed	ition; 1998.
3.	—En	ergy Management and Good Lighting Practice: fuel effecier	ncy∥ – booklet	12 – EEO.
4.	Energ	gy Management Handbook, Wayne C, John Willey and Son	8	
5.	Amla	n Chakrabarti, Energy Engineering and Management, Prent	ice hall India 2	2011
E-Resource	es			
1.	https:	://nptel.ac.in/courses/108106022/		
2.	http:/	//www.npcindia.gov.in/competencies/energy-management/		
3.	https:	://www.beeindia.gov.in/		

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Programm	e M.	E]	Progra	mme	Code	20	02	Regula	tion		2019	
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Course Code			Cours		ne			ds Pei eek	•	Cre	edit]	Maxir	num M	Iarks	
P19PSE11		n Co tems	nven	tiona	l Ene	ergy	L 3	T 0	P 0		C 3	CA 40		ESE 60	Total 100	
Course Objective		•	Awar Unde voltai	e of v rstantic cor	variou d in d iversi	on sys	ns of re ne wine tem	d ener	gy co	nvers	•	vstem an iques.	id pho	to		
		Understand in detail about the energy storing techniques. At the end of the course, the student should be able to, CO1: Understand the concepts of solar cells and photovoltaic conversion and													Knowledg Level	
Course Outcome	the CO	appli 2: D	icatio escril	ns of	photo	o volta	ic cells	s.		_		stems an			K2 K3	
	CO	3: E				tion of			nd the	appl	icatio	n of Hyd	lroger	1	K2	
	CO stor	4: A ages	nalyz	the the	energ	gy soui	ces fro	om tid				ations c		rgy	K4	
Pre-requisites	Geo	other	mal E	Energ	y.	hermal		syste	ms an	d the	appli	cations	of		K3	
(3/2/1 in				CO /]	PO M	apping	ç	- Medi	um, 1	- Wea	ak		CO/PS	O Maj	pping	
COs						Outcon]	PSOs		
PO 1 CO1 3	PO 2 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	PSC 3	PSO 4 2	
CO 2 3	2	2	2		1		1		1		1	3		3	2	
CO 3 3 CO 4 3	2	2	2		1		1		1		1	3		3	2	
CO 4 3 CO 5 3	2	2 2	2		1		1		1		1	3		3	2	
Course Assess	-	-		1		1	-	1		1	-		1	1 2		
2. Assig	nuous A nment Semeste					[& III										
1. Course	- end s	urve	у													

Unit -I SOLAR ENERGY Periods 9 Introduction to solar energy: solar radiation, availability, measurement and estimation – Solar thermal conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Application of PV Systems – solar energy collectors and storages. Periods 9 Introduction – Basic principles of wind energy conversion – wind data and energy estimation – site selection consideration – basic principles of wind energy conversion – wind data and energy estimation – site selection consideration – basic principles of wind energy – Inter connected systems. 9 Introduction – Basic principles of wind energy – Inter connected systems. 9 Unit – III CHENICAL ENERGY SOURCES Periods 9 Introduction – fuel cells – design and principles of operation of a fuel cell – classification of fuel cells. Type of fuel codes, work output and emf of fuel cells. Type of fuel codes, work output and emf of fuel cells. Type of fuel codes, work output and emf of fuel cells. Type of fuel codes, work output and emf of fuel codes or ore code OTEC system, closed OTEC cycle. Energy from tides: Basic principles of ubat power, componer of idial power plants, operation methods of utilization of fud elertic power generation of per cycle OTEC system, closed OTEC cycle. Energy from tides: Basic principles of ubat power, componer of idial power plants, operation methods of utilization of idial energy, site requirements, storage, advantages and limitations of tidal power generation of geothermal power, nature of geothermal fields, geothermal sources, inter connection of geothermal power, nature of geothermal fields, geothermal sources, inter connecti	Content of the	syllabus		
conversion devices and storage – solar cells and photovoltaic conversion – PV systems – MPPT. Application of PV Systems – solar energy collectors and storages. Unit - III WIND ENERGY Periods 9 Introduction – basic principles of wind energy conversion system – Types of wind machines – basic components of wind energy – nergy storage – applications of wind energy – nergy – nergy storage – applications of wind energy – nergy storage – applications of fuel cells. Types of electrodes, work output and emf of fuel cells – tonic cells – design and principles of operation of a fuel cell – classification of fuel cells. Type of fuel cells – conversion efficiency of fuel cells. Types of electrodes, work output and emf of fuel cells applications of fuel cells. Hydrogen energy: Introduction – hydrogen production – electrolysis, ther chemical methods. Westing House Electro-chemical thermal sulphur cycle. Fossil fuel methods. Hydroge storage, Utilization of hydrogen gas. Periods 9 Introduction, ocean thermal electric conversion (OTEC), methods of ocean thermal electric power generation open cycle OTEC system, closed OTEC cycle. Energy from tides: Basic principles of tidal power, componer of idal power plants, operation methods of utilization of tidal energy. site requirements, storage, advantages and limitations of tidal power generation. Ocean waves, energy and power from the waves, wave energy conversion devices. 9 Introduction, estimation of geothermal power, nature of geothermal fields, geothermal sources, inter connection of geothermal fossil systems, prime movers for geo thermal energy conversion. Application of geothermal fossil syst	Unit – I	SOLAR ENERGY	Periods	9
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Unit - IV ENERGY FROM OCEANS Periods 9 Introduction, ocean thermal electric conversion (OTEC), methods of ocean thermal electric power generation open cycle OTEC system, closed OTEC cycle. Energy from tides: Basic principles of tidal power, component of tidal power plants, operation methods of utilization of tidal energy, site requirements, storage, advantages and limitations of tidal power generation. Ocean waves, energy and power from the waves, wave energy conversion devices. Periods 9 Unit - V GEOTHERMAL ENERGY Periods 9 Introduction, estimation of geothermal power, nature of geothermal fields, geothermal sources, inter connection of geothermal formal songers, photosynthesis, classification of biogas plants. Biomass Energy conversion, Energy from waste. 9 Introduction, estimation of biogas plants. Biomass Energy conversion, Energy from waste. 45 Text Books I. SP Sukatme,Solar Energy - Principles of thermal collection and storage, second edition, John Wiley, New York, 1991. 2. J.A. Duffie and W.A. Beckman,Solar Engineering of Thermal Processes!, Second Edition, John Wiley, New York, 1991. 2. J.A. Duffie and W.A. Beckman, -Solar Engineering of Thermal Processes!, Adam Hilger, Bristol, 1996. 3. John F. Walker& Jenkins. N , _Wind energy Technology and use of Photovoltaics', Adam Hilger, Bristol, 1996. 3. John F. Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 199	of fuel cells – Applications of chemical meth	conversion efficiency of fuel cells. Types of electrodes, v of fuel cells. Hydrogen energy: Introduction – hydrogen ods, Westing House Electro-chemical thermal sulphur cycle	vork output an production –	d emf of fuel cell electrolysis, therme
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open cycle OTEC system, closed OTEC cycle. Energy from tides: Basic principles of tidal power, component of tidal power plants, operation methods of utilization of tidal energy, site requirements, storage, advantages and limitations of tidal power generation. Ocean waves, energy and power from the waves, wave energy conversion devices. Unit -V GEOTHERMAL ENERGY Periods 9 Introduction, estimation of geothermal power, nature of geothermal fields, geothermal sources, inter connection of geothermal fossil systems, prime movers for geo thermal energy conversion. Application of geothermal folds, geothermal sources, photosynthesis, classification of biogas plants. Biomass: Introduction, Biomass conversion technologies, photosynthesis, classification of biogas plants. Biomass Energy conversion, Energy from waste. 1. SP Sukatme, —Solar Energy – Principles of thermal collection and storage, second edition, Tata McGrawHill, 1991. 2. J.A. Duffie and W.A. Beckman, —Solar Engineering of Thermal Processes!, Second Edition, John Wiley, New York, 1991. Reference Books Image: Bristol, 1996. 3. Chetan Singh Solanki, Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol, 1996. 3. John F. Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL , _Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. <				
Introduction, estimation of geothermal power, nature of geothermal fields, geothermal sources, inter connection of geothermal fossil systems, prime movers for geo thermal energy conversion. Application of geothermal energy. Energy from biomass: Introduction, Biomass conversion technologies, photosynthesis, classification of biogas plants. Biomass Energy conversion, Energy from waste. Total Periods 45 Text Books 1. SP Sukatme, —Solar Energy – Principles of thermal collection and storage, second edition, Tata McGrawHill, 1991. 2. J.A. Duffie and W.A. Beckman, —Solar Engineering of Thermal Processes!, Second Edition, John Wiley, New York, 1991. Reference Books 1. 1. Chetan Singh Solanki, _Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol,1996. 3. John F. Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan,lRenewable Energy Sources and Emerging Technologies],Eastern Economy Edition, Second Edition E . Resources 1. 1. https://nptel.ac.in/courses/108108078/ 2. https://nptel.ac.in/courses/108108078/	of tidal power and limitation	plants, operation methods of utilization of tidal energy, site re- ons of tidal power generation. Ocean waves, energy and power	equirements, st	orage, advantages
connection of geothermal fossil systems, prime movers for geo thermal energy conversion. Application of geothermal energy. Energy from biomass: Introduction, Biomass conversion technologies, photosynthesis, classification of biogas plants. Biomass Energy conversion, Energy from waste. Total Periods 45 Text Books 1. SP Sukatme, —Solar Energy – Principles of thermal collection and storage, second edition, Tata McGrawHill, 1991. 45 2. J.A. Duffie and W.A. Beckman, —Solar Engineering of Thermal ProcessesI, Second Edition, John Wiley, New York, 1991. 7 Reference Books 1. Chetan Singh Solanki, _Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 7 2. Van Overstracton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol, 1996. 7 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 7 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 7 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan,lRenewable Energy Sources and Emerging Technologies, Eastern Economy Edition, Second Edition 7 F E E E 1. https://nptel.ac.in/courses/108108078/ 1 2. <t< td=""><td>Unit – V</td><td>GEOTHERMAL ENERGY</td><td>Periods</td><td>9</td></t<>	Unit – V	GEOTHERMAL ENERGY	Periods	9
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1. SP Sukatme, —Solar Energy – Principles of thermal collection and storage, second edition, Tata McGrawHill, 1991. 2. J.A. Duffie and W.A. Beckman, —Solar Engineering of Thermal ProcessesI, Second Edition, John Wiley, New York, 1991. Reference Books 1. Chetan Singh Solanki, _Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol,1996. 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan,IRenewable Energy Sources and Emerging TechnologiesI,Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/	T D L		Total Periods	45
1. McGrawHill, 1991. 2. J.A. Duffie and W.A. Beckman, —Solar Engineering of Thermal Processesl, Second Edition, John Wiley, New York, 1991. Reference Books 1. Chetan Singh Solanki, _Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol, 1996. 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologiesl, Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/			1	1 11.1 77 .
2. Wiley, New York, 1991. Reference Books 1. Chetan Singh Solanki, _Solar Photovoltaics -Fundamentals, Technologies and Applications', PH Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol,1996. 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan,lRenewable Energy Sources and Emerging Technologies ,Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/	I. Mo	GrawHill, 1991.	-	
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1. Learning Pvt. Ltd., New Delhi, 2011 2. Van Overstraeton and Mertens R.P., _Physics, Technology and use of Photovoltaics', Adam Hilger, Bristol,1996. 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies LEastern Economy Edition, Second Edition E- Resources 1. 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/	Reference Boo	ks		
2. Hilger, Bristol,1996. 3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies , Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/		•	hnologies and	Applications', PHI
3. John F.Walker& Jenkins. N , _Wind energy Technology', John Wiley and sons, Chichester, UK, 1997 4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies , Eastern Economy Edition, Second Edition E- Resources 1. 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/			ise of Photovol	taics', Adam
4. Freries LL ,_Wind Energy Conversion Systems', Prentice Hall, U.K., 1990 5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies , Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/	3 Jol	n F.Walker& Jenkins. N, _Wind energy Technology', John V	Wiley and sons	, Chichester, UK,
5. D.P.Kothari,K.C.Singal and Rakesh Ranjan, Renewable Energy Sources and Emerging Technologies Eastern Economy Edition, Second Edition E- Resources 1. https://nptel.ac.in/courses/108108078/ 2. https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/	4. Fre	eries LL, Wind Energy Conversion Systems', Prentice Hall, U	J.K., 1990	
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1.https://nptel.ac.in/courses/108108078/2.https://www.oreilly.com/library/view/non-conventional-energy/9789332579149/				
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Programme	M	E.]	Progr	amme	Code		20	2	Reg	gulation		2019			
Department	POWE ELECT ENGIN	FRIC	AL A	MS E AND	ENGI	NEER	ING /					Semester	r	I			
Course Code	Course	Name	e				Pe L	riods Week T		C	redit C	M CA	aximun ESE	n Marks Total			
P19PSE12	Fuggy (Swata	ma														
F 19F 5E 12	Fuzzy S	-		dhaa	mode	to	3	0	0		3	40	60	100			
Course Objective	• Gain	the k insig	nowl ht on	edge i to the	in the e Neu	fuzzy	sets zy mod	leling			ol		I				
C	At the e								le to,					Knowledge Level K2			
Course		CO1: know the basics of the Fuzzy logic system CO2: Apply and analyze fuzzy sets for existing systems															
Outcome	CO3: T indiscrit	o Dev	elop	a Fuz							on to th	ne		K4 K3			
	CO4: le		-		with	the oth	er soft	comp	outing	mode	els			K2			
	CO5: P			-				-	-					K5			
Pre-requisites	-																
(3/2/ COs	1 indicates	s stren	gth of	f corre	lation	apping) 3-Stro Outcor	ong, 2 -		um, 1	- We	ak	CO/P	SO Ma PSOs	pping			
	PO PO 1 2	3	PO 4	5	PO 6	РО 7	PO 8	PO 9	PO 10	РО 11	PO 12	PSO1	PSO 2	PSO 3			
CO 1 CO 2	3 3 2 3	2 2	3	23								2	3	—			
CO 3	$\frac{2}{3}$ 3	3	3	3		<u> </u>		<u> </u>	╞╴┤			~	2				
CO 4	3 3	3	3	3									3				
CO 5 Course Assessm	2 ent Meth	3 nods		3									2	2			
2. Assign 3. End-Se Indirect	emester ex	kamin			& III												
1. Course	- end sur	vey															

Content	of the syllabus		
Unit – I	INTRODUCTION TO FUZZY LOGIC PRINCIPLES	Periods	09
	faces of imprecision – inexactness, Ambiguity, Undecidability, Fuz v logic, Intelligent systems.	zziness and certa	ainty, Probability
Unit – II	CLASSICAL SETS AND FUZZY SETS	Periods	09
	s and crisp sets - Intersections of Fuzzy sets, Union of Fuzzy sets, the		
Unit – II	I FUZZY ARITHMETIC	Periods	09
	asoning - Linguistic variables, Fuzzy propositions, Fuzzy compositions, Defuzzification.	onal rules of inf	erence- Methods
Unit – IV	NEURO-FUZZY DESIGN	Periods	09
control, I	logy of fuzzy design - Direct & Indirect methods with single and mul Rule base design using dynamic response.		
Unit – V		Periods	09
Fuzzy log Algorith	gic applications to engineering, Fuzzy decision making, Neuro-Fuzzy ns.	systems, Fuzzy	Genetic
		Total Periods	45
Text Boo	ks		
1	Zimmermann H. J., Fuzzy set theory and its applications', Allied p Edition, 2001	oublishers limite	d, Madras, 4th
2	Kwang H.Lee, —First course on Fuzzy Theory and Applications ^I , S Heidelberg, 2005.	1 0 0	
3	Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fu Prentice-Hall of India, 2003.	zzy and Soft Co	mputing∥,
Reference	es		·
1	George J. Klir and bo yuan, —fuzzy sets and fuzzy logic-theory and 1995.	d applications, p	orentice hall,
2	Klir G. J. and Folger T., _Fuzzy sets, uncertainty and information', Delhi,1991.	Prentice Hall of	India, New
3	EarlCox, _The Fuzzy Systems Handbook', AP professional Cambrid	dge, 1999.	
4	S.N.Sivanandam, S.Sumathi and S.N.Deepa, —Introduction to Fuz Springer, 2007.		
5	Bart Kosko, —Neural Networks and Fuzzy Systems: Dynamical Sy Intelligencel, Prentice Hall, 1992.	stems Application	on to Machine
E-Resour			
1.	https://ocw.mit.edu/courses/electrical-engineering-and-computer-sc	ience/	
2.	https://www.coursera.org		
3.	https://www.lynda.com/course-tutorials		

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Programme	M.E.	Progr	ramme Co	ode		202	Regulation		2019
Department		R SYSTEMS ENG TRICAL AND	GINEERI	NG /			Semester		II
	ELECT	RONICS ENGIN	EERING	r					
Course Code	C	Course Name	Period	s Per V	Veek	Credit	Maxi	mum M	larks
Course Coue			L	Т	Р	С	CA	ESE	Total
P19PSE13		Electronics for able Energy	3	0	0	3	50	50	100
Course Objective	The stu • •	dent should be mad Study of environm Obtain knowledge Understand the cor	ental imp on role of	f electr	ical mad	chines and p	•	ers.	
Carrows	At the e	nd of the course, the	student sl	hould b	e able to),			Knowledg Level
Course	CO1: U	nderstand about ren	ewable en	ergy sc	ources an	d their impa	cts		K2
Outcome	CO2: D	esign analysis of El	ectrical C	Generat	ors.				K3
	CO3: D	esign of solar PV po	ower conv	erters.					K3
	CO4: A	nalysis of speed var	iations in `	WECS					K6
	CO5: D	esign and analysis o	f hybrid s	ystems	•				K6
Pre-requisites	Power I	Electronics							

(3/	/2/1 ind	dicates	s stren				apping) 3-Stro		- Medi	um, 1	- Wea	ık	C	O/PSO	Mapp	ing
COs					Progra	amme	Outcor	nes (PO	Ds)					PS	SOs	
	PO PO<											PSO 1	PSO 2	PSO 3	PSO 4	
CO 1	3	3	3		3							2	2			
CO 2	3		2		2							2	2		2	
CO 3	3		2	2								2	2			
CO 4	3	2										2	2		2	
CO 5	3		2									2	2		2	2

Course Assessment Methods

Direct

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

Indirect

1. Course - end survey

	ne syllabus		
Unit – I	INTRODUCTION	Periods	9
cost-GHG Er	I aspects of electric energy conversion: impacts of renewable nission) - Qualitative study of different renewable energy reso I cell, Hydrogen energy systems and hybrid renewable energy	urces: Solar, wind, o	
Unit - II	ELECTDICAL MACHINES FOD DENEWADI F	-	9
	ference theory fundamentals- principle of operation, analysis nous generators (PMSG).	of induction generate	ors (SCIG, DFIC
Unit – III	POWER CONVERTERS FOR RENEWABLE ENERGY	Periods	9
selection of i	operation: line commutated converters (inversion-mode) inverter, Three phase AC voltage controllers- AC-DC-AC con ers, Grid Interactive Inverters-matrix converters.		
Unit - IV		Periods	9
system -grid Unit – V	Integrated solar system. HYBRID RENEWABLE ENERGY SYSTEMS orid systems (wind-solar-diesel –fuel cell) –case studies – Max	Periods	9
	iniques for wind and solar	Total Periods	45
Text Books			
1.	Mukund R.Patel, Wind and Solar Power Systems, CRC	Press,2019	
2.	Rai. G.D, -Non conventional energy sourcesl, khanna p	ublishers, 2004.	
References			
1.	Gray, L Johnson, -Wind Energy System , prentice hal		
2.	Sumathi, S., Kumar, L. Ashok, Surekha, P. –Solar PV a Conversion Systems Springer International Publishing	0,	
3	S.M. Muyeen –Wind Energy Conversion Systems: Tech	nnology and Trends	Springer
3.	S.M. Muyeen –Wind Energy Conversion Systems: Tech International Publishing Switzerland.2015	nnology and Trends	Springer
3. 4.		Energy for Sustaina	1 0
	International Publishing Switzerland.2015 Fouad A. S. Soliman –Solar-Wind Hybrid Renewable	Energy for Sustaina ctober 2016.	ible
4.	International Publishing Switzerland.2015 Fouad A. S. Soliman –Solar-Wind Hybrid Renewable Agriculturell LAP LAMBERT Academic Publishing Oc Dr.N.P.Subramanian—Renewable energy resources Lab	Energy for Sustaina ctober 2016.	ible
4. 5.	International Publishing Switzerland.2015 Fouad A. S. Soliman –Solar-Wind Hybrid Renewable Agriculturell LAP LAMBERT Academic Publishing Oc Dr.N.P.Subramanian—Renewable energy resources Lab	Energy for Sustaina ctober 2016.	ible
4. 5. E-Resources	International Publishing Switzerland.2015 Fouad A. S. Soliman –Solar-Wind Hybrid Renewable Agriculturell LAP LAMBERT Academic Publishing Oc Dr.N.P.Subramanian—Renewable energy resources La	Energy for Sustaina ctober 2016.	ible

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Programme	M.	E		Lit			e Code		0371	203	2	Regulat	ion		20	19	
Department	POWI ELEC ENGI	TRI	CAL	AND	ENGI	NEE	RING	· /				Semes		I	I		
Course Code		Co	ourse	Name	e		v	ods P Veek		Crea	lit		Iaxin	/lark			
							L	Т	Р	C		CA			Total		
P19PSE14	Advar Proces	ssing			_		3	0	0	3		40		60		100	
Course Objective	 characterization of discrete time random process enunciate the significance of estimation of power spectral density of random processor Understand the principles of optimum filters such as wiener and kalman filters Understand the principle of adaptive filters and their application to communication engineering Understand the concepts of multi-resolution analysis. 																
	At the	end o	of the	cour	se, the	stude	ent sho	uld be	e able	to,					K	nowledg Level	
Course	applica	ation					•	•			•	esses in	•			K3	
Outcome	proces	s	-		-					-		a given 1		m		K4	
	applica	ation					-	-				nication				K3	
	CO4:	Appl	y app	oropria	ate ada	ptive	algori	thm f	or pro	cessir	ng nor	n-station	ary si	ignals		K3	
	CO5: based		•	•	yze wa	velet	transf	orms	for sig	gnal a	nd im	age proc	cess			K3	
Pre- requisites	Digita	l Sig	nal P	roces	sing												
(3/2/1	indicates	stren	gth of	corre		3-Stro	ong, 2 –		um, 1	- Wea	k			SO Ma	ıppi	ng	
]	Progra	amme C	Outcor	nes (PC	Ds)						PSOs			
COs Pe		PO 3	РО 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS 3		PSO 4	
		5	- 1	3	v	,	0	,	10	**	14	1	1	1			

								-
	1	2	3	4	5	6	7	
CO 1	3	1		1	1			
CO 2	3	2						
CO 3	3	2	1					
CO 4	2	2	1					
CO 5	3	2		1	2			

Direct

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

Indirect

1. Course - end survey

Content of t	the syllabus		
Unit – I	DISCRETE TIME SIGNALS, SYSTEMS AND THEIR REPRESENTATIONS	Periods	9
	e signals - Linear shift invariant systems - Stability and causality		
0	screte time Fourier transform- Discrete Fourier series- Discrete f different transforms	Fourier Transf	orm - Z transform
Unit - II	DISCRETE FOURIER TRANSFORM(DFT)	Periods	9
	volution using DFT - Computation of DFT Design of IIR digital f		-
	ariance method - Bilinear transformation method.		
Unit – III	DIGITAL FILTER DESIGN AND REALIZATION STRUCTURES	Periods	9
	design using window functions - Comparison of IIR and FIF		
	ealization structures - Signal flow graph representations Qu quantization effects in IIR and FIR filters	uantization pr	ocess and errors
Unit - IV	ANALYSIS OF FINITE WORD-LENGTH EFFECT	Periods	9
	sion noise- Arithmetic round-off errors- Dynamic range scaling-C cycles in IIR filters - Linear Signal Models	Overflow oscill	ations and zero
Unit – V	STATISTICAL SIGNAL PROCESSING	Periods	9
signals - Es	l zero and Pole-zero models- Power spectrum estimation- Spectra stimation of power spectrum of stationary random signals - Op ation - Mean square error estimation - Optimum FIR and IIR Filte	timum linear f	
0		Total Periods	45
Text Books			
	Sanjit K Mitra, —Digital Signal Processing: A computer-based app Edition 1998	proach –,TataM	lc Grow-Hill
	Dimitris G .Manolakis, Vinay K. Ingle and Stephen M. Kogon, – Processingl, Mc Grow Hill international editions2000	-Statistical and	l Adaptive Signal
References			
	Jhon G.Proakis & Dimitrics G.Manolakis, Digital Signal Processing Applications, Fourth Edition, Person Education/Prentice Hall, 2007.		orthim,&
2.	Sophoncies J.Orfanidis, Optimum Signal Processing, McGraw Hill	,2000.	
E-Resource	s		
1.	https://nptel.ac.in/courses/117101001/		
2	https://www-syscom.univ-mlv.fr/~zaidi/teaching/dsp-esipe-oc2/Cou	maa Nataa Adra	1 DCD 16
2.	https://www-syscom.univ-miv.ir/~zaidi/teaching/dsp-esipe-oc2/Cou	irse-notes_Adva	incea-DSP.pdf

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Programme		M.E.	H	Program	nme	Code	20	2	Regul	ation		2019
Department	ELEC		MS ENGINE AND ELECT				•		Sem	nester		II
Course C	ode	Course Na	ame		Pe	riods Week		Cred	it	Ma	ximum	Marks
					L	Т	Р	C	(CA	ESE	Total
P19PSE	15	Dynamics Machines	s of Electrica	1	3	0	0	3	4	40	60	100
Objective	• At the	Analyze th	e behavior of he model of el ourse, the stud	ectrica	l mao	chines	under		•			t state Knowledge Level
Course	CO1:	Derive Kron	's Primitive m	achine	as an	unifie	d elec	trical m	achine r	nodel		K3
Outcome			mathematical									K6
			nmetrical 2-pł									K4
	CO4:.I	Develope the	mathematical	model	of D	C mote	or and	DC Ser	ries mot	or		K6
	CO5: <i>A</i>	Analyze a thi	ee phase sync	hronou	s ma	chine u	nder t	ransient	t conditi	ons		K4
Pre- requisites	Electri	cal Machine	Ś									
(3/2/1	indicate	s strength of	CO / PO Mapp correlation) 3-S	Strong,	2 – N	ledium	, 1 - W	/eak	0		O Map	ping
COs		Pı	ogramme Out	tcomes	(POs)				H	SOs	
	PO PO 1 2	PO PO	PO PO PO			O PO 9 10			PSO 1	PSO 2	PSO 3	PSO 4

	2/1 1nc	licates	stren				3-Stro			ium, 1	- We	ak	Ŭ	0/200	opi	
COs				Р	rogra	mme	Outco	mes (P	Os)					P	SOs	
	РО 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	2	2		1										3	
CO 2	3	3	2		2										3	3
CO 3	3	2	2	2											3	
CO 4	3	3	1		2										3	
CO 5	3	2	1	2											3	3

Course Assessment Methods

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 MODELING CONCEPTS

Basic Two-pole machine representation of commutator machines, 3-phase synchronous machine with and without damper bars and 3-ph induction machine, Kron's primitive machine.

Periods

09

Unit – II	MODELING OF THREE PHASE INDUCTION MACHINE	Periods	09
	nodel in arbitrary reference frame- Electromagnetic torque – De achine models- Stator reference frame model Rotor reference e model		
Unit – III	SYMMETRICAL AND UNSYMMETRICAL 2 PHASE INDUCTION MACHINE	Periods	09
frame variat	ymmetrical 2 phase induction machine- voltage and torque equa- ples for unsymmetrical 2 phase induction machine-analys al 2 phase induction machine		
Unit – IV	DC MACHINE MODELING	Periods	09
of a separate	al model of a separately excited DC motor- steady state and tran ly excited DC motor – Mathematical model of a DC series r small perturbations. DYNAMIC ANALYSIS OF SYNCHRONOUS		
	MACHINE		
	formance of synchronous machine, comparison of actual an s, Equal area criteria- simulation of three phase synchronous mathematical synchronous sy		
Text Books		Total Periods	45
1.	P.S. Bimbra, Generalised Theory of Electric Machines, Khann 2010	a Publications, 7	thEdition, Delhi,
2.	Analysis of Electrical Machinery and drive systems- Paul C. K D. Sudhoff.2002	Krause, OlegWasy	ynczuk&Scott
REFERENC	ES		
1.	D.P. Sengupta & J.B. Lynn, Electrical Machine Dynamics, T	The Macmillan Pr	ess Ltd. 1980
2.	R Krishnan —Electric Motor Drives, Modeling, Analysis, and 2001	Controll, Pearso	n Education.,
3.	P.C. Kraus, —Analysis of Electrical Machinesl, McGraw Hill	Book Company,	1987
4.	Chee Mun Ong —Dynamic simulation of Electric machinery u Prentice Hall 2003	using Matlab / Si	mulink∥ –
5.	C.V. Jones, -The Unified Theory of Electrical Machinesl, Butto	erworth, London.	. 1967
E-Resources			
1.	https://archive.org/ details/Dynamics_and_Control_of_Electric		
2.	https://epdf.pub/electrical-machines-drives-and-power-system manual.html	s-sixth-edition-in	structors-
3.	https://nptel.ac.in/course.html		
	https://ocw.mit.edu/ans7870/resources/woodson/textbook/emd		

	VIVE		nomou	s Instit	tution, A	GE OF Affiliate m, Tiruc	d to An	na Uni	versity	-	WOME nai)	N		TATACAS TATACAS TATACAS
Programme	M.E.					Progra	mme	Code	20	2	Regula	tion		2019
Department	POWE ELECT ENGIN	FRIC	AL A								Seme	ester		II
Course Code		Course	e Nar	ne			iods F Week	er	Cre	dit]	Maxin	num M	larks
						L	Т	Р	C	-	CA		ESE	Total
P19PSE16	SOFT O			NG		3	0	0	3		40		60	100
Course Objective	The stu	Learr Perfo mode	n the orm co el con	Soft (ogniti nplex	Comp ive fu syste	uting 7 nctions ms	s as pi	obler	n solv	ving,	e Data A expertis	se and	intuit	ion, to systems
	At the e			-										Knowledge Level
	CO1: U							-		eural	network	c syste	ms	K2
	CO2:			-										K4
	CO3: 1				-			ogic s	ystem	S				K3
	CO4 :		^		•									K2
	CO5 : 1			the fu	undam	entals	and co	oncep	ts of C	Genet	ic Algoi	rithm.		K3
Pre-requisites	Fuzzy	systen	ıs											
	licates strer	ngth of	corre	lation		ong, 2 -		um, 1	- Wea	k			O Map	oping
COs]	Progra	amme	Outco	mes (PO	Os)						PSOs	
PO 1	PO PO 2 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
CO1 3	2 3		5	1	,	0	,	10		12	3		1	
CO 2 2	3 2						1				2		2	1
CO 3 3	2 2	2						1			3	2	1	
CO 4 3 CO 5	2 3 2	3					1	1			2	2	1	1
Course Assessm							I					2		1
Direct														
1.Continu2.Assign3.End-SeIndirect	uous Asses ment, Min mester exa - end surv	i proje aminat	ct, qu			based l	earnin	g						
Content of the s	vllahus													
Unit – I	ARTIF	ICIA	L NE	URA	L NE	TWO	RKS				Periods			9
Motivation for t Fundamental Co neuron: Archited applications.	oncepts -	weigh	nts –	biase	s and	thresh	olds	- com	nmon	activ	ation fu	nctior	ns. Mc	Culloch-Pitts

Unit -	II	NEURAL NETWORK ARCHITECTURE AND ALGORITHMS	Periods	9
		Neural Net: Standard back propagation -architecture - algorithm		
		l neural net- architecture - algorithm ,Kohonen self-organizir	ng Maps – A	daptive Resonance
		hitecture - Algorithm - Introduction to Neuro controllers.	Daniada	0
Unit – I		FUZZY LOGIC	Periods	<u>9</u>
		erties of Classical and Fuzzy sets- Operations on Fuzzy sets- guistic Hedges- Fuzzy statements- Assignment statement		
		ements- Fuzzy rule base- Canonical rule formation-Decompo		
Unit - I		FUZZY LOGIC CONTROLLER	Periods	9
		oller: Functional diagram - Fuzzification -Membership value tions-Defuzzification: Max-Membership principle - centroid		
Unit –	V	GENETIC ALGORITHM	Periods	9
– encoding function –	g and of fitness	raditional optimization methods – Concept of Evolutionary A decoding of variables – GA operators – reproductions – C scaling. Advantages and limitations of GA, Applications of C –Genetic Neuro Hybrid Systems.	ross over –	mutation – fitness
	2		otal Periods	45
Text Book	KS			
1.		al Networks, Fuzzy Logic and Genetic Algorithms: Synthesis asekaran, G. A. Vijayalakshami, PHI.	& Application	ons,
2.	Gene	tic Algorithms: Search and Optimization, E. Goldberg		
Reference				
1.		hing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, —Neuro-Fuice-Hall of India, 2003.	uzzy and Sof	t Computing ^{II} ,
2.	H.Le 2005	e, —First course on Fuzzy Theory and ApplicationsI, Springe	r–Verlag Ber	rlin Heidelberg,
3.	M. G	anesh - Introduction to fuzzy sets and fuzzy logic, PHI.		
4.		thy J. Ross – Fuzzy logic with engineering applications, Wile	•	
5.		G.J. & Yuan,B Fuzzy sets and Fuzzy logic, theory and appli te Limited.	cations, Prer	ntice Hall of India
6.	J.S.R	. Jang, C.T. Sun, E. Mizutani - Neuro-fuzzy and soft computi	ng, PHI.	
E-Resourc				
1.	https:	//shodhganga.inflibnet.ac.in/bitstream/10603/34784/10/10_ch	napter1.pdf	
2.	http:/	/users.monash.edu/~app/CSE5301/Lnts/LaD.pdf		
3.	http:/	/users.du.se/~jwe/fuzzy/NFL/F9.PDF		

Programme Department Course Code P19PSE17 Course	ANI Con Ana The • Po nu	n puter lysis student	C TRO Course	NICS	IGINE	•	me Co	da			_	1		201	
Course Code P19PSE17	ANI Con Ana The • Po nu	D ELE nputer lysis student	C TRO Course	NICS				ue		202	Reg	ulatio	n	201	9
P19PSE17	Ana The • P	n puter lysis student		Nor	ENGI			LECT	RICAL		Se	meste	r	II	
	Ana The • P	l ysis student	Aided	iname			L	Т	Р	С	(CA	E	SE	Total
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Objective	• S • D	uances mphasi omputa olve ba	steady of estin ze the tional p sis pro his ow	state a nation fundan purpose blems o n prog	nd tran of diffe nentals e for m of AC	erent s of pov odelin Power	tates over systems g and stands flow a	f powe stem ar simulat malysis	er system nalysis w tion of a s.	hile emp	oloying	a cor	nputer	for	
	At th	he end o	of the c	ourse,	the stu	dent sl	nould l	be able	to,						wledge evel
Course	CO1			us num ning va			-		-	ity and c	optimal	order	ing]	K6
Outcome		and	stabili	ty and	analyz	es.				ults and j	_]	K5
	CO3		ate the lied.	e given	power	syster	n abou	t its op	eration	using vai	rious ai	nalyse	S]	K3
	CO4	: Unde	rstandi	ng the	basics	securi	ty anal	ysis an	d contin	gency se	election	۱.]	K6
		5: Evalu n Mode		transie	ent stat	oility a	nd sm	all sign	al stabil	ity of dif	ferent	power	•]	K2
Pre- requisites	Pow	er Syste	em An	alysis											
(3/2/	1 indica	ates stre			lation)	3-Stro	ng, 2 -		um, 1 - `	Weak		CO/I	PSO Ma	apping	
COs			I	Program	nme O	utcom	es (PO	s)					PSOs		
PO1	PO2	PO3	PO4	PO5	PO6	РО 7	PO8	PO 9	PO10	PO 11	PO 12	PS O1	PSO 2	PSO 3	PSO 4
CO1 3	3	3		3	1						1	2			
CO 2 3				2							2	2	1		
CO 3 3		2						1			1	2		1	
CO 4 3	1										2	2			
CO 5 3 Course Assess	nort M	lathada									2	2			
Direct		remous													
1. Contin 2. Assign	ment	ssessm r exami			& III										
Indirect															
1. Course -	end su	rvey													

Signature of the BOS chairman, EEE

Content of	he syllabus			
Unit – I	GENERAL INTRODUCTION	Peri	ods	9
	ver systems operation and control - Different types of power system analy			
-	ring schemes – Solution algorithms – LU factorization – By factorization and it			
Unit - II	AC POWER FLOW ANALYSIS	Peri		9
	- Modeling of power system components - power flow equations - Formation			
	n algorithm – Newton Raphson load flow method – fast decouple load flow n			
	C-DC system power flow analysis – Incorporating load models and FACT			
	Incorporating HVDC converter control in power flow - Sequential and	Simult	aneous	Solution
Algorithms.			1	0
Unit – II		Peri		9
	to fault analysis and types of faults in power systems - Symmetrical Componer			
•	f symmetrical and asymmetrical faults using sequences networks - Bus imped		trix for	nulation –
	s analysis of Large Power systems using Z-bus – Analysis of Open circuit faults			-
Unit - IV	SECURITY ANALYSIS	Peri		9
	ots - static Security Analysis at control centers - Contingency analysis - conting			
Unit – V	STABILITY ANALYSIS	Peri	ods	9
	n of power system stability - Classical model of synchronous machines			
	bility analysis of multi -machine systems - Eigen Analysis of dynamical system	ns – Sma	all signa	1
stability Ana	lysis using classical model – Basics concepts of voltage stability analysis.			
	Total F	Periods		45
Text Books				
	A. R. Bergen and V. Vittal, —Power system analysis, Prentice Hall, 2000)		
	W. Stagg and A. H. El-Abiad, -Computer methods in power system ana	lysis		
References				
1. I	lgerd O.I., Electric Energy T heory – An Introduction, Second Edition. Tata Mc	Graw-hi	11,2007	
2. 0	rainger J.J, and Stevenson W.D., Power system analysis, McGraw-hill, Newyor	k,1994.		
3. I	.P.Singh, — Advanced power system analysis and dynamics, Wiley Eastern			
E-Resource	S			
1. ł	ttps://ieeexplore.ieee.org/document/6594487/			
2. ł	ttps://www.degruyter.com/view/j/ijeeps?lang=en			
3. I	ET Journal on Generation, Transmission and Distribution.			
4. ľ	IPTEL Courses on Electrical Engineering.			
5. I	EEE Transactions on Power System.			

	VIV			ious In	stitutio	on, Affil	OF EN liated to Tiruchen	Anna U	Jnivers	sity ,Ch		OMEN			
Programme	M.E.				Prog	gramm	e Code	è		20	2	Regula	tion		2019
Department	POWER ELECTI ENGINE	RICA	L AN									Seme	ster		П
Course Code	C	ourse	Name	e				iods F Week	-	Cree			Maxim	um M	
P19PSE18	Modelin Electrica				of		L 3	Т 0	Р 0	C 3		CA 40		ESE 60	Total 100
Course Objective	• U r • A	Jnders Jnders elatio	stand stand nship ze the	the v the d s.	ariou: iffere	s elect nt type	es of re	eferen	ce fra	me the	ories	cal form and tran ers and r	nsform	ng of	electrical
	At the en	d of t	he co	urse,	the st	udent	should	be ab	le to,						Knowledge Level
Course	CO1: Ou	tline	about	the v	variou	s elect	trical p	arame	ters in	n math	emati	ical form	n.		K4
Outcome	CO2: Re	cogni	ze the	e diffe	erence	e fram	e theor	ies fo	r elec	trical 1	nachi	nes			K2
	CO3: Ar	alyze	the s	teady	state	and d	ynami	c state	opera	ation c	of DC	machin	e		K3
	CO4: Mo	odelin	ig and	l anal	ysis o	of Indu	ction I	Machi	nes						K3
	CO5: An machines	•	the s	teady	state	and d	ynami	c state	opera	ation c	of syn	chronou	S		K3
Pre-requisites	Electrical	mach	ines												
(3/ COs	2/1 indicate	s stren	gth of	corre	lation				um, 1	- Weal	k	(CO/PS	O Map PSOs	oping
	PO PO	PO 2	PO 4	PO	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO	PSO	PSO	PSO	
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CO 4	3 3 2	2		2						$\left \right $		2	2	3	3
CO 5	3			2								2		3	3
Course Assessm	ent Metho	ods													
2. A 3. E	ontinuous ssignment nd-Semeste				I, II	& III									
Indirect															
	- end surv	ev													

Content of the syl	labus		
Unit – I	PRINCIPLES OF ELECTROMAGNETIC ENERGY CONVERSION	Periods	09
equations - Sing	etic circuits – General expression of stored magnetic energy – E ly and Doubly fed excited systems – Linear and Non – linear with air gap and permanent magnets.		
Unit – II	REFERENCE FRAME THEORY	Periods	09
Transformation of	g reference frames – Transformation of variables – Transform f a balanced set – Balanced set – Balanced steady states phasor veral frames of references.		
Unit – III	DC MACHINES	Periods	09
	que Equations – Dynamics characteristics of permanent magnet a Solution of dynamic characteristics by Laplace transformation.	and shunt DC Mot	ors –
Unit – IV	INDUCTION MACHINES	Periods	09
frame variables performances for arbitrary reference		characteristics –	Dynamics outer simulation
Unit – V			
Voltage and Torq Park equations –	SYNCHRONOUS MACHINES ue Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amia performances for three phase fault – Transient stability	- Dynamic perform	mance for torqu
Voltage and Torq Park equations –	ue Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability	rotor reference fra - Dynamic perform y limit – Critical	nme – nance for torqu clearing time
Voltage and Torq Park equations – variations – Dyn	ue Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability	rotor reference fra - Dynamic perform	ume – mance for torqu
Voltage and Torq Park equations – variations – Dyn Computer simulat	ue Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability ion.	rotor reference fra - Dynamic perform y limit – Critical Total Periods	nme – nance for torqu clearing time - 45
Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books	ue Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200	nance for torque clearing time - 45
Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books 1.	P S Bimbhra, —Generalized Theory of Electrical Machines ^{II} , Khar A.E., Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, — E Hill, 5th Edition, 1992	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200 Electric Machinery	ame – nance for torque clearing time - 45 8 , Tata McGraw
Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books 1. 2.	P S Bimbhra, —Generalized Theory of Electrical Machines ^{II} , Khar A.E., Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, — E	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200 Electric Machinery	ame – nance for torqu clearing time – 45 8 , Tata McGraw
Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books 1. 2. References	P S Bimbhra, —Generalized Theory of Electrical Machinesl, Khar A.E., Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, — E Hill, 5th Edition, 1992 Paul C.Krause.Oleg Wasyzczuk,Scott S.Sudhoff. Analysis of electrical State	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200 Electric Machinery lectric machinery	and Drive
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Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books 1. 2. References 1. 2.	 Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability ion. P S Bimbhra, —Generalized Theory of Electrical Machinesl, Khar A.E, Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, — E Hill, 5th Edition, 1992 Paul C.Krause.Oleg Wasyzczuk,Scott S.Sudhoff.lAnalysis of el Systemsl.Jhon Wiley&Sons, 2013. Krishan.R, IElectric Motor Drives ,Modeling ,Analysis and contr Samuel Seely, IElectromechanical Energy Conversionl, Tata M Bimal K Bose, –Modern Power Electronics and AC Drivesl, Pre New Delhi 	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200 Electric Machinery lectric machinery roll. Prentice Hall of cGraw Hill publis ntice Hall of India	and Drive and Drive bing Co,1962. , 2007,
Voltage and Torq Park equations – variations – Dyn Computer simulat Text Books 1. 2. References 1. 2. 3.	 Equation – Voltage equation in arbitrary reference frame and Rotor angle and angle between rotor – Steady state analysis – amic performances for three phase fault – Transient stability ion. P S Bimbhra, —Generalized Theory of Electrical Machinesl, Khar A.E, Fitzgerald, Charles Kingsley, Jr, and Stephan D, Umanx, — E Hill, 5th Edition, 1992 Paul C.Krause.Oleg Wasyzczuk,Scott S.Sudhoff.lAnalysis of el Systemsl.Jhon Wiley&Sons, 2013. Krishan.R, Electric Motor Drives, Modeling, Analysis and contr Samuel Seely, Electromechanical Energy Conversionl, Tata M Bimal K Bose, –Modern Power Electronics and AC Drivesl, Pre 	rotor reference fra - Dynamic perform y limit – Critical Total Periods ma Publishers, 200 Electric Machinery lectric machinery roll. Prentice Hall of cGraw Hill publis ntice Hall of India	and Drive and Drive bing Co,1962. , 2007,
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Course	CC)1: D	evelo	p an a	assem	bly la	nguage	e prog	ram u	ising l	PIC co	ntroller			K3
Outcome	CC)2: Il	lustra	te the	conc	epts o	f intern	upts a	and tir	ner.					K2
	CC)3: A	pply	the co	oncep	t to int	erface	with	outpu	t devi	ces.				K3
	pro	gram	ming			-		-				ly langı	-		K4
						y complication		platfo	orm ai	nd sof	tware	for engi	neerii	ng	K4
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(3/2/1 in COs	ndicates	stren					ong, 2 - nes (PC		um, 1	- Wea	k			PSOs	
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$\begin{array}{c} \mathbf{CO} 2 & 3 \\ \mathbf{CO} 3 & 3 \end{array}$	3	$\frac{2}{2}$	1	2							1	2	$\frac{1}{2}$		
CO 4		2		-		2		<u> </u>		1	1	1	2	+	1
CO 5		3	2	3	2				2	3	2			1	3
Course Assess Direct 1. Conti	ment M	Asses	sment				based 1								

Indirect

1. Course - end survey

Unit – I	INTRODUCTION PIC MICROCONTROLLER	Periods	9						
	on to PIC Microcontroller–PIC 16C6x and PIC16C7x Architect		Pipelining						
	Memory considerations – Register File Structure - Instruction								
Operation		n bet - Addressi	ing modes Simply						
Unit -		Periods	9						
	controller Interrupts- External Interrupts-Interrupt Programmin		-						
	ogramming– Front panel I/O-Soft Keys– State machines and ke								
Variable	strings.	-	-						
Unit –	III PERIPHERALS AND INTERFACING								
	For Peripherals Chip Access- Bus Operation-Bus Subroutines-								
U U	onverter-UART-Baud Rate Selection-Data Handling Circuit-	Initialization - L	CD And Keyboard						
	g - ADC, DAC, And Sensor Interfacing.	Deviate	0						
Unit -		Periods	9						
	chitecture –ARM programmer's model –ARM Developmer		• •						
	Language Programming–Simple Examples–Architectural Supp		· ·						
Unit -		Periods	9						
	ipeline ARM Organization– 5-Stage Pipeline ARM Organizatio								
	station– ARM Instruction Set– ARM coprocessor interface– As– Embedded ARM Applications.	Architectural supp	ort for High Leve						
Dunguuge		Total Periods	45						
Text Boo	ks	10000110000							
1.	Furber, S., —ARM System on Chip Architecture Addison W 2000.	esley trade Comp	uter Publication,						
1. 2.	2000.	, , , , , , , , , , , , , , , , , , ,	-						
	2000. Peatman, J.B., —Design with PIC Micro Controllers Pearson F	, , , , , , , , , , , , , , , , , , ,	-						
2.	2000. Peatman, J.B., —Design with PIC Micro Controllers Pearson F	Education,3rdEditi	on, 2004.						
2. Referenc	2000. Peatman,J.B., —Design with PIC Micro Controllers Pearson F es John.F.Wakerly: -Microcomputer Architecture and Programm Ramesh S .Gaonker: -Microprocessor Architecture, Programm	Education,3rdEditi	on, 2004. nd Sons 1981.						
2. Referenc 1.	2000. Peatman,J.B., —Design with PIC Micro Controllers PearsonE es John.F.Wakerly: -Microcomputer Architecture and Programm	Education,3rdEditi ingl, John Wiley a ning and Applicat	on, 2004. and Sons 1981. ions with the						
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2. Reference 1. 2. 3. 4. 5.	2000. Peatman,J.B., —Design with PIC Micro ControllerslPearsonE es John.F.Wakerly: -Microcomputer Architecture and Programm Ramesh S .Gaonker: -Microprocessor Architecture, Programm 8085l, Penram International Publishing (India), 1994. Raj Kamal: -The Concepts and Features of Microcontrollersl, Mazidi, M.A.,—PIC Microcontrollerl Rollin Mckinlay, Dann Kenneth .J. Ayala, The 8051 Microcontroller, Architecture, P edition), Penram International, India (2004). ces	Education,3rdEditi ingl, John Wiley a ning and Applicat Wheeler Publishin y causey Printice 1 rogramming & Ap	on, 2004. nd Sons 1981. ions with the ng, 2005 Hall of India, 200						
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	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205										
Programme	M.E.	Programme Code 202 Regulation							2019		
Department	POWER SYSTEMS ENGINEERING / ELECTRICAL AND ELECTRONICS ENGINEERINGSemester								II		
Course Code	C	ourse Name	-	riods P Week	er	Credit	redit Maxi		mum Marks		
			L	Т	Р	С	CA	ESE	Total		
P19PSE20	SCADA S Applicatio		3	0	0	3	40	60	100		
Course Objective	AT THE END OF THE COURSE, THE STITUENT SHOULD BE ADIE TO								Knowledge Level		
Course	CO1: Explain the basic building blocks of SCADA system										
Outcome	CO2: Describe the hardware and firmware requirements of SCADA Systems										
	CO3: Illustrate the role of PLC as RTU in SCADA system										
	CO4: Knowledge about single unified standard architecture IEC 61850.										
	CO5: Learn and understand about SCADA applications in transmission and distribution sector, industries etc										
	distribution	n sector, industries et	С								

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

Course Assessment Methods

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	INTRODUCTION	Periods	9
Introductio	n to SCADA: Data acquisition systems, Evolution of SCADA, Con	mmunication tec	chnologies.
Unit - II	FUNCTIONS	Periods	9
Monitoring	and supervisory functions, SCADA applications in Utility Autom	ation, SCADA i	n Industries.
Unit – II	SCADA UTILIZATION	Periods	9
Devices (SCADA System Components: Schemes- Remote Terminal Un IED), Programmable Logic Controller(PLC),Communication MI Systems		
Unit - IV	ARCHITECTURE	Periods	9
	chitecture: Various SCADA architectures, advantages and disadva dard architecture –IEC 61850.	antages of each	system - single
Unit – V	APPLICATIONS	Periods	9
Transmissi	es. open standard communication protocols. SCADA Appli on and Distribution sector-operations, monitoring, analysis and im Case studies, Implementation, Simulation Exercises		
Text Book		lotal Periods	45
1.	John W. Webb & Ronald A. Reis, —Programmable Logic Control New Delhi, 2010.	lers", Prentice H	all Publications,
2.	Dr. Mini Shaji Thomas –Power System SCADA and Smart Gri Francis, USA and a book chapter in the McGraw hill Standard Engineers, 17th edition, 2018.		
References			
1.	Stuart A. Boyer: —SCADA-Supervisory Control and Data Acquisi AmericaPublications, USA,2004.	tion ^{II} , Instrumen	t Society of
2.	Gordon Clarke, Deon Reynders: —Practical Modern SCADA Prot RelatedSystems ^{II} , Newnes Publications, Oxford, UK,2004.	ocols: DNP3, 60	0870.5 and
3.	William T. Shaw, —Cyber security for SCADA systems ^I , PennW	ell Books, 2006	5.
4.	Kevin James, —PC Interfacing and Data Acquisition: 7 Instrumentation and Controll, Newnes, 2000.	Techniques for	r Measurement,
5.	Jane W. S. Liu, -Real-time Systems, Pearson Education India, 2	2001.	
E-Resource	es		
1.	https://nptel.ac.in/courses/108106022/		
1. 2.	https://nptel.ac.in/courses/108106022/ https://nptel.ac.in/courses/108105063/		

Programme M.E. Programme Code 202 Regulation 2019 Department POWER SYSTEMS ENCIPEERING / ELECTRONICS Semester II Course Code Course Name Periods Per Week Credit Maximum Marks P19PSE21 System Theory 3 0 0 3 40 60 100 The students should made to - Larn the state space model for the given electrical/electromechanical systems. - Analyze the stability of the linear and nonlinear system. - Level Level Course Outcome CO1: Construct the state space model for the given electrical/electromechanical systems. Kanowice Kanowice CO2: Construct the phase plane trajectory of a given non-linear system using Lyapunov stability theory K3 CO3: Construct the phase plane trajectory of a given non-linear system using Lyapunov stability theory K5 CO3: Construct the phase plane trajectory of a given non-linear system using Lyapunov stability theory K5 PSO PSO PSO CO4: Evaluate the concept of various advanced controllers K5 S PSO CO4: Evaluate the concept of various advanced controllers K5 PSO PSO PSO PSO PSO PSO	NOMEN EMPOWERNEN	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 M.E. Programme Code 202 Regulation													TÜVFreisland DETIFFED D 105NOS				
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Course Code Course Name Week Credit Maximum Marks P19PSE21 System Theory 3 0 0 3 40 60 100 Course Objective The students should made to - Learn the state space model for the given electrical/electromechanical systems. - Analyze the stability of the linear and nonlinear system. - Learn the concept of various advanced controllers. Knowlec Course Outcome At the end of the course, the student should be able to, - Learn the concept of state and characteristic equations for SISO and MIMO systems K3 CO2: Apply the concept of state and characteristic equations for SISO and MIMO systems K3 CO3: Construct the phase plane trajectory of a given non-linear system using Lyapunov stability theory K5 CO5: Evaluate the concept of various advanced controllers K5 Co6: Evaluate the concept of various advanced controllers K5 Co7: Control Systems CO7: Control Systems PSO Co1 3 2 2 3 Co1 2 3 2 2 2 CO4: Evaluate the stability of the given linear and nonlinear system using Lyapunov stability theory V5 PSO Co3 3	Department	ELEC	TRICA	L AN							Sem	nester			II				
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Content of the syllabus	Direct 1. Continu 2. Assignn 3. End-Ser	ous Ass nent	essmer			& III													
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Unit - ISTATE VARIABLE REPRESENTATIONPeriods9	•																		
	Unit – I	STAT	E VA	RIAB	LEF	REPR	ESENT	TATIO	DN			Perio	ds		9				

Unit –	Π	SYSTEM MODELS	Periods	9
Characteri	istic eq	uation – Eigen values and eigen vectors – Invariance of e	igen values –	Diagonalization –
		l form -Concept of controllability and observability -		
Controllat	ole and	Observable Phase Variable forms for SISO and MIMO	systems – E	ffect of pole-zero
cancellatio	on on c	ontrollability and observability - Pole placement by state f	feedback -Ful	l order and reduced
order obse	ervers.			
Unit –	III	NONLINEAR SYSTEMS	Periods	9
		arity – Phase plane analysis – Singular points – Limit cycles		n of phase
trajectorie	s – Des	cribing function method - Derivation of describing function	S	
Unit –	IV	STABILITY	Periods	9
Introducti	on – Ec	uilibrium Points – Stability in the sense of Lyapunov – BIB	O Stability – S	Stability of LTI
Systems -	- Equil	brium Stability of Nonlinear Continuous Time Autonomo	us Systems -	Direct Method of
		ear Continuous Time Autonomous Systems - Finding Lya		ions for Nonlinear
		Autonomous Systems - Krasovskii and variable - Gradient		
Unit –	$\cdot \mathbf{V}$	ADVANCED CONTROL SYSTEMS	Periods	9
		: Model - Reference Adaptive Control - Fundamental conce		
Robust Co	ontrol –	Parameter perturbations - Design of robust control system	n – PID contro	llers – Fuzzy Logic
Control –	Neutral	Network Controller – Genetic Algorithm		
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Content	t of the syllab			1
Unit – l	[INTRODUCTION OF AI AND PROBLEM SOLVING METHODS	Periods	09
Intellige Strategi Searchin	ent Agents – es- Uninforn	ion - Future of Artificial Intelligence – Characteristi Problem Solving Approach to Typical AI problems.Pr ned - Informed - Heuristics - Local Search Algorithr al Observations - Constraint Satisfaction Problems – Con	roblem solvin ns and Optir	g Methods - Searc nization Problems
<u>Search.</u> Unit – I	I	KNOWLEDGE REPRESENTATION	Periods	09
		Logic – Prolog Programming – Unification – Forward C		
		edge Representation - Ontological Engineering-Categorie bjects - Reasoning Systems for Categories - Reasoning w		
$\frac{1}{\text{Unit} - 1}$		MACHINE LEARNING AND LINEAR MODELS	Periods	09
Learnin Going H – Overv Curse o	g System – H Backwards: B view – Derivi	of Machine Learning – Supervised Learning – The Bacerspectives and Issues in Machine Learning. Multi-layer back Propagation Error – Multi-layer Perceptron in Practing Back-Propagation – Radial Basis Functions and Split lity – Interpolations and Basis Functions – Support Vect ature Map.	er Perceptron ice – Exampl nes – Concep	 Going Forwards es of using the ML ts – RBF Network
Unit – l	V	DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS.	Periods	09
Optimiz	ation Evo	ent Component Analysis – Locally Linear Embedd		r
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CO 2		3			3	2				2	1			3	3	
CO 3			2	2							2	2		3	1	3
CO 4			3	3			2	2				2		3		3

Direct

1. Continuous Assessment Test I, II & III

2. Assignment

3. End-Semester examinations

Indirect

Content of the	e syllabus		
Unit – I	POWER CONVERTERS FOR SOLAR SYSTEM	Periods	9
Block diagram	n of solar photo voltaic system: line commutated converters (inv	version-mode)	- Boost and buck-
	ers- selection of inverter, battery sizing, array sizing standalone	PV systems -	Grid tied and grid
interactive inv	verters- grid connection issues.		
Unit – II	POWER CONVERTERS FOR WIND SYSTEM	Periods	9
A	C voltage controllers- AC-DC-AC converters: uncontrolled rect s-matrix converters.	tifiers, PWM I	nverters, Multi
Unit – III	WIND AND SOLAR PV ENERGY CONVERSION SYSTEMS	Periods	9
	peration of fixed and variable speed wind energy conversion syst		
	sues -Grid integrated PMSG and SCIG Based WECS Grid Integr		
Unit – IV	POWER QUALITY AND FAULT ANALYSIS	Periods	9
	er electronics in power system – Harmonics – Flicker – Remedi – International standards for grid integration of renewable energ		avior of wind and
Unit – V	SHUNT AND SERIES COMPENSATION	Periods	9
compensation Transfer capa	methods of VAR generation, analysis of uncompensated AG, Compensation by a series capacitor connected at the midpoi city, Compensation by STATCOM and SSSC, Fixed capacitor-T or-switched capacitor- Thyristor controlled reactor (TSC-TCR),	nt of the line. Thyristor contr	Effect on Power olled reactor (FC-
		otal Periods	45
Text Books			
	ed Mohan, Power Electronics Converters Applications and Desi, Viley and Sons, 2002.	gn, New York	, John
2. E	wald Fuchs, Mohammad A. S. Masoum, —Power Quality in Pov lectrical Machines, Academic Press, 2011.	wer Systems a	nd
References			
	N.Bhadra, D. Kastha, & S. Banerjee — Wind Electrical Systems ,		
	Sastrvedam, S.Sarma, -Power quality VAR compensation in pov	-	
	akesh Das Bagamudres, Extra high voltage AC transmission Eng ternational ltd., third edition 2007.	gineering ,Nev	v age
4. R	ai. G.D, Solar energy utilization, Khanna publishes, 1993.		
5. G	ray, L. Johnson, —Wind energy system ^I , prentice hall linc, 1995	5.	
E-Resources			
1. ht	tps://www.mdpi.com/journal/electronics/special_issues/appli_po	ower_elec	
	tps://nptel.ac.in		
	tp://www.idc-online.com/technical references/pdfs/electrical eng Electrical.pdf	gineering/Type	es and Revolution

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Programme	M.E.			ramme		-	20		R	egulation		2019
Department	POWER SY ELECTRIC ENGINEER	AL AN								Semester		Π
Course Code	Course Name	e				riods Weel	ĸ		redit			n Marks
P19PSE24	Waste Mana Energy Reco		t And		L 3	Т 0	Р 0		C 3	CA 40	ESE 60	Total 100
Course Objective	The student s Provide i Understa Realize o	nformat and rece nd the r	tion or ent ene recent f	n varion rgy ge technol	nerati logies	on tec of wa	chniqu aste di	es. spos	-	ment.		
Course Outcome	At the end of CO1: Unders CO2: Know	tand so what is	lid was bioma	ste mar ss	nagen	nent te	echniq	ues			K	Inowledge Level K2 K2
Pre-requisites	CO3: Study I CO4: Know (CO5: Unders	equipme	ent me	ant for	biom	ass co	ombus	tion		fication		K2 K1 K2
-	s strength of con	/ PO M rrelation gramme) 3-Stro	ong, 2 –		um, 1	- Weal	k		CO/PS	50 Maj PSOs	oping
PO PO	PO PO P	0 PO	PO	РО	РО	PO	PO	РО	PSC	01 PSO 2	1	3 PSO 4
1 2 CO 1 3 CO 2 3	3 4 5	5 6	7 3 3	8	9 2	10	11	12 2 2			2	2
CO 3 3 CO 4 3 CO 5 3			3 3 3		2			2 3 2			2	2
Course Assessmen	t Methods		3					2			2	2
Direct4.Continuou5.Assignme6.End-SemeIndirect	us Assessment ent ester examination end survey	ons	I & III						Per	iods		09
Introduction to End waste - MSW – Co	ergy from Was	te: Clas						gro t			sidue, I	

Unit – II	BIOMASS PYROLYSIS	Periods	09
	yrolysis: Pyrolysis – Types, slow fast – Manufacture of Manufacture of pyrolytic oils and gases, yields and appli		-Yields and
Unit – III	BIOMASS GASIFICATION	Periods	09
construction arrangemen	Fixed bed system – Downdraft and updraft gasifiers n and operation – Gasifier burner arrangement for th at and electrical power – Equilibrium and kinetic consideration	nermal heating – Gastion in gasifier operation	ifier engine n.
Unit – IV	BIOMASS COMBUSTION	Periods	09
combustors operation -	Combustion: Biomass stoves – Improved chullahs, type , Types, inclined grate combustors, Fluidized bed combust Operation of all the above biomass combustors	ors, Design, constructio	n and
Unit – V	BIOGAS	Periods	09
Bio energy Biomass co - pyrolysis Application Alcohol pro	operties of biogas (Calorific value and composition) - Bio system - Design and constructional features - Biomass r onversion processes - Thermo chemical conversion - Direct and liquefaction - biochemical conversion - anaerobic dig as - poduction from biomass - Bio diesel production - Urban was gramme in India	esources and their class combustion - biomass gestion - Types of biog	sification - gasification as Plants –
		Total Periods	45
Text Books	S		
1	Biomass for Energy, Industry and Environment, G. Grass Collina (Editor), H. Zibetta (Editor)6th E.C. Conference Press; 1 edition (April 21,	1st Edition, Kindle Edit	ion, CRC
2	2014 Biomass as Energy Source: Resources, Systems and Dahlquit,France Group,Londan,UK,2013	l Applications,Erik	
3	LaGrega, M., et al., -HazardousWasteManageme 2nded., 2001.	ntl,McGraw-Hill,c.1200) pp.,
REFEREN	ICES		
1	Biomass Conversion and Technology, C. Y. WereKo-Bro Wiley & Sons, 1996.	bby and E. B. Hagan, J	ohn
2	Food, Feed and Fuel from Biomass, Challal, D. S., IBH F	Publishing Co. Pvt. Ltd.	, 1991
3	Energy CogenerationHandbook,GeorgePolimveros, Indu	strial PressInc,NewYorl	x1982
4	HowardS.Peavyetal,-Environmental Engineering, McGra	wHill International Edit	tion,1985
E-Resource	es		
1	https://doi.org/10.1016/B978-0-12-410950-6.X5000-4		
2	https://www.crcpress.com/Biomass-as-Energy-Source-Re		
3.	Applications/Dahlquist/p/book/9781138073227#googleP https://www.sciencedirect.com/book/9780080428499/bic environment#book-info		ie-

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Progr	amme		M.E.			Prog	ramm	e Code			202	Reg	ulation		2	019
Depai	rtment	E	LECT		L AN			RING ONIC				Se	mester		III	
Course	e Code	•		Cours	se Nan	ne			iods P Week T	er P	Credit C		Maxi CA	mum M		Total
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1171	SE25			lent sh			to	5	Ū	0	5		-10	00		100
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~								conven								K2
	ırse come	an	d enha	ince us	es of d	c drive	e in mo	odern a	pplica	tions	•		DC driv	es		K3
		C	03 : Ar	nalyze	the per	forma	nce of	AC m	otors v	vith v	various c	ontrol st	rategies			K3
				pleme			•									K3
			05:Ide plicati		the su	itabilit	y of	contro	l meth	nods	of AC	Drives	for ind	ustrial		K4
Pre-ree	quisite	s Nl	L													
	(3/2/	1 indic	ates st	rength	of cor		n) 3-S	trong, 2		ediun	n, 1 - We	eak	C	O/PSO		pping
COs		r		T		I	1	mes (P		1					SOs	
	PO 1		PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	PO 9	РО	10 PO	1 PO 1		1 PSC	0 2	PSO 3
CO 1	3	2	-	2	-	-	-	-	-	-		-	2	1		1
CO 2 CO 3	- 3	32	2	2	- 2	-	- 1	-	-	-	- 1	-	1			1
CO 4	-	3	2	-	2	- 1	2	-	- 1	-		-		2		1
CO 5	3	3	2	1	-	-	-	1	-	-	2	-	1			2
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Direct			A		Test	11 0 11	r									
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Content of the s	yllabus		
Unit – I	RECTIFIER CONTROL OF DC DRIVES	Periods	9
transfer function	oventional Control of DC Drives and Characteristics - Methods on of series and separately excited dc motor–Multi quadrant of d three phase converters- Closed loop control- Dual converter fee	peration. Cor	
Unit - II	CHOPPER CONTROL OF DC DRIVES	Periods	9
reversal of D	rives, input filter design. Step -up chopper for photovoltaic sy C motor drives using choppers, multiphase choppers, Close for drives Traction motors- Traction supply systems.		0 1
Unit – III	VOLTAGE AND FREQUENCY CONTROLLED INDUCTION MOTOR DRIVES	Periods	9
supply on perfection motor	Four quadrant control and closed loop operation of AC drives ormance of induction motor: Stator voltage control using AC vol- rs: motoring, regenerative braking and closed loop operation – nd air gap flux weakening control – Comparison of VSI and CS	tage controlle Constant V/F	er- VSI and CSI driven
Unit - IV	ROTORRESISTANCECONTROLANDSLIIENERGY RECOVERY SCHEMES	Periods	9
Indirect vector c	operation –static rotor resistance control – Principle of vector control scheme – Speed control of slip ring induction motor by injected erbius drives- sub synchronous and super synchronous operations- torque	emf- Torque sl	
Unit – V	SYNCHRONOUS MOTOR DRIVES	Periods	9
	ed PM synchronous motor drives – constant flux and Flux wes -control - closed loop operation- permanent magnet synchronous m	• •	
		Total Peri	ods 45
Text Books			
	bey G.K. "Power Semiconductor Controlled Drives", New York:		
	nal K. Bose, "Modern Power Electronics and AC Drives", Pear . Ltd., New Delhi, 2003	son Educatio	on (Singapore)
References			
-	C Sen, "Thyristor DC Drives", John wiley and sons, New York, 2		
	Krishnan, "Electric Motor Drives – Modeling, Analysis and Conta t Ltd., New Delhi, 2003.	ol", Prentice-	Hall of India
	damSubramanyam, "Electric drives concepts and application of the second structure of the second struct	ons", Tata l	McGraw Hill
E-Resources			
1. htt	p://nptel.ac.in/courses		
2. htt	ps://electrical-engineering-portal.com		
3. htt	p://www.digimat.in>nptel>courses>video		

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Programme	M.E.	Program	nme Cod	e		202	Regulation		2019
Department	POWER SYSTEMS ENGINEERING / ELECTRICAL AND ELECTRONICS Semester ENGINEERING								III
Course Code	Cour	rse Name		ods Pe Veek	er	Credit	Maxi	imum Ma	rks
			L	Т	Р	С	CA	ESE	Total
P19PSE26	Energy Con Electrical Sy		3	0	0	3	40	60	100
Course Objective	• Under	should be made to stand the various vze the various app	types of			-	vstems.		
	At the end of	f the course, the st	udent sh	ould b	e abl	e to,			Knowledge Level
Course		ze various types ion based on techr					s and perform	the	K4
Outcome	CO2: Unders	stand the application	on of the	ermal s	torag	ge system			K1
	CO3: Analyz	CO2: Understand the application of thermal storage system CO3: Analyze the various types of batteries performance and its characteristic							
	CO4: Unders	stand the concept of	of fuel c	ell and	its a	pplication			K3
	CO5: Optimi	ize the level of alte	ernate er	nergy s	torag	e technolo	ogies		K3
Pre- requisites	Power system	n modeling and ar	nalysis						

	CO / PO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak												CO/PSO Mapping			
~~~	Programme Outcomes (POs)													PSOs		
COs	PO 1												PSO1	PSO 2	PSO 3	
CO 1	1		2	3												
CO 2	1	1	1	1	1											
CO 3	1		1	1	1											
CO 4	1		1	1	1											
CO 5	1		1	1												

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

Content of th	ie syllabus		
Unit – I	INTRODUCTION	Periods	09
Necessity of Applications.	energy storage - types of energy storage - comparison of energ	y storage techr	ologies-
Unit – II	THERMAL STORAGE SYSTEM	Periods	09
Thermal stor	age –Types–Modeling of thermal storage units– Simple water	r and rock bed	l storage
system- pres	surized water storage system- Modeling of phase change storage	ge system– Sir	nple units, packed
bed storage u	nits – Modeling using porous medium approach, Use of Transform	1	
Unit – III	ELECTRICAL ENERGY STORAGE	Periods	09
battery, stora	concept of batteries-measuring of battery performance, charg ge density, energy density, and safety issues. Types of batteries ese dioxide and modern batteries for example(i)zinc-Air(ii) Nicke	s-Lead Acid, N	Nickel– Cadmium,
Unit – IV	FUEL CELL	Periods	09
type. Unit – V	cell, Hydrocarbon air cell, alkaline fuel cell, detailed analysis– ALTERNATE ENERGY STORAGE TECHNOLOGIES	Periods	09
	per capacitors, Principles &Methods–Applications, Compres rage–Applications	sed air Energ	y storage, Concept
		<b>Total Periods</b>	45
<b>Text Books</b>			
1.	IbrahimDincerandMarkA.Rosen, "ThermalEnergyStorageSystem Wiley&Sons2002.	nsandApplicatio	ons",John
2.	James Larminie and Andrew	Dicks	s. "Fuel
۷.	cellsystemsExplained",Wileypublications,2003.		s, ruei
2. References	cellsystemsExplained",Wileypublications,2003.		s, ruei
	cellsystemsExplained",Wileypublications,2003. S. G. Jamdade, P. G. Jamdade) "Renewable Energy and Exploit Publications, LLP,2019	nergy Storage'	,
References	S. G. Jamdade, P. G. Jamdade) "Renewable Energy and En		,
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P19PS	SE27		ıstrial Contr	Load ol	Mode	ling	3	(	) 0	)	3		40	60		100
Course       The students should made to         Objective       • Understand the energy demand scenario         • Understand the modeling of load and its ease to study load demand industrially.         • Impart knowledge in electricity pricing models																
		At th	At the end of the course, the student should be able to,													owledge Level
Cou	rco	<b>CO1:</b> Acquire knowledge about energy scenario load management to reduce demand of electricity during peak time											e	K2		
Outco		<b>CO2:</b> Acquire knowledge about load control techniques in industries and its application.										5	K2			
		CO3	B:Anal	yse and	d unde	rstand c	liffere	ent ene	ergy sa	ving	g opp	ortuniti	es in indu	stries.		K2
						ge abou				ontro	ol in i	industri	es and ana	alyse		K2
		CO5	:Learn	n math	ematic	al mode	elling	and p	rofiling	g of	vario	us load	S		K2	
Pre-																
requisi	tes															
	(3/2/	1 indic	ates st	rength		/ PO M relatior			$2 - M_{\odot}$	ediu	m, 1	- Weak		CO	PSO M	apping
co					Progr	amme	Outco	mes (l	POs)						PSOs	5
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	PO 9	РС	O 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	1		2	3												
CO 2	1	1	1	1	1											
CO 3			1		1											
CO 4 CO 5	CO4         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1															
	Course Assessment Methods Direct															
1.		tinuous	s Asse	ssment	Test l	, II & I	II									
2.	Assi	gnmen	ıt			-										
3.		Semes	ster exa	aminat	ions											
Indire			1.0													
1.	Cou	rse - er	nd Surv	vey												

Unit –	of the syllabus I ENERGY SCENARIO AND LOAD MANAGEMENT	Periods	9
			-
Shaping	Energy Scenario-Demand Side Management-Industrial Load Manage Objectives-Methodologies-Barriers-Classification of Industrial -Load Modeling.		
Unit - I	I LOAD MODELING AND PRICING	Periods	9
•	y pricing – Dynamic and spot pricing –Models-Direct load control- l p approach- scheduling- Formulation of load models-Optimization	-	
Unit – I	II INDUSTRIAL POWER MANAGEMENT	Periods	9
	power management in industries-controls-power quality impacts-app	lication of Fi	lters-Energy
Unit - I	V LOAD CONTROL TECHNIQUES AND OPTIMIZATION	Periods	9
Banking-	power units- Operating and control strategies- Power Pooling- Operation Industrial Cogeneration; Selection of Schemes Optimal Operates-Problem formulation- Case study; Integrated Load management for	ting Strategi	
Unit – V	V LOAD MODELING AND CONTROL	Periods	9
0	and heating loads- load profiling- Modeling- Cool storage- Problem formulation- Case studies	-Types-Contro	ol strategies-Optima
		<b>Total Period</b>	s 45
Text Boo	ks	Total Period	ls 45
Text Boo 1.	ks C.O. Bjork "Industrial Load Management - Theory, Practice and Si Netherlands, 1989.		
	C.O. Bjork "Industrial Load Management - Theory, Practice and Si	imulations", E	Elsevier, the
1.	<ul> <li>C.O. Bjork "Industrial Load Management - Theory, Practice and Si Netherlands, 1989.</li> <li>C.W. Gellings and S.N. Talukdar, Load management concepts. IEI 1986</li> </ul>	imulations", E	Elsevier, the
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Cours	e Code	•		Course	e Name	e	Р	Perioc We			Credi	t	Max	Maximum Marks		
							L		Т	Р	С		CA	ESE	Тс	otal
P19F	PSE28			Advanced Energy Storage Technologies300340								40	60 100			
	ourse jective		<ul> <li>The students should made to</li> <li>Develop the ability to understand/ analyses the various types of energy</li> <li>Understand the various applications of energy storage systems.</li> </ul>											storage.		
		At the end of the course, the student should be able to,											Knowledg Level			
G						ous typ echno-eo						ces an	d perform	n the	K4	
	urse come		CO2: U	Jnderst	tand th	e applic	ation o	of the	rmal	sto	rage sys	stem			K1	
Out	come		CO3: charact			e vario	ous ty	pes	of l	oatt	eries p	berform	ance and	d its	K4	
			CO4: U	Jnderst	tand th	e conce	pt of fi	uel ce	ell an	d its	s applic	ation			ŀ	K1
			CO5: C	ptimiz	the l	evel of a	alterna	te en	ergy	stor	age tec	hnolog	ies		ŀ	K4
Pre-rec	quisite	5	Power	system	mode	lling an	d analy	vsis								
	-			5		0		,								
					CO	/ <b>PO</b> M	appin	g								_
	(3/2/	1 ind	icates st	rength		relation			2 – N	/led	ium, 1	- Weak		CO/PSC	) Mapp	ing
COs				1	Progra	amme C			Os)				P	SOs		
0.03	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	РО 8	PO	9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO 3
CO 1	1		2	3												
CO 2	1	1	1	1	2											
CO 3 CO 4	1		1	$\frac{2}{2}$	$\frac{2}{2}$					-						
CO 5	1		1	2						$\neg$						
	<u> </u>		1	1		1 1			<u> </u>				1			1

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

#### Indirect

Cont	ent of the	syllabus		
Unit -	- I	INTRODUCTION	Periods	09
	sity of ene cations.	ergy storage – types of energy storage – comparison o	f energy storag	ge technologies-
Unit -	– II	THERMAL STORAGE SYSTEM	Periods	09
pressu	urized wate	-Types-Modeling of thermal storage units- Simple wate r storage system- Modeling of phase change storage sy odeling using porous medium approach, Use of Transform		0
Unit -	- III	ELECTRICAL ENERGY STORAGE	Periods	09
storag	ge density, o anese dioxi	cept of batteries–measuring of battery performance, charge energy density, and safety issues. Types of batteries–Lea de and modern batteries for example(i)zinc-Air(ii) Nickel H FUEL CELL	d Acid, Nickel-	-Cadmium, Zinc
	-	y of Fuel cell, Principles of Electrochemical storage–		0,2
	ogen air cel type.	l, Hydrocarbon air cell, alkaline fuel cell, detailed analys ALTERNATE ENERGY STORAGE		
	•	TECHNOLOGIES		
•		capacitors, Principles & Methods–Applications, Compresse Applications	ed air Energy st	orage, Concept of
			<b>Total Periods</b>	45
Refer	rences			
1	IbrahimDi Wiley&S	ncerandMarkA.Rosen, "ThermalEnergyStorageSystemsand ons2002.	Applications",Jo	ohn
2.	James Lar	minie and Andrew Dicks, "Fuel cell systemsExplained",Wi	leypublications,	2003.
3.	Lunardini	V.J, Heat Transfer in Cold Climates, JohnWileyandSons19	981.	
	Lunardini sources	V.J, Heat Transfer in Cold Climates, JohnWileyandSons19	981.	
	sources	V.J, Heat Transfer in Cold Climates, JohnWileyandSons19 prgystorage.org/why-energy-storage/technologies/	981.	

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Dep	oartmer	nt	POWI ELEC ENGI	TRIC	AL AN							(	Semeste	r	II	I	
C	C	1	C		т		Period	s Per V	Neek	Cr	edit		Ma	aximum	um Marks		
Cou	rse Coo	ie	C	ourse l	Name		L	r.	ΓF	•	С		CA	ES	SE	Total	
P19	PSE2	9	POWER SYSTEM SECURITY30034060										100				
	Course ObjectiveThe students should made to • Understand the characteristics of power system security • Understand the operations knowledge in power system security • Analyze the load forecasting and state estimation. • Analyze the methods in optimal power flow																
			At the end of the course, the student should be able to,													wledge	
CO1: Assess the security level status of the large power									vstem Understan								
0			CO2: Analyze the large power system in terms of real power performance index (PI) or other PIs Analyze												alyze		
-	'ourse itcome	•	CO3: Identify the bad data in the measurement set, if present Apply											pply			
			CO4: Estimate the state of the power system in terms of its measured values CO5: Optimize the power flow in terms of real and reactive power with the												A	Apply	
				le vari										with the agement		pply	
Pre-1	requisi	tes	Power	system	n mode	elling a	and and	alysis									
	(3/2/1 i	ndica	tes stren		<b>O / PO</b> orrelati			2 – Me	dium,	1 - W	'eak			CO/PSO	SO Mapping		
				Pro	ogramn	ne Outc	omes (	POs)						Р	SOs		
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2	PSO3	PSO4	
CO 1	1		2	3							<u> </u>						
CO 2	1	1	1	1 2	2 2												
CO 3 CO 4	1		1	2	2						+						
CO 4						<u> </u>	+										
	rse As	sessn	nent Me	thods			1	1		1	1	<u>l</u>		1	I		
Di	2. A	ssign	uous As iment emester			t I, II 8	z III										
Inc	direct																
	1. C	ourse	e - end si	urvey													

Unit – I	<b>BASICS OF POWER SYSTEM SECURITY</b>	Periods	9
Contingency E	actors Affecting Power System Security, Contingency A valuation DC Load Flow, Fast Decoupled Load-flow, H verview of Security Analysis		
Unit – II	OPERATIONSINPOWERSYSTEMSECURITY	Periods	9
flow after outag	ty Factors, Generation shift sensitivity factor, Line outage ge, AC Power Flow Security Analysis, AC Power Flow se Selection, Concentric Relaxation, Bounding Area metho	v Security A	
Unit – III	LOAD FORECASTING & MEASEUREMENTS	Periods	9
	verage, periodic, stochastic components of load, basic id Detection and Identification of Bad Measurements, Ne ements.		
Unit – IV	STATE ESTIMATION	Periods	9
Maximum Like	Aethod of Least Squares, Simple DC circuit example lihood Weighted Least-Squares Estimation, Matrix Formu Orthogonal Decomposition, The Orthogonal Decomposition	lation, Estin	
Unit – V	OPTIMAL POWER FLOW	Periods	9
formulation, O Constrained	ptimal Power Flow (OPF) Formulation, Economic Load ptimal Reactive Power Dispatch (ORPD), Economic En OPF (SCOPF), OPF solution techniques, Lagrang Method, Interior Point Method.	nission Disp	atch (EED), Securit
Fotal Periods			45
Text Books			
	.Wood and B.F. Wollenberg., Power generation, opel sons, 1996.	ration and c	control, John Wile
References			
Ioh	n J. Graignaer and William D. Stevenson, Power sy 1, 2003.	ystem analy	sis, Tata Mc Grav

E-Resour	E-Resources								
1.	https://www.eeeguide.com/power-system-security/								
2.	http://home.iitk.ac.in/~saikatc/								

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN(Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205M.E.Programme Code202Regulation															
Progra	amme		M.	E.		Pro	ogrami	ne Co	de	202	2	Regul	lation		2	0		
Depar	tment	EL	ECTR		AND		NEER CTRO				S	Semeste	r	III				
Course	e Code		Co	urse N	ame		Pe	riods I Week		Crec	lit		Maxi	imum	Marks	Marks		
							L	Т	Р	C		C	CA	E	SE	Total		
P19PSE	230		Smart Grid Technology and Applications300340								40	6	0	100				
	urse ective	At t	<ul> <li>Understand various aspects of smart grid.</li> <li>Study various smart transmission and distribution technologies.</li> <li>Impact knowledge in Computation intelligence Techniques, Algorithms</li> <li>Familiarized with the high Performance computing for smart grid applicat</li> </ul> At the end of the course, the student should be able to,											cation	s nowledge Level			
		CO	1: Exp	lain the	e Fund	ament	als Of	Smart	grids							K2		
Cou	irse						of sma			onents	•					K2		
Outo	come	CO	3: Asse	ess the	role of	f autor	nation	in Dis	tributi	on						K3		
		CO	4: App	ly com	putati	onal te	echniqu	ies inv	olved	with tl	ne s	mart gr	id			K4		
		CO	5:Impl	ement	the sm	art gri	d tech	nologie	es							K3		
Pre-req	uisites	Sma	art grid	l														
	(3/2/1	indicate	s streng		<b>O / PO</b> orrelati			2 – Me	dium,	1 - We	ık		C	O/PS	O Map	ping		
				Pre	ogramr	ne Outo	comes (	(POs)						]	PSOs			
COs	PO 1         PO 2         PO 3         PO 4         PO 5         PO 6         PO7         PO8         PO 9         PO 10         PO 11         12         PS01					PSO1	PSO 2	PSO3	PSO4									
CO 1	3		1			1												
CO 2	2	2	1	1	2													

Direct

CO 3

CO 4

CO 5

1. Continuous Assessment Test I, II & III

2. Assignment

3. End-Semester examinations

Indirect

Content of the	e syllabus		
Unit – I	INTRODUCTION TO SMART GRID	Periods	9
opportunities, &Self Healing	Electric Grid - Concept, Definitions and Need for Smart challenges and benefits - Difference between conventional Grid - Present development & International policies in Sr obal Smart Grid initiatives- Smart Grid Roadmap for India.	& Smart Grid	- Concept of Resilient
Unit - II	PMU, SAS and DAS	Periods	9
& Placement,	ement Unit (PMU): Requirements, RTU limitations, GPS Tim Features – Wide Area Monitoring Systems (WAMS) – Sub utomation Systems (DAS), Introduction to Internet of things	-station Autor	nation Systems (SAS) -
Unit – III	DISTRIBUTION GENERATION TECHNOLOGIES	Periods	9
	Renewable Energy Technologies –Micro grids – Storage Tec Environmental impact and Climate Change – Economic		
Unit – IV	TOOLS AND TECHNIQUES FOR SMART GRID	Periods	9
	Techniques – Static and Dynamic Optimization Techniques – Evolutionary Algorithms – Artificial Intelligence techniques.	- Computationa	l Intelligence
Unit – V	HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS	Periods	9
	ting and Its Architecture - Basics of Cloud Computing - Cloud orid clouds - Cloud Security for Smart Grid.	d models (IaaS	, SaaS, PaaS) - Public,
	,	Total Periods	45
Text Books	Borlase, Smart Grids, Infrastructure, Technology and Solutions	CRC Press 1	e 2013
	sters, Renewable and Efficient Electric Power System, Wiley–		
Janaka	Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, A logy and Applications, Wiley & Sons Ltd., February 2012.		
References			
Ali Ke	yhani and Muhammad Marwali, —Smart Power Grids 2011, S	Springer Public	ations,2011.
=	hadke and J.S. Thorp, "Synchronized Phasor Measurements and I.S. Thorp, "Synchronized Phasor Measurements and the second se	nd their Applic	ations", Springer Edition,
3. Hanck Indust	C. Güngör, DilanSahin, TaskinKocak, SalihErgüt, Concettinal e, Smart Grid Technologies: Communication Technologies an rial Informatics, Vol. 7, No. 4, November 2011	d Standards IE	
	ne Hertzog, —Smart Grid Dictionary, Springer publications,		2012
5. T. Ack	ermann, Wind Power in Power Systems, Hoboken, NJ, USA,	John whey, 26	2012.
E-Resources			
¹ grid&a	www.google.com/search?q=introduction+to+smart+grid&oq=i as=chrome.0.69i59i017.6569i0i7&sourceid=chrome&ie=UTF-	8	
	www.google.com/search?q=distribution+generation+technolog ENERATION+TECHNOLOGIES&aqs=chrome.0.0.1403j0j88		
https://	www.google.com/search?q=Wikipedia-smart+grid&oq=Wikip		<u> 011 0</u>
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					rse, the s					ation mo	thoda			KL K2	
			CO1: Understand research problem types and data collection methods.         CO2: Understand research design methodologies												
Course Outcon		CO3: Analyze research related information													
outcon	iic	<b>CO4:</b> Follow research ethics													
		Techno								y Compu concept,				К2	
Pre- requisit	tes	-													
					CO/PO	Mapp	ing						CO/I	PSO	
	(3/2	2/1 indic	ates stre		correlati			2 – Mee	dium, 1 -	Weak			Map	ping	
COs	<b>R</b> 0 1		20.0		Programm								PS		
CO 1	PO 1 3	PO 2 3	<b>PO 3</b>	PO 4 3	PO 5	PO 6	PO 7	PO 8	<b>PO 9</b>	PO 10 2	PO 11	P	<b>SO 1</b> 3	<b>PSO 2</b> 2	
CO 1 CO 2	3	3	3	3	-	-	-	-	1	2	-		2	2	
CO 2	3	3	2	3	-	_	_	-	1	2	-		3	2	
CO 4	3	3	3	2	-	-	-	-	1	2	-		1	1	
CO 5	3	3	2	2	-	-	-	-	1	2	-		2	2	
Course A Direct	Asses	sment I	Method	s											
1. 2.	Assi	inuous . gnments		nent Te	est I, II &	& III									
Indirect 1.		se - end	l survey	7											

Content of th	ne syllabus		
Unit - I	INTRODUCTION TO RESEARCH	Periods	9
Meaning of I Research des	research problem, Sources of research problem, Criteria Charact Research- Types of Research- Research Process- Problem definition ign- Approaches to Research- Quantitative vs. Qualitative Approac -Research and Scientific Method-Research Process-Criteria of Goo	on- Objectives h- Research Me	of Research-
Unit – II	RESEARCH DESIGN	Periods	9
U U	esearch Design-Need for Research Design- Features of a Good Desearch Design-Different Research Designs-Basic Principles of Exp	<b>v</b>	·
Unit – III	DATA COLLECTION	Periods	9
through Que	ion :Collection of Primary Data-Observation Method-Interview stionnaires-Collection of Data through Schedules-Difference be illection of Secondary Data- Processing Operations-Elements/Typ	etween Questic	onnaires and
Unit – IV	REPORT WRITING	Periods	9
Significance	ng: Meaning of Interpretation- Technique of Interpretation-Proof Report Writing-Different Steps in Writing Report-Layout of the Presentation-Mechanics of Writing a Research Report-Precaut	e Research Rep	ort-Types of
Unit - V	INTELLECTUAL PROPERTY RIGHTS (IPR)	Periods	9
	tellectual Property: Patents, Designs, Trade and Copyright-IPR Geographical Indications.	History-Patent	Law—Trade
		Total Periods	45
References			
1.	C. R. Kothari, "Research Methodology – Methods and Techniqu International Publishers	ies", 2nd Editio	n, New Age
2.	Bordens, K. S. and Abbott, B. B., "Research Design and Methods Edition, McGraw-Hill, 2011	– A Process Ap	pproach", 8th
3.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Internological Age", 2016.	ellectual Prope	rty in New
4.	Davis, M., Davis K., and Dunagan M., "Scientific Papers and Elsevier Inc.	Presentations",	3rd Edition,
5.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Internet Technological Age". Aspen Law & Business; 6 edition July 2012	ellectual Prope	rty in New
E-Resources			
1.	https://www.questionpro.com/blog/research-design/		
2.	https://research-methodology.net/research-methods/data-collection	1/	
3.	https://www.wipo.int/edocs/pubdocs/en/intproperty/958/wipo_pub	958_3.pdf	

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Course Cod	<b>_</b>	Co	ourse l	Name		Per	riods	Per W	/eek	Cred	it	M	aximuı	m Ma	rks			
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P19PSAC2	Pe	Pedagogy Studies     2     0     0       The student should be made to,										100	(	0	100			
Course Objective	At	n	haking dentify	unde v critic	rtaken cal evid	by the dence	e DFI gaps	D, oth to gui	er age de the	ncies a develo		archers		sign a	Ind policy			
Course Outcome		<b>)1:</b> Und l inforr								ng used	l by tea	chers in	n forma	al	Level K2			
		<b>)2</b> : Uno ctices,									se peda	gogical			K2			
	sch											icum) ar bedagog			K2			
Pre-requisite	S																	
(3/2/	1 indica	dicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak										)/PSO ]	SO Mapping					
COs			-		amme (				,				PS	Os				
	PO PC	-	PO	PO	PO	PO 7	PO	PO	PO 10	PO 11	PO	PSO	PSO	PSO	PSO			
CO 1	1 2	3	4	5	6	7	8	9	10	11	$\frac{12}{2}$	1 3	2	3	4			
CO 2						3			1		3	2						
<b>GO 3</b>		-1	1	1	t – †	-	1		+	+	2	1 -		1				

Direct

CO 3

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

# Indirect

1. Course - end survey

Content of the sy	llabus		
Unit – I	INTRODUCTION AND METHODOLOGY	Periods	4
	ale, Policy background, Conceptual framework and ter ther education-Conceptual framework, Research questions	0.	0
Searching.			i menouorogy and

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Unit -	II	THEMATIC OVERVIEW	Periods	9
		s are being used by teachers in formal and informal classr education.	ooms in developing	countries-
Unit –	III	EFFECTIVENESS OF PEDAGOGICAL PRACTICES	Periods	9
assessmen guidance evidence	t of includ materials 1 for effect	ctiveness of pedagogical practices- Methodology for the i led studies- Teacher education (curriculum and practicum best support effective pedagogy-Theory of change- Stre ive pedagogical practices, Pedagogic theory and peda and Pedagogic strategies	n) and the school-current nature of	the body of
Unit - I	IV	PROFESSIONAL DEVELOPMENT	Periods	9
	unity- Curi	sroom practices and follow up Support-Peer support-Supp riculum and assessment- Barriers to learning: limited reso <b>RESEARCH GAPS AND FUTURE</b> <b>DIRECTIONS</b>		
and resear	ch impact.	ontexts - Pedagogy - Teacher education - Curriculum and	assessment - Dissen Total Periods	nination 45
Reference				
1.	Ackers J (2):245-2	, Hardman F (2001) Classroom interaction in Kenyan prin 261.	mary schools, Comp	oare, 31
2.		M (2004) Curricular reform in schools: The importance of um Studies, 36 (3): 361-379.	of evaluation, Journa	al of
3.	research	pong K (2003) Teacher training in Ghana - does it count? project (MUSTER) country report 1. London: DFID.		
4.	maths ar	pong K, Lussier K, Pryor J, Westbrook J (2013) Improvind nd reading in Africa: Does teacher preparation count? Inter ment, 33 (3): 272–282.		
5.		er RJ (2001) Culture and pedagogy: International compar n.Oxford and Boston: Blackwell.	isons in primary	
E-Resour	ces			

		KANANDHA COLI (Autonomous Institutio Elayampal	on, Affiliate	ed to An	na Univ	versity ,Che		TWReshad CETTED	60 907:275			
Programme	M.E.	Program	nme Cod	e		202	Regulation	2019				
Department	ELECT	R SYSTEMS ENG RICAL AND ELI EERING				Se	emester	Ι				
Course Code	C	ourse Name	Period	s Per V	Veek	Credit	Maxi	mum M	m Marks			
Course Code	C	ourse rvanie	L	Т	Р	C	CA	ESE	Total			
P19PSAC3	Disaster	Management	2	0	0	0	100	0	100			
Course Objective		<ul> <li>billion and a control of a control of the problem of the</li></ul>										
C	At the en	d of the course, the	student s	hould t	e able	e to,		K	Inowledg Level			
Course Outcome		<b>CO1:</b> Understand the pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.										
	<b>CO2</b> : Understand the evidence on the effectiveness of these pedagogical practices, in what conditions, and population of learners.											
		, in what conditions	, und pop					1				
		, in what conditions nderstand the teac urriculum and guida	cher educ					the	K2			

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

Direct

- Continuous Assessment Test I, II & III
   Assignment

Indirect

Content of the	syllab	us		
Unit – I		INTRODUCTION	Periods	4
		Factors And Significance; Difference Between Hazar Difference, Nature, Types and Magnitude.	d and Disaste	r; Natural and
Unit - II		REPERCUSSIONS OF DISASTERS AND HAZARDS	Periods	9
Earthquakes, V Man-made disa	/olcan aster: 1	Loss of Human And Animal Life, Destruction Of Ecosysten isms, Cyclones, Tsunamis, Floods, Droughts And Famines Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks e And Epidemics, War And Conflicts.	, Landslides A	
Unit – III		DISASTER PRONE AREAS IN INDIA	Periods	9
		nes; Areas Prone To Floods And Droughts, Landslides and Il Hazards With Special Reference To Tsunami; Post-Disast		
Unit - IV		DISASTER PREPAREDNESS AND MANAGEMENT	Periods	9
	ng, Da	oring of Phenomena Triggering A Disaster or Hazard; Eval ata From Meteorological and Other Agencies, Media Re lness.		
Unit – V		RISK ASSESSMENT	Periods	9
Techniques Of	Risk	pt And Elements, Disaster Risk Reduction, Global and Nati assessment, Global Co-Operation In Risk Assessment and Assessment. Strategies for Survival.		
References			1 otal 1 erious	45
1.		shith, Singh AK, "Disaster Management in India: Perspecti wRoyal book Company.	ves, issues and	strategies
2.	OfInc	i, Pardeep Et.Al. (Eds.)," Disaster Mitigation Experiences A lia, New Delhi.		-
3.		S. L., Disaster Administration And Management Text And cation Pvt. Ltd., New Delhi.	Case Studies"	,Deep &Deep
<b>E-Resources</b>				
1.	https:	//www.undp.org/content/dam/india/docs/disaster_managem	ent_in_india.p	df

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P19PSAC4		Va	lue F	Educa	tion			2	0	0	0	)	100		0	100	
Course Objective		Th	•	<ul> <li>Imbibe good values in students</li> <li>Let the should know about the importance of character</li> <li>the end of the course, the student should be able to,</li> </ul>													
Course		At	At the end of the course, the student should be able to,												Knowledge Level		
Outcome												K2					
					<u> </u>			-		s						K2	
		CO	<b>D3</b> : D	evelop	ping tl	he ove	rall pe	ersonal	ity							K4	
Pre-requis	ites																
(3/	2/1 in	dicate	e et <b>r</b> an			PO Ma		<b>g</b> ong, 2 -	Medi	um 1	Wee	ե	CO	D/PSO	Mapp	ing	
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CO 1	1	2	3	4	5	6	7	8	9	10	11	<u>12</u> 2	1 1	2	3	4	
CO 2							3					2	2				
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Unit – I		IN	TRO	JDU	CHI	JN							Perio	ds		4	

Unit - II		IMPORTANCE OF CULTIVATION OF VALUES	Periods	9
Sense of duty.	Devot	ion, Self-reliance. Confidence, Concentration. Truthfulness	, Cleanliness-H	Ionesty,
Humanity. Pov	wer of	faith, National Unity.  Patriotism. Love for nature, Discipl	ine.	
Unit – III		PERSONALITY DEVELOPMENT	Periods	9
		ttitude. Positive Thinking. Integrity and discipline. Punctua Free from anger, Dignity of labour. Universal brotherhood		
Unit - IV		BEHAVIOR DEVELOPMENT	Periods	9
Cooperation-I		ppiness Vs suffering, love for truth-Aware of self-destructive best for saving nature.		
Unit – V		CHARACTER AND COMPETENCE	Periods	9
÷		d Good health-Science of reincarnation- Equality, Nonviol- ons and same message-Mind your Mind, Self-control- Hon	•	
			<b>Total Periods</b>	45
References				
1.		roborty, S.K. "Values and Ethics for organizations Theory a , New Delhi	and practice", (	Oxford University
<b>E-Resources</b>				
1.	https:	//www.undp.org/content/dam/india/docs/disaster_managen	ent_in_india.p	df

	VIVE	KANANDHA COLL (Autonomous Institution Elayampala	n, Affiliate	ed to An	na Uni	versity ,Che		TÜVRichalar	60 909-275 www.buom 0 909475		
Programme	M.E.	Program	me Cod	e		202	Regulation		2019		
Department	ELECT	R SYSTEMS ENG 'RICAL AND ELE EERING	CTRON	NICS			emester		II		
Course Code	C	Course Name	Period			Credit		mum M			
			L	Т	Р	C	CA	ESE	Total		
P19PSAC5	Constitution of India2001000										
Course Objective	•	dent should be made Understand the pre from a civil rights p To address the grow constitutional role a emergence of natior To address the role Bolshevik Revoluti Indian Constitution.	mises in erspective with of In- and entite whood in of social on in 1	ve. dian op lement the eau ism in 917 ar	binion to ci ly ye India id its	regarding vil and ea ars of Ind after the impact of	g modern India conomic rights ian nationalisn commencemer	an intel as we as we at of the drafting	lectuals' Il as the		
Course	<b>CO1:</b> 1.	nd of the course, the s Discuss the growth of Indians before the ar	of the de	mand f	or civ	vil rights i			Level K2		
Outcome	CO2: D	bulk of Indians before the arrival of Gandhi in Indian politics. <b>CO2</b> : Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in									
	Congress Nehru a	viscuss the circumstant s Socialist Party [Condition of the eventual fait ffrage in the Indian (	der the prop	e lea	dership o	f Jawaharlal	gh	K2			
Pre-requisites											

(3/	2/1 inc	licates	s stren				<b>apping</b> ) 3-Stro		Medi	um, 1	- Wea	k	CC	)/PSO	Mappi	ng
COs			Programme Outcomes (POs)     PSOs       PO     PO     PO     PO     PO     PO     PO     PO     PSO     PSO     PSO													
	РО	D PO												PSO	PSO	PSO
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO 1	3						3					3	3			
CO 2	3						3					3	3			
CO 3	3						3					3	3			

Direct

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

Indirect

Content of	the syllabus		
Unit – I	HISTORY OF MAKING OF THE INDIAN CONSTITUTION	Periods	9
	fting Committee, (Composition & Working), Philosophy of	f the Indian Co	nstitution- Preamble,
Salient Fea		1	
Unit - II	CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES	Periods	9
Fundament	al Rights -Right to Equality -Right to Freedom -Right again	st Exploitation	-Right to Freedom of
Religion -C	Cultural and Educational Rights -Right to Constitutional Ren	nedies -Directi	ve Principles of State
Policy -Fur	damental Duties.		
Unit – III	ORGANS OF GOVERNANCE	Periods	9
	-Composition -Qualifications and Disqualifications -Powers		
	overnor -Council of Ministers -Judiciary, Appointment and	Transfer of Juc	lges, Qualifications
-Powers an	d Functions.		
Unit - IV	LOCAL ADMINISTRATION	Periods	9
District's A	Administration head: Role and Importance, -Municipaliti	es: Introductio	on, Mayor and role of
	presentative, CEO of Municipal Corporation-Pachayatir		
	cials and their roles, CEO ZilaPachayat: Position and role -		•
	lepartments), -Village level: Role of Elected and Appointe	ed officials, -Ir	nportance of grass root
democracy			
Unit – V	ELECTION COMMISSION	Periods	9
	ommission: Role and Functioning - Chief Election Commiss		
State Electi	on Commission: Role and Functioning -Institute and Bodies	s for the welfar	e of SC/ST/OBC and
women.			
		<b>Total Periods</b>	45
References	3		
1.	The Constitution of India, 1950 (Bare Act), Government F	ublication.	
2.	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Cor	stitution, 1st E	dition, 2015.
3.	M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis	s, 2014.	
4.	D.D. Basu, Introduction to the Constitution of India, Lexis	Nexis,2015.	
5.	Granville Austin"The Indian Constitution: Cornerstone of 2002.	a Nation" Oxf	ord University Press,
E-Resourc	es		
1.	https://www.loc.gov > law > help > guide > nations > India		
1.	https://www.loc.gov > law > help > guide > nations > India		

		VIVE		omous	COLLI Institution ayampalay	, Aff	iliated	to Anr	na Uni	versi	ty ,Chenr		EN		Kerree UVRheinand B roberts	
Prog	gramme	M.E			Program	nme	e code	e			202	Regi	ulatior	1	20	19
Depart	ment	POWER /ELECT ENGIN	RICA	LANI			NEER FROM				Se	mester	•		II	
Course	e Code	С	Course N	Jame				iods Week		(	Credit		Max	ximum	Mark	S
							L	Т	Р	,	С	C	ĊA	ESE	,	Total
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C		At the en	d of the	cours	e, the stu	den	t shou	ıld be	able	to,						wledge evel
Cou Outc		<b>CO1:</b> Ur	nderstar	nd for	ming and	l bra	ake up	o sent	ence	s						К3
oute	ome	<b>CO2:</b> Ar	nalyze a	nd fir	nding pla	gia	rism s	olvin	g and	l pro	blem F	inding				K2
		СО3: То	•						1							K3
		<b>CO4:</b> Fo			•											K6 K6
Pre-req	uisites	<b>CO5:</b> To	explai		concept	51 W	/111112	SKIII	s and		eropine	ли <b>.</b>				KU
	(3/2	2/1 indicates		h of co	Weak	) 3-5	Strong			ım, 1	-	C	O/PSO	) Mapp	ing	
	COs			Pro	gramme (	Dutc	comes	(POs)					P C			
		0 0 1 2	P P O O 3 4	5	6	0 7	P O 8	P 0 9	P O 10	P 0 11	P 0 12	PS 0 1	PS O 2	PS 0 3	PS 0 4	
		$\begin{array}{c c} 2 & 1 \\ 2 & 2 \\ \end{array}$	1 1 2	3	2 3	2	2 2	3 2	3	2	3	1	3	2 1	3	
	CO 3	3 3	$\begin{array}{c c}1&2\\2&3\end{array}$	3	1	1	1			1	2	3	2	1 3	2 2	
		1 1 3 2	2 3 1 2	1		2 1	1			1 2	2	1	2 2	5	2	
Course A	Assessme	ent method	s													
Direct																
	Continuo Assignm	ous Assessi ient	ment Te	st I, II	& III											
Indirect	t															
1.	Course -	end survey	1													

	e syllab	us		
Unit - I		Planning and Preparation	Periods	9
		tion, Word Order, Breaking up long sentences, Structuring emoving Redundancy, Avoiding Ambiguity and Vagueness		Sentences,
Unit – II		Clarifications	Periods	9
		What, Highlighting Your Findings, Hedging and Criticising of a Paper, Abstracts. Introduction.	, Paraphrasing a	and
Unit – III		Literature Review	Periods	9
Review of the	Literat	ture, Methods, Results, Discussion, Conclusions, The Final	Check.	
Unit – IV		Skill Development - I	Periods	9
		I when writing a Title, key skills are needed when writing ar an Introduction, skills needed when writing a Review of the		skills are
Unit - V		Skill Development - II	Periods	9
		n, skills are needed when writing the Conclusions, useful phossibly be the first- time submission	Total Periods	45
Text Books				
1.	Adri	an Wallwork, English for Writing Research Papers, Spi	ringer US,201	1
	Swal	es, J.and C. Feak. Academic Writing for Graduate Stud	-	
1. 2.	Swal		-	
1.	Swal Task	es, J.and C. Feak. Academic Writing for Graduate Stud	lents: Essentia	l Skills and
1.2.References	Swal Task Gold	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012.	lents: Essentia vailable on Goo	l Skills and gle Books)
1.           2.           References           1.	Swal Task Gold Day I Adria	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av	lents: Essentia vailable on Goo pridge Universit	l Skills and gle Books) ty Press
1.           2.           References           1.           2.	Swal Task Gold Day I Adria Heida C. R.	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av R (2006) How to Write and Publish a Scientific Paper, Camb an Wallwork, English for Writing Research Papers, Springer	lents: Essentia vailable on Goo oridge Universit New York Dor	l Skills and gle Books) ty Press rdrecht
1.           2.           References           1.           2.           3.	Swal Task Gold Day I Adria Heide C. R. Intern Bord	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av R (2006) How to Write and Publish a Scientific Paper, Camb in Wallwork, English for Writing Research Papers, Springer elberg London, 2011 Kothari, "Research Methodology – Methods and Technique	lents: Essentia vailable on Goo oridge Universi New York Dor es", 2nd Edition	l Skills and gle Books) ty Press rdrecht , New Age
1.           2.           References           1.           2.           3.           4.	Swal Task Gold Day I Adria Heide C. R. Intern Bord	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av R (2006) How to Write and Publish a Scientific Paper, Camb an Wallwork, English for Writing Research Papers, Springer elberg London, 2011 Kothari, "Research Methodology – Methods and Technique national Publishers ens, K. S. and Abbott, B. B., "Research Design and Methods	lents: Essentia vailable on Goo oridge Universi New York Dor es", 2nd Edition	l Skills and gle Books) ty Press rdrecht , New Age
1.         2.         References         1.         2.         3.         4.         5.	Swal Task Gold Day I Adria Heidd C. R. Intern Bord Editid	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av R (2006) How to Write and Publish a Scientific Paper, Camb an Wallwork, English for Writing Research Papers, Springer elberg London, 2011 Kothari, "Research Methodology – Methods and Technique national Publishers ens, K. S. and Abbott, B. B., "Research Design and Methods	lents: Essentia vailable on Goo oridge Universit New York Dor es", 2nd Edition s – A Process A	l Skills and gle Books) ty Press rdrecht , New Age
1.         2.         References         1.         2.         3.         4.         5.         E-Resources	Swal Task Goldl Day I Adria Heidd C. R. Intern Bordd Editid	es, J.and C. Feak. Academic Writing for Graduate Stud s. Michigan University Press, 2012. bort R (2006) Writing for Science, Yale University Press (av R (2006) How to Write and Publish a Scientific Paper, Camb an Wallwork, English for Writing Research Papers, Springer elberg London, 2011 Kothari, "Research Methodology – Methods and Technique national Publishers ens, K. S. and Abbott, B. B., "Research Design and Methods on, McGraw-Hill, 2011	lents: Essentia vailable on Goo oridge Universit New York Dor es", 2nd Edition s – A Process A	l Skills and gle Books) ty Press rdrecht I, New Age

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Programme	M.E.	Program	me Code	e		202	Regulation		2019
Department	ELECT	R SYSTEMS ENG TRICAL AND ELE EERING				Se	emester		Π
Course Code	С	course Name	Periods	s Per V	Veek	Credit	Maxi	mum M	larks
			L	Т	Р	С	CA	ESE	Total
P19PSAC7	Throug	lity Development h Life enment Skills	2	0	0	0	100	0	100
Course Objective	<ul><li>To le</li><li>To b</li></ul>	ent should be made to earn to achieve the ecome a person wi waken wisdom in a	highest th stable	e mino		•	sonality and	determ	ination
Course	At the er	nd of the course, the s	student sł	nould b	e able	e to,			Knowle dge Level
Outcome		udy of Shrimad-Bha ing his personality a							K2
		e person who has st l to peace and prosp		eeta wi	ll lead	d the natio	on and		K2
	CO3:Str students	udy of Neetishataka	m will he	elp in c	levelo	ping vers	atile personali	ty of	K2
Pre-requisites									

(3	/2/1 in	dicate	s stren				<b>apping</b> ) 3-Stro	ong, 2 –	Medi	um, 1	- Wea	k	CC	)/PSO	Mappi	ng
COs				]	Progra	mme	Outcon	nes (PC	)s)					PS	Os	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 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			
CO 2	3						3					3	3			
CO 3	3						3					3	3			

### Content of the syllabus

Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) -Verses- 26,28,63,65 (virtue) – Verses - 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)Approach to day to day work and duties - Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48,Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,- Chapter 18-Verses 45, 46, 48. Statements of basic knowledge - Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 - Chapter 12 -Verses 13, 14, 15, 16,17, 18 Personalit y of Role model. Shrimad BhagwadGeeta:Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63.

	Total Periods	45
References	· · · · · ·	
1.	"Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publ Department), Kolkata	ication
2.	Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rash Sansthanam, New Delhi.	triya Sanskrit
<b>E-Resources</b>		
1.	https://www.udemy.com/course/personality-development-holistic-all-rou	nd/

	A 1992 LUND				nous In	stitutio	on, Af	filiated	l to An	na U	RING F niversity 537 205			EN		TÜVRheinland (55/176)	SC MIT 2015 CT MIT 2016 CT MIT 2016 D TIMETOR
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Course	e Code			Cours	se Nam	ne			iods Pe Week	er	Credit			Maxim	um M	lark	S
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	urse	1n	variou	s neid	s.												
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Obje Cor Oute	ective urse come	At CC CC CC CC S NI	Provid the en 01: Su 02: Ur 03: Ur 04: A 05: An	le the k ad of th mmari adersta ndersta nalyze nalyze	cnowle ne cour ze the nd the nd the the fat the per <b>CO</b> of corr Progra	se, the concep function effect ult in r riodic a / PO N relation amme	stude pts of s ons an of co nachir and pr <b>/Iappi</b> n) 3-St Outco	nt shou stationa d respo rrosion nes eventiv <b>ng</b> trong, 2 mes (P	Ild be a ary equ onsibili and th ve main 2 – Me Os)	able t aipmo ty of neir p	o, ents. mainten preventio nce in m	ance n. achi	e depart				Level K2 K3 K3 K3 K4
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Course	e Assessment Methods
Direct	
1.	Continuous Assessment Test I, II & III
2.	Assignment
3.	End-Semester examinations
Indired	et
1.	Course - end survey

Content of	f the syllabus		
Unit – I	CONCEPT AND STATUTORY REQUIREMENT	Periods	9
preventive water layo	safety: Accident, causes, types, results and control, mechanical and e steps/procedure, describe salient points of factories act 1948 for heal routs, light, cleanliness, fire, guarding, pressure vessels, etc, Safety ng, equipment and methods.	th and safety,	wash rooms, drinking
Unit – II		Periods	9
	ENGINEERING		
functions	ntals of maintenance engineering: Definition and aim of maintenance and responsibility of maintenance department, Types of maintenance maintenance, Maintenance cost & its relation with replacement econom	e, Types and	l applications of tool
Unit – III	WEAR AND CORROSION AND THEIR PREVENTION	Periods	9
lubrication	re grease gun, iii. Splash lubrication, iv. Gravity lubrication, v .W n, vii. Ring lubrication, Definition, principle and factors affecting prevention methods. FAULT TRACING		
		i chius	,
of fault fi pneumatic compresso	cing: Fault tracing-concept and importance, decision tree concept finding activities, show as decision tree, draw decision tree for pro- c, automotive, thermal and electrical equipment's like, I. Any o or, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, T	blems in macl ne machine t	hine tools, hydraulic ool, ii. Pump iii. Ai
of fault fi pneumatic compresso their gener <b>Unit – V</b>	inding activities, show as decision tree, draw decision tree for production, automotive, thermal and electrical equipment's like, I. Any o or, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Teral causes.         PERIODIC       AND       PREVENTIVE         MAINTENANCE       PREVENTIVE	blems in machine the machine the machine the presence of faults periods periods blems in machine the presence of the presence	hine tools, hydraulic ool, ii. Pump iii. Ai in machine tools and 9
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of fault fi pneumatic compresso their gener <b>Unit – V</b> Periodic a schemes, remedies preventive Machine to maintenan	inding activities, show as decision tree, draw decision tree for production, automotive, thermal and electrical equipment's like, I. Any of or, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Teral causes.         PERIODIC       AND       PREVENTIVE         MAINTENANCE       and preventive maintenance: Periodic inspection-concept and need, overhauling of mechanical components, overhauling of electric of electric motor, repair complexities and its use, definition e maintenance. Steps/procedure for periodic and preventive maintenanctools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, nce of mechanical and electrical equipment, advantages of pre	Periods degreasing, c cal motor, co ,need, steps nce of: I. Program and	hine tools, hydraulic ool, ii. Pump iii. Ai in machine tools and 9 cleaning and repairing ommon troubles and s and advantages o schedule of preventive tenance. Repair cyc
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