

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN



(An Autonomous Institution Affiliated to Anna University-Chennai) Approved by AICTE – Accredited by NAAC and ISO 9001:2015 Certified Elayampalayam, Tiruchengode – 637 205, Namakkal District, Tamilnadu.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

M.E- POWER SYSTEMS ENGINEERING (CURRICULUM & SYLLABI -2023)



(Applicable to the students admitted from the Academic year 2023-2024 onwards)

(Regulation 2023)



VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (An Autonomous Institution Affiliated to Anna University-Chennai)



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.

Signature of the BOS Chairman, EEE

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	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
I	\checkmark	\checkmark	\checkmark										
II	\checkmark										\checkmark		
III		\checkmark	\checkmark			\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	
IV	\checkmark												

Year	SEM	COURSE NAME	P01	P02	P03	P04	P05	P06	P07	PO8	PO9	P010	P011	P012
		Advanced Power System Operation and Control	\checkmark	\checkmark	\checkmark									\checkmark
		Computer aided power system analysis			\checkmark		\checkmark						\checkmark	\checkmark
–		Analysis of Power Converters	\checkmark											\checkmark
ear	EM 1	Professional Elective - I												
Y	IS	Professional Elective - II												
		Audit Course -I												
		Power System Simulation Lab- I	\checkmark		\checkmark						\checkmark			\checkmark

	VIVEKANAN (Autonomous E	DHA COLLEGE OF I Institution Affiliated to layampalayam, Tirucher	ENGINEERING FOR Anna University, Che ngode – 637 205	R WOMEN nnai)	TOPRevented CERTIFIED D TORMONIC
Programme	M.E ·	Programme Code	202	Regulation	2023
Department	POWER SYST ELECTRICAL	EMS ENGINEERING	/ S ENGINEERING	Semester	Ι
(Applicable to the	CURRIC students admitted from	ULUM the academic year 202	3 - 2024 onwa	ards)

Course	Course Name	САТ	Perio	ds / V	Veek	Credit	Max	imum N	Marks
Code		em	L	Т	Р	С	edit Maximum Ma C CA ESE T 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 60 1 3 40 40 1 2 60 40 1	Total	
	THE	ORY							
P23MA102	Applied Mathematics	FC	3	0	0	3	40	60	100
P23PS101	Advanced Power System Operation and Control	PCC	3	0	0	3	40	60	100
P23PS102	Computer Aided Power System Analysis	PCC	3	0	0	3	40	60	100
P23PS103	Analysis of Power Converters	PCC	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	AC	2	0	0	0	100	-	100
	PRAC	CTICA	L						-
P23PS104	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, AC- Audit Course,

CA - Continuous Assessment, ESE - End Semester Examination, FC-Foundational Course

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Programme	M.E.	Programme Code	e	202			Regulatio	n	2023	6		
Department	POWER SYST ELECTRICAI	EMS ENGINEERIN AND ELECTRONI	G / CS ENG	SINEE	RIN	G	Semeste	er	II			
	(Applicable to the	CURRI students admitted from	CULUN	A demic	year	2023	- 2024 on	wards)				
Course Course Car Periods / Week Credit Maximum Marks												
Code		Name	CAI	L	Т	Р	С	CA	ESE	Tota		
		THE	EORY									
P23PS205	Restructured Po	ower System	PCC	3	0	0	3	40	60	100		
P23PS206	Power System	Fransients	PCC	3	0	0	3	40	60	100		
P23PS207	HVDC Transm	ission Systems	PCC	3	0	0	3	40	60	100		
	Professional El	ective - III	PCC	3	0	0	3	40	60	100		
	Professional El	ective -IV	PEC	3	0	0	3	40	60	100		
	Audit Course -	Ι	AC	2	0	0	0	100	-	100		
		PRAC	TICAL									
P23PS208	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, AC- Audit Course,

CA - Continuous Assessment, ESE - End Semester Examination

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Programme	М.Е.	Programme Code	202	Regulation	2023
Department	POWER SYST	EMS ENGINEERING	/ S ENGINEERING	Semester	III
	(Applicable to the	CURRIC students admitted from	3 - 2024 onw	vards)	
Course			k Credit	Maximum Marks	

Course	Course	CAT	Perio	as / V	vеек	Credit	Max	1mum M	Aarks
Code	Name		L	Т	Р	С	CA	ESE	Total
	THE	ORY							
	Professional Elective - V	PEC	3	0	0	3	40	60	100
	Open Elective	OEC	3	0	0	3	40	60	100
	PRA	CTIC	AL						
P23PS309	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

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Programm	e M.E.	Programme Code		202		I	Regulation	n	202	3
Departmen	t POWER SYST	TEMS ENGINEERIN(L AND ELECTRONI(G / CS ENG	SINEE	RINO	G	Semeste	r	IV	
	(Applicable to th	CURR ne students admitted fro	ICULU m the ac	M cademic	e year	r 2023	- 2024 or	nwards	5)	
Course			~	Perio	ds / V	Veek	Credit	Max	imum N	Aarks
Code	se Name	САТ	L	Т	Р	C	CA	ESE	Total	
PRACTICAL					•					
P23PS410 Project Phase - II EEC 0 0 32 16						60	40	100		

EEC - Employability Enhancement Course, CA - Continuous Assessment,

Total Credits

ESE - End Semester Examination

Cumulative Course Credits -69

60

16

40

100

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Programme	M.E.	Programme Code		202	2		Regulati	on	202	23		
Department	POWER SYST ELECTRICAL	EMS ENGINEERIN	G / CS EN	GINE	ERIN	٩G	Semes	ter	-			
	(Applicable to the	CURR e students admitted from	ICUL m the a	UM academ	ic ye	ar 202	23 - 2024	onwar	ds)			
		PROFESSION	AL E	LECTI	VE-l	[
Course Code	(Course Name		Perio	ds / V	Veek	Credit	Ma	aximum l	Marks		
				L	Т	Р	C	CA	ESE	Total		
P23PSE01	Power Quality	Power Quality			0	0	3	40	60	100		
P23PSE02	Power System	Power System Stability			0	0	3	40	60	100		
P23PSE03	Electrical Pov	ems	3	0	0	3	40	60	100			
P23PSE04	Power System	Economics		3	0	0	3	40	60	100		
		PROFESSION	AL EI	LECTI	VE-I	I						
P23PSE05	Electric and H	lybrid Vehicles		3	0	0	3	40	60	100		
P23PSE06	Intelligent Po	wer Management Sys	stem	3	0	0	3	40	60	100		
P23PSE07	Optimization System	Techniques in F	Power	3	0	0	3	40	60	100		
P23PSE08	Power Electro	nics for Renewable		3	0	0	3	40	60	100		
		PROFESSIONA	AL EL	ECTIV	/E-II	I						
P23PSE09	Power System	Dynamics		3	0	0	3	40	60	100		
P23PSE10	Power Electro Power System	nics Applications to		3	0	0	3	40	60	100		
P23PSE11	Smart Grid Te	echnology		3	0	0	3	40	60	100		
P23PSE12	Power System	Security		3	0	0	3	40	60	100		

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Programme	M.E.	Programme Code		202	2		Regulati	on	202	3	
Department	POWER SYST ELECTRICAI	EMS ENGINEERING	/ S ENGI	NE	ERII	NG	Semes	ter	-		
(Applicable to the	CURRIC e students admitted from	CULUM the acad	I dem	ic ye	ar 202	23 - 2024	onwar	ds)		
	1	PROFESSIONAL	LELEC	TIV	/ E- I	V					
Course Code		Course Name Periods / Week Credit Maxim							ximum l	Marks	
			Ι	Ĺ	Т	Р	C	CA	ESE	Total	
P23PSE13	Neuro –Fuzzy	logic Controllers	3	3	0	0	3	40	60	100	
P23PSE14	Industrial Ele	ctric Drives	3	3	0	0	3	40	60	100	
P23PSE15	Advanced Mi Systems	crocontroller Based	3	3	0	0	3	40	60	100	
P23PSE16	Modeling and Machines	Analysis of Electrical		3	0	0	3	40	60	100	
		PROFESSIONAI	L ELEC	CTI	VE-V	7					
P23PSE17	Energy conser systems	rvation in Electrical	3	3	0	0	3	40	60	100	
P23PSE18	Intelligent Co	3	3	0	0	3	40	60	100		
P23PSE19	Distributed g	d 3	3	0	0	3	40	60	100		
P23PSE20	FACTS		3	3	0	0	3	40	60	100	

		OPEN EL	ЕСТІ	VES (EEE)				
S.N O	COURSE CODE	COURSE NAME	L	Т	Р	С	CA	ESE	Total
1	P23PSOE1	Industrial Safety	3	0	0	3	40	60	100
2	P23PSOE2	Energy Storage Technologies	3	0	0	3	40	60	100
3	P23PSOE3	Energy Management and Auditing	3	0	0	3	40	60	100
4	P23PSOE4	Electrical circuit design for Hazardous in Industries	3	0	0	3	40	60	100

AUDIT COURSE-I

S.NO	COURSE	COURSE NAME	CATEGORY	L	Т	Р	С	Maximum Marks			
	CODE							CA	ESE	Т	
1	P23AC001	Research Process and Methodologies	AC	2	0	0	0	100	0	100	
2	P23AC002	Pedagogy Studies	AC	2	0	0	0	100	0	100	
3	P23AC003	Disaster Management	AC	2	0	0	0	100	0	100	
4	P23AC004	Value Education	AC	2	0	0	0	100	0	100	
5	P23AC005	Constitution of India	AC	2	0	0	0	100	0	100	

AUDIT COURSE-II

S.NO	COURSE	COURSE NAME	CATEGORY	L	Т	Р	С	Ν	laximu Marks	m
	CODE							CA	ESE	Т
1	P23AC006	English for Research Paper Writing	AC	2	0	0	0	100	0	100
2	P23AC007	Personality Development through Life Enlightenment Skills	AC	2	0	0	0	100	0	100
3	P23AC008	Universal Human Values	AC	2	0	0	0	100	0	100
4	P23AC009	Online Course	AC	2	0	0	0	100	0	100

CA - Continuous Assessment, ESE - End Semester Examination

AC- Audit Course

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 M.E. Programme Code 202 Regulation 2023														
Pr	ogramn	ne	M.E.				Prog	gramm	e Code	202	R	egulati	on	2	023		
De	epartme	nt	POWER ELECTI ENGINE	R SYST RICAL ERING	TEMS I AND E	ENGII LECT	NEERI RONIC	NG / S				Semes	ter		I		
Cours	se Code	.	С	ourse N	Vame		Period	ls Per	Week	Credit		M	axim	ım Ma	rks		
D221	JA 103		Annlind	Matha				T	P 0	C 2		CA 40		ESE 60	Tot 10	al 0	
P23	VIA102		Applied The mai	n objec	matics	the co	o urse is	to	0	3		40		00		0	
Course Object	e tive		• 7 1 • 7 • 7 • 1 • 1 • 1 • 1	 This course aims at providing the necessary basic concepts of a few statistical a numerical methods and give procedures for solving numerically different kinds problems occurring in engineering and technology. To acquaint the knowledge of testing of hypothesis for small and large samp which plays an important role in real life problems. Identify and demonstrate suitable sampling and data collection process. Identify the formulation and graphical solution of linear programming problem. Potentially understand forward and backward recursion. 													
			At the en	At the end of the course, the student should be able to Know													
Course	ρ		CO1: A samples :	CO1: Apply the concept of testing of hypothesis for small and largeamples in real life problems.CO2: Apply the basic concepts of classifications of design ofK1, K2,K3,K4,K													
Outco	me		experiments in the field of agriculture.													,KJ	
			CO3: probabili	Apply ty/stati	appi stical c	ropriat oncept	e mo	dern	techno	ology	to	explo	re K	1, K2,¥	K3,K4,	,K5	
			CO4: In	corpor	ate Tra	nsporta	ation an	d Assi	gnment	t probler	ns.		K	1, K2, k	$\frac{(3, K4, K4)}{(3, K4)}$	K5	
			cos: Remethod.	ecogniz	ze Dyna	amic p	rogrami	ming a	pplicat	ions usir	ng Lo	bading	K	1, K2,F	3,K4,	K5	
Pre-req	uisites		Nil		~ ~ / -												
	(3/2	/1 ii	ndicates str	ength o	CO/PO	O Map	-Strong	2 – Me	dium 1	- Weak			CO/I	PSO M	apping	3	
COs	(3/2	/ 1 11	indicates su	engui o	Program	nme Ou	itcomes	$\frac{2}{(POs)}$	urum, r	. Weak			PSOs	5			
	PO 1	PO	0 2 PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO	PS 03	PS 0.4	
CO 1	3	2	1		1					10	11	12	2	2	03	04	
CO 2	3		1		1								2				
CO 3	3	2	1	1	1								$\frac{2}{2}$			+	
CO 5	3	2	1	1	1								2				
Direc 1. 2. 3. Indire 1.	e Assess t Cont Assia End- ect Cour	inua gnm Sen	nt Method ous Assess ient and Se nester exar end surve	Is ment T eminar nination y	est I, II 15	& III											

Content of	the syllabus		
Unit –	I TESTING OF HYPOTHESIS	Periods	9
Sampling of	listributions - Estimation of parameters - Statistical hypothesis	- Large samp	ole tests based on
Normal dis	tribution for single mean and difference of means -Tests based on	t, Chi-square a	and F distributions
for mean, w	ariance and proportion - Contingency table (test for independent) -	- Goodness of t	fit.
Unit - l	I DESIGN OF EXPERIMENTS	Periods	9
One way a	nd two way classifications - Completely randomized design - R	andomized blo	ock design – Latin
square desi	$gn - 2^2$ factorial design.		
Unit – I	II ESTIMATION THEORY	Periods	9
Sampling	distributions, point estimation, unbiasedness, consistency, m	aximum likeli	ihood estimation,
Confidence	intervals for parameter in one sample from normal population.		
Unit - I	II LINEAR PROGRAMMING	Periods	9
Formulatio	n-Graphical solution-Simplex Method -Transportation and Assign	ment problems	
Unit - Y	V DYNAMIC PROGRAMMING	Periods	9
Dynamic I loading me	Programming-principle of optimality-forward and backward rec thod)-Problems of dimensionality.	cursion-DP Ap	oplications (Cargo
]	Fotal Periods	45
Text Book	S		
1.	Douglas.C; Montgomery, 'Applied Statistics and Probability fo Students Edition, Wiley, 2017.	or Engineers',	6 th Edition, Wiley
2.	Hamdy A. Taha., 'Operations Research: An Introduction', 9 th Ed	lition, Pearson	New Delhi, 2014.
References	3		
1.	Richard. A. Johnson, Irwin Miller,' Probability And Statistics For Pearson Education, Delhi,2020.	or Engineers', 8	th Edition,
2.	Kalyanmoy Deb., 'Optimization For Engineering Design', Phi, 20	004.	
3.	Kanti B. Datta., 'Mathematical Methods Of Science And Engine	ering', Cengag	e Learning, 2013.
4.	Ronald E.Walpole & Raymond H.Myers 'Probability An Scitintists', Pearson Education, Delhi, 9th Edition, 2014.	d Statistics For	r Engineers And
5.	Kothari.C.R., 'An Introduction To Operational Research' 3rd Edi	ition, VIKAS, 1	New Delhi, 2010.
E-Resource	28		
1.	https://online.stanford.edu >		
2.	www.learnerstv.com/Free-engineering-Video-lectures		
3.	www.nptel.ac.in		

	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Cold Cold Cold Cold Cold Cold Cold Cold												
Programme	M.E.		Progra	.mme C	Code	202	Regulation		2023				
Department	POWER SYSTE ELECTRICAL A	MS ENGINEERING ND ELECTRONICS I	G / ENGINI	EERIN	G		Semester		I				
Course Code	Course Name Periods Per Week Credit Maximum Marks												
			L	Т	Р	С	CA	ESE	Total				
P23PS101	Advanced Power and Control	System Operation	3	0	0	3	40	60	100				
Course Objective	 The students should made To gain knowledge on various power system operation and control techniques. To familiarize to analyze the static and dynamic model of LFC and generation scheduling and their algorithms To gain knowledge to differentiate economic dispatch and unit commitment problem and understand various states of power system security 												
	At the end of the o	course, the student she	ould be	able to),				Knowledge Level				
Course Outcome	CO1: Explain abore present status of Ir	ut the operation and adian power sector	contro	ol of po	ower	system a	and List the pa	ast and	K2				
	CO2: Analyze the and two area systemeters	static and dynamic m em	odel of	Load I	Frequ	ency Con	trol in single		К3				
	CO3: Analyze the p construct the algo	problems associated w rithm for feasible load	vith hyc 1 manag	lro ther gement	mal S	Schedulin	g and to		K2				
	CO4:Determine unit commitment and economic dispatch problems in power system K2 network												
CO5: Summarize the power system security and determine the system state by various K2 methods													
Pre-requisites	Power System Ana	lysis											
(3/2/1 in	CO / PO Mapping CO/PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak CO/PSO Mapping												
	D	$(\mathbf{D}_{\mathbf{Q}})$					D	0.0					

	(3/2/1 indicates strength of correlation) 3-Strong, 2 – Medium, 1 - Weak											con so mapping				
COs				Prog	ramme		PSOs									
0.00	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3											3	3			3
CO 2	3	2	2									3	3			2
CO 3	3	2										2	3	2	3	
CO 4	3		3									3	3	3	2	2
CO 5	3															2
Course	Assess	ment	Metho	ds												

Direct

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

Indirect

1. Course – end survey

Content o	of the syllabu	S		
Unit –	·I	INTRODUCTION	Periods	9
System loa	d variation: S	ystem load characteristics, Reserve requirements: Inst	talled reserve	s, spinning reserves,
cold reserv	ves, hot rese	rves. Overview of system operation and Control:	Load forec	asting, -Method of
Extrapolati	on – Method	of Correlation - Indian power sector- Past and preser	nt status: Rec	ent growth of power
sector in In	dia – An over	view, A time line of the Indian power sector, Players in	n the Indian p	ower sector.
Unit -	II	LOAD FREQUENCY CONTROL	Periods	9
Need for fr	equency and	voltage control - Plant and system level control - mode	eling of LFC of	of single area system
- static and	l dynamic ana	alysis - LFC of two area system - static and dynamic	analysis - Ti	e line bias control -
developme	nt of state va	riable model of single and two area system – Extens	sion of ALFC	C loop to Multi area
systems – A	Application of	Optimal Control concepts in ALFC		-
Unit –	III	HYDROTHERMAL SCHEDULING PROBLEM	Periods	9
Hydrothern	nal coordinat	ion - hydro electric plant models - short term and	long term sc	heduling problem –
gradient ap	proach – Hyd	lro units in series – Hydro-thermal scheduling with pu	imped hydro	plant: Scheduling of
systems usi	ing Dynamic	programming and linear programming.		
Unit - I	IV	UNIT COMMITMENT AND ECONOMIC	Periods	9
<u> </u>		DISPATCH		1
Statement	of Unit comr	nitment (UC) problem; constraints in UC: spinning	reserve, theri	nal unit constraints,
dynamic n	corremping a	prosch numerical problems. Incremental cost curve	us: Priority-II	st methods, forward
loss and wi	ith loss solut	ion by direct method and λ – iteration method. Gradi	ent method –	Newton's method –
Base point	and participat	ion factor method. Economic dispatch controller added	to LFC cont	rol
Unit –	V	POWER SYSTEM SECURITY	Periods	9
Need for po	ower system S	Security- Contingency analysis – linear sensitivity factor	ors – AC pow	er flow methods –
contingenc	y selection – o	concentric relaxation – bounding-security constrained of	optimal power	r flow-Interior point
algorithm-I	Bus increment	tal costs		
			Fotal Periods	45
TEXT BO	OKS			
1. A	bhijit Chakraba	arti, Sunita Halder, "Power System Analysis Operation and	Control", PHI	Learning, PVT Ltd
N	ew Delhi 2015			
2. R	obert H. Miller	, James H. Malinowski, 'Power system operation', Tata Mc	Graw-Hill, 200)9
REFEREN	NCES		. 15 ****1 *	
I. A Se	llen J. Wood, E econd Edition,	Bruce F. Wollenberg, 'Power Generation, Operation and Con 2009. nd	ntrol', Wiley Ii	idia Edition,
2. O	lle. I. Elgerd, "	Electric Energy Systems Theory – An Introduction", Tata N	AcGraw Hill	
3. D	P. Kothari and	LJ. Nagrath. "Modern Power System Analysis". Third Edit	tion. Tata McG	raw Hill
Pi	ublishing Com	pany Limited, New Delhi, 2003.		
E-RESOU	RCES			
1.	https://mrcet 20Control.po	t.com/downloads/digital_notes/EEE/31082020/Power%	%20System%2	20Operation%20&%
2.	http://nptel.a	nc.in/courses/108101040/ (PSOC web course)		
3.	https://schol	ar.google.co.in/scholar?q=state+estimation&hl=en&as	_sdt=0&as_v	is=1&oi=scholart

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Course	Code			Cours	e Nar	ne		Per V	iods Pe Veek	er P	Credit		\mathbf{M}	laximu FSI	m Mark	Total	
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Cour Objec	rse tive	1. 2. 3. 4. 5.	 The students should made To introduce various solution techniques to solve the large scale power systems To impart in-depth knowledge on different power flow solution methods for large pow system networks To perform various optimal power flow methods involving operating and securi constraints. To perform short circuit fault analysis for various fault conditions on three phase basis. To Illustrate different numerical integration methods and factors influencing transite stability 														
Cour Outco	rse ome	A C SC C C C C	stabilityAt the end of the course, the student should be able to,Knowledg LevelCO1: solve large scale simultaneous linear equations and the ordering schemes for preserving sparsity.K2CO2: solve large scale power flow problemsK2CO3: solve optimal power flow problem using various solution methodsK2CO4: Do fault calculations for various fault conditions on three phase basisK2CO5: Do stability studies under various disturbances using numericalwa														
Pre-requ	isites	Po	ower S	System	n Ana	alysis											
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Direct 1. 2. 3. Indirect 1.	Continuous Assessment Test I, II & III Assignment End-Semester examinations t Course - end Survey																

Content of	the syllabus										
Unit –	I SOLUTION TECHN	IQUE	Periods	9							
Sparse M	atrix techniques for large sca	ale power systems - Optimal	ordering sche	emes for preserving							
sparsity -	Flexible packed storage sch	eme for storing matrix as co	mpact arrays	- Factorization by							
Bifactoriz	ation and Gauss elimination m	nethods - Repeat solution using	; Left and Rig	ht factors and L and							
U matrice	5										
Unit - I	I POWER FLOW ANA	ALYSIS	Periods	9							
Power flo	w equation in real and pola	r forms - Review of Newton	n Raphson n	nethod for solution;							
Adjustme	nt of P-V buses - Review of F	ast Decoupled Power Flow me	ethod - Sensit	ivity factors for P-V							
bus adjust	ment.										
Unit – l	II OPTIMAL POWER	FLOW	Periods	9							
Problem s	tatement - Solution of Optima	al Power Flow (OPF) - The gra	adient method	l - Newton's method							
- Linear S	ensitivity Analysis - LP met	hods - With real power varia	bles only - L	P method with AC							
power flo	w variables and detailed cost	functions - Security constraine	ed Optimal Po	ower Flow - Interior							
point algo	rithm - Bus Incremental costs.	•									
Unit - l	V SHORT CIRCUIT A	NALYSIS	Periods	9							
Formation	of bus impedance matrix wi	th mutual coupling (single pha	ase basis and	three phase basis) -							
Computer	method for fault analysis usi	ing ZBUS and sequence comp	onents - Der	ivation of equations							
for bus v	oltages -fault current and lir	ne currents - both in sequence	e and phase	- symmetrical and							
unsymmetrical faults.											
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Unit –	V TRANSIENT STABL	LITY ANALYSIS	Periods	9							
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Unit – Introducti Algorithm	V TRANSIENT STABL on - Numerical Integration for simulation of SMIB and	LITY ANALYSIS Methods - Euler and Fourth ad multi-machine system with	Periods Order Rung classical sy	9 ge-Kutta methods - nchronous machine							
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Cou Obje	rse ctive	1r. • •	 Provide the mathematical fundamentals necessary for deep understanding of power converter operating modes. Introduce the electrical circuit concepts behind the different working modes of power converters so as to enable deep understanding of their operation Impart required skills to formulate and design inverters for generic load and for machine loads. Equip with required skills to derive the criteria for the design of power converters starting from basic fundamentals. Inculcate knowledge to perform analysis and comprehend the various operating modes of different configurations of power converters. 														
		different configurations of power converters. Knowledge At the end of the course, the student should be able to, Level CO1 to be able t															
		At the end of the course, the student should be able to, Level CO1: Acquire and apply knowledge of mathematics in power converter analysis K2															
		CO	2: Mo	del, an	alyze a	and un	dersta	nd pow	ver elec	ctronic	systems	and equ	ipmen	ts.	ŀ	ζ4	
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CO 3	2	2	2	2	-	-	-	-	-	-	2	2	2	2	2	-	
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Content o	f the syllabus			
Unit –	I SINGLE PHASE AC-DC CONVERTER	Periods		9
Static Char	acteristics of power diode, SCR and GTO, half controlled and f	ully contro	lled convert	ers with R-
L, R-L-E 1	oads and freewheeling diodes - continuous and discontinuou	is modes	of operation	ı - inverter
operation a	nd its limit -Sequence control of converters - performance	e paramete	ers – effect	of source
impedance	and overlap-reactive power and power balance in converter circ	uit.		-
Unit -	II THREE PHASE AC-DC CONVERTER		Periods	9
Half contro	lled and fully controlled converters with R, R-L, R-L-E loads a	nd freewhe	eling diode	s – inverter
operation a	nd its limit – performance parameters – effect of source im	pedance a	nd overlap	- 12 pulse
converter –	Applications - Excitation system, DC drive system.		Darriada	0
Unit – . Intro du oti o	III SINGLE PHASE INVERIERS	of or or otic	Perious	9 J.f.,11
Introduction	to self-commutated switches: MOSFE1 and IGB1 - Principle	of operation	on of nair an	a Iuli
techniques	_ various harmonic elimination techniques _ Design of UPS _ V	SR operati	ion	US F W WI
Unit -	V THREF PHASE INVERTERS	SK operati	Periods	9
180 degree	and 120-degree conduction mode inverters with star and delta c	onnected 1	oads – volta	ge control
of three pha	se inverters: single multi pulse sinusoidal space vector modul	ation tech	niques – VS	R
operation-A	poplication – Induction heating. AC drive system – Current sour	ce inverter	S.	
Unit –	MODERN INVERTERS		Periods	9
Multilevel	concept – diode clamped – flying capacitor – cascaded type mul	tilevel invo	erters - Com	parison of
multilevel i	nverters - application of multilevel inverters – PWM techniques	for MLI -	- Single pha	se &Three
phase Impe	dance source inverters – Filters.		0 1	
	Tot	al Periods	4	5
Text Book	3			
1	Rashid M.H., "Power Electronics Circuits, Devices and Applic	cations ", F	Pearson, four	rth Edition,
1.	10th Impression 2021.			
2	Jai P. Agrawal, "Power Electronics System Theory and De	esign", Pe	arson Educ	ation, First
2.	Edition, 2015			~ 1
3.	Bimal.K.Bose "Modern Power Electronics and AC Drive	es", Pearso	on Education	on, Second
D.C.	Edition, 2003			
References	Ned Mohan T.M. Undeland and W.D. Dahhing "Dower Electronics:	aonvartara	Application	and design"
1	3rd edition Wiley. 2007	conventers,	Application	and design ,
2	Philip T. Krein, "Elements of Power Electronics" Indian edition Ox	ford Univer	sity Press-20	17
3	Bin Wu, Mehdi Narimani, "High-Power Converters and AC Drives"	, Wiley, 2nd	d Edition, 20	17.
4	P.S.Bimbra, "Power Electronics", Khanna Publishers, Eleventh Edit	ion, 2003	- , - •	
5	P.C.Sen. "Modern Power Electronics". S.Chand Publishing 2005	,		
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Pre-ree	quisites	Nil		•			•	•										
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	-	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	
	CO 1	3 2 3 2 2 1 2 3												3		3		
	CO 2	2	3	3	2	2	1			1			2	2		3	1	
	CO 2	-	2	3	2	2					1		2	3		3		
	0.05	2		5	2											-		
	CO 3 CO 4	3	2	5	2	-												

Direct

- 1. Pre lab &Post lab test
- 2. End-Semester examinations

Indirect

1. Course - end survey

Content of the synabus	
Experiments	Course Outcome
1. Power flow analysis by Gauss Seidal method.	CO 1
2.Power flow analysis by Newton-Raphson/ Fast decoupled method	CO 1
3. Transient stability analysis of single machine-infinite bus system using classical machine model	CO 2
4. Economic load dispatch using lambda-iteration method	CO 3
5. Unit commitment: Priority-list scheme and dynamic programming	CO 3
6. Contingency analysis: Generator shift factors and line outage distribution factors	CO 1
7. Load flow analysis of two-bus system with STATCOM	CO 1
8. Simulation of IGBT Inverters.	CO 2
9.Simulation of Thyristor Converters	CO 2
10. Short Circuit Studies.	CO 2
	Total period : 45

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205. Image: Code State St													
Program	mme		M.E.					Pr	ogran	nme (Code	202	Re	egulation	2	023
Departi	ment	P H E	OWI ELEC NGIN	ER S TRIC NEER	YSTE CAL A ING	EMS I AND F	ENGI ELECT	NEER 'RONI	RING CS	/				Semester		Ι
Course	e Code	:		(Cours	e Nar	ne		Pe	riods Wee	Per k	Credit	,	Maxi	mum N	Iarks
									L	Т	Р	С		CA	ESE	Total
P23P	SE01	P	Power Quality 3 0 0 3 40													
Cour Object	se tive		 Understand the Power quality standards. Understand the Electrical power quality issues. Analysis of various PQ issues. Understand the Methods to improve power quality Understand the Reduction of PQ problems using custom power devices harmonic filters. 													
		A	At the end of the course, the student should be able to, Kno e e													
Cour	se	C is	CO1: ssues,	Unde elect	erstan	d va syster	rious ns and	source their	es, ca measu	uses ures a	and nd m	effects itigation	of po n.	wer qua	lity	K2
Outco	me		$\frac{202}{102}$	Analy	ze th	e cau	ses &	Mitiga	tion t	echn	ques	of vario	ous PQ	events	ortiona	K3
		h	armo	nics.	leista	lia u	lie co	ncepts	abc	Jui	vonag	ge and	curre	ent uisu	JIUOIIS,	K5
		C	:04:	Analy	ze ar	nd des	sign th	e passi	ive fil	ters.						K4
		C	:05:	Acqu	ire kr	lowle	dge on	comp	ensat	ion te	echnic	ques.				K5
Pre- requisit	es	P	rotec	tion a	nd Sv	witch	gear									
(3/2/1 inc	licates	stren	gth of	corre	lation	90 M) 3-Sti	apping rong, 2	g – Med	ium, 1	- W	eak		C	CO/PSO M	lapping	g
COs					Progr	amme	Outco	mes (P	Os)					Р	SOs	
	PO 1	PO 2	PO 3	PO	PO 5	PO 6	PO 7	PO 8	PO	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	2	2	2	5	2	1	0	,	3	2	12	3		2	
CO 2	3	3	3	2						2	1		3		2	
CO 3	3	3		3		2					2	2	2	3	1	2
CO 4	3	3	2	3	1		2	2				2	2	3		2
Direct														3		
1.	Conti	nuou	ıs Ass	essme	ent Te	est I. I	I & III									
2.	Assig	nme	nt		•	, -										
3.	3. End-Semester examinations															
Indirec	Cours	0 61	ad are	21011												
I .	Cours	e - ei	lia sui	vey												

Content of	the syllabus		
Unit –	INTRODUCTION	Periods	9
Electric p	ower quality phenomena- IEC and IEEE definitions - po-	wer quality of	listurbances-voltage
fluctuation	s- transients-unbalance-waveform distortion-power frequency	variations, D	C offset in loads,
Notching i	n load voltage		
Unit –	II SAGS AND INTERRUPTIONS	Periods	9
Voltage va	riations, Voltage sags and short interruptions - flicker- longer d	uration variation	ons – sources range
and impac	on sensitive circuits-standards - solutions and mitigations - equip	ment and tech	niques.
Unit – I	II TRANSIENTS AND PROTECTION	Periods	9
Transients	- origin and classifications - capacitor switching transient - light	ntning-load sw	itching – impact on
users – pro	tection – mitigation.		
Unit –	V HARMONICS	Periods	9
Harmonics	- sources $-$ definitions & standards $-$ impacts $-$ calculation and s	simulation – ha	armonic power flow
– mitigatic	n and control techniques – filtering – passive and active.		
Unit –	V APPLICATIONS	Periods	9
Power Qu	ality conditioners - shunt and series compensators-D Statcom-	Dynamic volt	age restorer
unified por	ver quality conditioners-case studies.		
	,	Fotal Periods	45
Text Book	s		
1.	Roger. C. Dugan, Mark. F. Mc Granagham, Surya Santoso, H.W	ayneBeaty, —	Electrical Power
	Systems Quality ^{II} , McGraw Hill,2003.		
2.	Arindam Ghosh ,Power Quality Enhancement Using Custom Pow	ver DevicesI, H	Kluwer
	Academic Publishers, 2002.		
Reference	5		
1.	Heydt, G.T., Electric Power Quality", Stars in a Circle Publication	ons, Indiana,2 nd	edition 1994.
2.	J. Arrillaga, N.R. Watson, S. Chen, -Power System Quality Ass	essmentl, (Nev	w York:
	Wiley),2000.		
3.	Math H.J.Bollen, Understanding Power Quality Problems: Volta	ge Sags and In	terruptions ,
	IEEE Press New York 2000		
	11111 1 1035, 1 CW 1 OK, 2000.		
4.	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y	ork, 2000.	
4.	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y	ork, 2000.	
4. E-Resource	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y	ork, 2000.	
4. E-Resour 1.	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y es http://www.powerqualityworld.com/2011/09/handbook-power-qu	ork, 2000. Jality-free-ebo	ok.html
4. E-Resour 1. 2	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y es http://www.powerqualityworld.com/2011/09/handbook-power-qu http://www.idc-online.com/technical references/pdfs/electrical er	ork, 2000. uality-free-ebo ngineering/Typ	ok.html es and Revolution
4. E-Resourc 1. 2.	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y es http://www.powerqualityworld.com/2011/09/handbook-power-qu http://www.idc-online.com/technical references/pdfs/electrical er of Electrical.pdf	ork, 2000. uality-free-ebo ngineering/Typ	ok.html es and Revolution
4. E-Resource 1. 2.	Barry W.Kennedy: Power Quality Primer, McGraw-Hill, New Y es http://www.powerqualityworld.com/2011/09/handbook-power-qu http://www.idc-online.com/technical references/pdfs/electrical er of Electrical.pdf https://books.google.co.in/books/about/Electrical_Power_Quality	ork, 2000. Jality-free-ebo ngineering/Typ 7_Control_Tec	ok.html es and Revolution hniq.html?id=6xR

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205Image: Coll of the second secon														
Progra	mme	N	И.Е					Progra	amme	Code	е	202	Regul	lation		2023	
Depart	tment	F J F	POW ELEC ENGII	ER S CTRIC NEER	YSTE CAL A XING	EMS I IND E	ENGIN LECTI	EERI RONIC	ING / CS				Sem	nester		Ι	
Course	Code	;		Co	urse l	Name		P	Period: Wee	s Per ek	(Credit		Maxi	mum N	larks	
								L	Т	Р		С	CA	4	ESE	Total	l
P23P5	SE02	F S	POW TAB	ER S SILIT	YSTH Y	EM		3	0	0		3	4()	60	100	
Cou Obje	rse ctive		 Impart knowledge on mathematical modeling of a synchronous machine. Offer an opportunity to innovate newer procedures and better methods for effective design. Provide knowledge on enhancing small signal stability concepts in power system. 														for wer
		A	At the end of the course, the student should be able to, Knowledge Level													dge I	
		C a	CO1: Gain a deep understanding on power system modeling for stability analysis. Level														
Cou Oute	rse ome	C	CO2: Gain a deep understanding of power system behavior under transient K													K2	
		(u	CO3: Inder	Anal trans	lyze 1 sient,	the p stead	erform ly state	ance	of sin lynan	ngle nic c	anc ond	d multi litions.	-machi	ne sy	stems	K2	
		s	CO4: olutic	Analy ons of Analy	yze th contr	e fac ol of	tors eff voltage	ect vo instat	ltage oility	stabil	lity	and ana	lysis of	factor	rs and	K2	
Pre-requ	uisites	s F	Power	· Syste	em Tr	ansie	nts	lilous		1011	ng s	stability				112	
(3/	2/1 ind	licate	s stren	ngth of	CO / I corre	PO M lation	apping) 3-Stror	ng, 2 –	Mediu	m, 1	- We	eak		CO/PS	О Марр	ing	
					Progra	mme	Outcom	es (PO	s)					F	PSOs		
COs	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	3	2	2		
CO 2	3	3	2		2							2	3	2	2		
CO 3	3	3	2	2	2							2	3	2	3	2	
CO 4	3	2		2	2							2	3	2	2	2	
Course A	Assess	ment	nent Methods														
Direct	~																
1. 2. 3.	 Continuous Assessment Test I, II & III Assignment End-Semester examinations 																
Indirec	t																
1.	Cour	se - ei	nd Su	rvey													

Signature of the BOS Chairman, EEE

Content of t	ne syllabus		
Unit – I	POWER SYSTEM STABILITY CONSIDERATIONS	Periods	9
Introduction	n-Stability classifications -rotor angle and voltage s	tability- sync	hronous machine
representati	on -classical model-load modeling concepts-modeling of	excitation sys	tems modeling of
prime move	ers		
Unit - II	TRANSIENT STABILITY	Periods	9
Swing equa	tion-equal area criterion-solution of swing equation-Nu	nerical method	ls -Euler method-
Runge-Kut	a method-critical clearing time and angle-effect of excita	tion system and	d governors-Multi
machine sta	bility -transient energy function approach- Application of	TSA to SMIB	system
Unit – II.	SMALL SIGNAL STABILITY	Periods	9
State space	representation – Eigen values- modal matrices-small si	gnal stability of	of single machine
infinite bus	system – synchronous machine classical model repre	esentation-effect	ct of field circuit
dynamics-e	The to excitation system-small signal stability of multi m	achine system.	0
	VULIAGE STABILITY	Periods	9
Generation	aspects - transmission system aspects – load aspects – PV	curve - QV c	urve – PQ curve –
ingtobility r	in static loads – load admity mint - sensitivity analysis-co	nunuation pow	er now analysis -
Instability I	STADIL TV IMDOVEMENT	Dorioda	0
Mathada of	improving stability transiant stability anhancement h	igh speed foul	t clearing steam
turbing fast	$\frac{1}{1}$ valving high speed excitation systems, small signal stab	ility enhancem	ent power system
stabilizers	valving-high speed excitation systems- small signal stat		ent power system
stabilizers	voltage stability enhancement – reactive power control	Total Periods	45
Text Books		Total Terrous	6
1 1	Zundur D. "Dower System Stability and Control" McCrow II	11 International	Editiona 1004
1.	Anderson DM and Equal A A "Dower System Control on	d Stobility" Co	Editions, 1994.
2.	New Delhi, 2003.	u Stability , Ga	igolia Publications,
References			
1.	Kimbark EW. "Power system stability-III, synchronous m	achines", John	Wiley & Sons
2.	Taylor C.W. "Power systems voltage stability", TMH		
3	K.R. Padiyar, "Power systems Dynamics stability and contr	ol", Interline p	ublishing pvt., ltd.,
	Bangalore		
E-Resources			
1.]	https://www.electrical4u.com/power-system-stability/		
2.	https://circuitglobe.com/voltage-stability-in-power-system.html		
3	nttps://www.electricaleasy.com/2021/02/power-system-stability	v.html	

			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Content of Content													
Prog	ramm	e M	I.E.			Prog	ramm	ne Code	e		2	202	Regula	ation		2023
		PC)WE	ER SY	STE	MS E	NGIN	NEERI	ING /							
Depa	artmer	^{it} EI	LEC	TRIC	AL A	AND F	ELEC	TRON	VICS				Sem	ester		I
		EN	NGIN	NEEF	RING											
								Per	riods I	Per	6	1.				
Course	Code			Cours	se Na	me			Week		C	redit		Maxii	num M	arks
								L	Т	Р		С	CA		ESE	Total
		El	ectri	cal P	ower					_		-				
P23P	SE03	Di	Distribution Systems30034060												100	
		Tł	The student should be made to,													
			• Understand the distribution system expansion planning and reliabi												ility	
Course			analysis procedures.												2	
Objectiv	e		 Analysis procedures. Analyze the types of load and their characteristics 													
objectiv	C		 Analyze the types of load and their characteristics. Understand the protection in distribution system 													
			Understand the protection in distribution system.												Knowledge	
		At	At the end of the course, the student should be able to,												Level	
		CC	<u>)1. s</u>	Studer	te wi	11 be (able t	o do la		culat	ion i	n distr	ibution	lines	select	77.1
Cou	rse	the	nro	tectiv	e con	noner	nts nl	anning	and r	eliahi	lity a	nalvsi	s	mes,	sciect	KI
Outco	ome		$\frac{1}{2}$	<u></u>			ns, pi	<u>61 1</u>	1	1 .	1					K2
)2: L	Differe	entiat	e the t	ypes o	of load	s and	their of	chara	cterist				
		a	J3: C	alcul	ate th	e volta	age dr	op and	powe	er loss	s in a	distric	bution s	ystem.		K2
		CC	D4: I	Recog	nize	the ne	ecessi	ty of d	listrib	ution	syste	em pro	otection	and d	levices	К2
		ava	ailab	le for	discr	iminat	ting fa	aults			2	1				
		CC	D5: E	Desigr	a sui	itable	capac	itance	for vo	ltage	cont	rol in a	u distrib	ution		К2
		Sy	stem	l												112
Pre-requ	isites	Po	wer S	Syster	n Ana	lysis, I	Electr	ical Po	wer D	istribı	ution	Systen	ns			
					CO/1	PO Ma	pping	g _				_	(CO/PS	O Map	ping
(3,	/2/1 inc	dicates	stren	igth of	corre	lation)	3-Stro	$\frac{1}{2}$ ong, 2 –	• Medi	.um, 1	- Wea	ak			0.00	
COs	P.C		D.C.		rogra		Juicon	nes (PC	s)	D C	P.C.			l nac	rsus	D CC
	РО 1	PO 2	РО 3	PO 4	РО 5	РО 6	РО 7	PO 8	РО 9	РО 10	РО 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	2	1	2	1				1				1	2		2	
CO 2	2	1	2	1				1				1	2		2	
CO 3	2	1	2	1				1				1	2		2	
CO 4	$\frac{2}{2}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$														
Direct	<u> </u>	-														
Direct																
1.	Conti	ontinuous Assessment Test I, II & III														
2. 2	3. End-Semester examinations															
	End-2	emest		amme	nons						<u> </u>					
Indirec	t															
1.	Cours	e - enc	l surv	vey												

Content of	the syllabus									
Unit –	I GENERAL CONCEPTS	Periods	9							
Industrial a	nd commercial distribution systems - Energy losses in distribution	n system – sys	tem ground for							
safety and	protection – comparison of O/H lines and underground cable sy	stem .Networ	k model – power							
flow, short	CIrcuit and loss calculations.	Dariada	0							
Distributio	n sustem reliability analysis reliability concents. Markey m	adal distribu	y ution naturals							
reliability	– reliability performance	odel – distrib	ution network							
Unit – l	II DISTRIBUTION SYSTEM PLANNING	Periods	9							
Distribution system expansion -planning – load characteristics – load forecasting – design concepts – optin location of substation – design of radial lines – solution technique.										
Unit - I	V VOLTAGE CONTROL OF DISTRIBUTION SYSTEM	Periods	9							
Voltage co VAR syste	ntrol – Application of shunt capacitance for loss reduction – Hams – loss reduction and voltage improvement.	armonics in th	e system – static							
Unit –	V DISTRIBUTION SYSTEM PROTECTION	Periods	9							
System pr frequency	otection – requirement – fuses and section analyzers-over cuprotection – coordination of protective device.	rrent. Under	voltage and under							
	ŗ	Fotal Periods	45							
Text Book	S									
1.	Turan Gonen, "Electric Power Distribution Engineering ",3rd 1	Edition, CRC	Press,2014							
2.	James A. Momoh, "Electric Power Distribution, Automation, Edition, CRC Press,2007	Protection, an	d Control" 1st							
Reference	5 · · · · · · · · · · · · · · · · · · ·									
1.	Pabla, A.S., "Electrical Power Distribution System", 5th edition	on,Tata McGr	aw hill, 2004.							
2.	Tuvar Goner, "Electrical Power Distribution System Engineer	ing", McGrav	v hill, 1986.							
3.	Sterling, M.I.H., "Power System Control", Peter Peergisus, 20)06								
4.	Cooper, "Electrical Distribution System Protection "1st edition	n, 2005								
5.	Abdelhay A. Sallam "Electric Distribution Systems" 2nd edit	ion, CRC Pres	ss, 2014							
E-Resourc	es									
1.	https://nptel.ac.in/courses/108107112/									
2.	https://epdf.pub/electric-power-distribution-system-engineerin	g.html								
3.	http://tnebes.org/archive/2019/May19/safetymanual%20.pdf									
4.	http://students.aiu.edu/submissions/profiles/resources/onlineBool ution_EngineeringThird_Edition.pdf	k/Z7e5T7_Ele	ctric_Power_Distrib							

			VIVE	CKAN (Aut	AND onomo	HA C us Inst Elaya	OLLE itution, mpalay	C GE O Affilia am, Tir	F EN(ted to A ucheng	GINE Anna U 30de –	ERI Jnive 637 2	ING FOR ersity ,Cher 205	WOM nnai)	IEN	TÜVRheinland CERTIFIED	ISO 9001.2015			
Prog	gramme	N	1.E.					Prog	amm	e Coo	le	202	Regi	ulation		2023			
Dep	artment	P E E E	OWE LECT	CR SY FRIC	(STE CAL A RING	MS I AND	ENGII ELE(NEER CTRO	NICS	/		I	Semester I						
Course	Code			Cour	se Na	me		Pe	eriods Wee	Per k		Credit		Max	imum M	Iarks			
P23	PSE04	P	ower	Syst	em E	cono	mics	L 3	0) (р О	3	4	A 0	60 ESE	1 otal 100			
Cou Objec	Course The students should made to Objective Understand the basic concept of economics in electrical energy Understand the transmission networks, system networks and ancillary serv Understand the generation system characteristics														ervices				
	At the end of the course, the student should be able to, Know CO1: Evaluate the market competition														Knowledge Level				
Cou	Irse CO1: Evaluate the market competition														K5				
Oute	ome	ne CO2: Analyze the electricity power market														K4			
	CO3: Identify the transmission losses and pricing														K3				
		C	04: E	Evalua	te sys	stem 1	netwoi	ks and	1 anci	llary	serv	vices				K5			
		Co sy	05: E stem	Evalua relial	te the	powe	er syste	em eco	onomi	c pla	nnin	ıg ,Load	foreca	sting a	nd	K5			
Pre-req	uisites	G	enerat	tion o	f Ele	ctrical	l Ener	gy, Po	wer S	Syster	n Op	peration a	and Co	ntrol					
	(3/2/1 i	ndica	ites st	rength	CO/I	PO Ma rrelati Weak	apping on) 3-5	g Strong	, 2 – N	lediu	n, 1	-	(CO/PSO	O Mappi	ing			
COs		DO	BO	DO	Prog	amme	Outco	mes (I	POs)	BO	DO	DO	B SO		PSOs	B EO			
<u> </u>	PO 1	2	PO 3	4 4	РО 5	6 6	PO 7	8 8	9 9	PO 10	PO 11	12 12	1 1	2	3	4			
CO 1 CO 2	3	$\frac{2}{2}$				3		$\frac{2}{2}$				3	3			3			
CO 3	3	2				3		2				3	3			3			
CO 4 CO 5	3	2				3		2				3	3			3			
	3	3				3		2				3	3			3			
Course A	Assessm	ent I	Meth	ods															
Direct																			
1. 2. 3.	 Continuous Assessment Test I, II & III Assignment End-Semester examinations 																		
Indirec	Indirect																		
1.	Indirect 1. Course - end survey																		

Content of	f the sy	llabus		
Unit –	- I	BASIC CONCEPTS FROM ECONOMICS	Periods	9
Introductio contracts a efficiency -	on - Fu and fo - Mark	ndamentals of Markets- Concepts from the Theory of the rward markets, Future contracts and futures markets, M ets with Imperfect Competition.	Firm- Types o Ianaging the	f Markets, Forward price risks, Market
Unit –	II	MARKETS FOR ELECTRICAL ENERGY	Periods	9
Introductio pools- Con closure, O markets	on- Nee nparisc Operatic	ed for a Managed Spot Market- Open Electrical Energy Ma on of pool and bilateral trading- Managed Spot Market, Ob on of the managed spot market, Interactions between the n	rkets-Bilateral taining balanc hanaged spot n	trading- Electricity ing resources, Gate narket and the other
Unit –	ш	TRANSMISSION NETWORKS AND ELECTRICITY MARKETS	Periods	9
Introductio with physic two-bus sy formulation	on- Deo cal trar /stem, n of no	centralized Trading Over a Transmission Network- Physi- nsmission rights- Centralized Trading Over a Transmission Centralized trading in a three-bus system, Losses in tran dal pricing, Managing transmission risks in a centralized tra	cal transmission Network, Cen smission netwo ding system.	on rights- Problems tralized trading in a orks, Mathematical
Unit –	IV	SYSTEM SECURITY AND ANCILLARY SERVICES	Periods	9
Introductio Ancillary S provision of and reserve	on-Deso Service of ancil e in a c	cribing the Needs, Balancing issues-Network issues s, Compulsory provision of ancillary services, Market for lary services-Buying Ancillary Services, Quantifying the ne entralized electricity market, Allocating the costs-Selling A	-System resto ancillary service eds, Co-optim ncillary Service	oration-Obtaining ces, Demand-side nization of energy ces.
Unit –	·V	GENERATION SYSTEM CHARACTERISTICS, COST AND RELIABILITY ANALYSIS	Periods	9
Characteris input/ outp reliability: power syste	stic ope out cur load f ems- si	eration of power plants- choice of power plants- hydro, there ves. Economic planning – generation system- cost analys forecasting-generation system reliability – co-ordination is imple problems.	nal and nuclea is. Load forec nethods- econ	r-size of plant- casting and system omic operation of
		· · · · · · · · · · · · · · · · · · ·	Fotal Periods	45
Text Book	is ·		 ,	
1. 2.	Moha Syste	ammad Shahidehpour, Hatim Yamin, Zuyi Li, "Market Ope ms: Forecasting Scheduling and Risk Management". Wiley	m Economics rations in Elec -IEEE Press: 1	tric Power st edition 2002
Reference	s		1222 11030, 1	
1.	RR B	arathwal "Industrial Economics- an introductory ",2007		
2.	Steve	n Soft, "Power System Economics", Wiley-IEEE Press; 1st	edition,2002	
E-Resource	es			
1.	https:	//cds.cern.ch/record/1607317/files/9780470845721_TOC.p	df	
2.	https: Trans	//ecal.berkeley.edu/files/ene2xx/Readings/Kirschen- missionNetworksElectricMarkets.pdf		
3.	https: %20s	//www.fayoum.edu.eg/stfsys/stfFiles/243/2512/Ch%204%2 ystem.pdf	0%20Principle	es%20of%20Power

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Progr	amme	I	M.E.			Progra	amme	Code			202	Regula	ation		2023		
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P23	PSE0	5 E V	lectri ehicle	c and es	Hybrid	d		3	0	0	3	40		60	1	00	
Course Object	e t ive]	The stu	ident s Unde Analy Desig	hould rstand ysis of y gn of h n.	be made the con- electric ybrid a	le to, ncept o c vehio and ele	of fund cles. ectric v	amenta	als of s with	electrical the HVD	drives. OC conve	rters a	nd thei	r contro	ol	
	At the end of the course, the student should be able to, Knowled Level														wledge evel		
Cours	se	CO1: Select appropriate source of energy for the hybrid electric vehicle based on													I	K2	
Outco	ome	Driving cycle. CO2: Applying the concepts of topologies of power flow controllers.													I	K3	
		C	CO3: Measure and Estimate the energy consumption of the Hybrid Vehicles													K4	
		CO	D4: De	esign th	e conc	epts th	e conf	iguratio	on and	contr	ol of vari	ous hybr	id		I	K6	
		C	ei D5: M	odeling	g and F	drives Plan an	d desi	gn app	ropriat	e vehi	icle mana	gement s	system	l.	I	K6	
Pre-re	quisit	es -															
	(3/2	2/1 inc	licates	strengt	CO h of cor	/ PO N relation	Aappin n) 3-Str	ng rong, 2	– Medi	um, 1	- Weak			CO/PS	SO Maj	pping	
					Pro	gramm	e Outco	omes (P	Os)					PS	SOs		
COs	PO1	PO2	РОЗ	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4	
CO 1	3	3	3	1	1	-	-	1	-	-	2	2	2	1	1	1	
CO 2	3	2	3	1	2	-	-	1	-	-	2	2	2	1	1	1	
CO 3	3	3	3	1	2	-	-	1	-	-	2	3	2	1	1	1	
CO 4	3	2	3	1	1	-	-	1	-	-	2	3	2	1	1	1	
CO5	3	3	3	1	1	-	-	1	-	-	2	3	2	1	1	1	
Course Assessment Methods																	
	1. 2. 3.	C A E	ontinu ssignn nd-Sei	ous As nent nester	ssessm exami	ent Te	st I, II S	& III									
Indirec	t																
	1.Cc	urse -	- end s	urvey													

Content of	he syllabus		
Unit – I	INTRODUCTION	Periods	9
History of hybrid elect power sour performanc	hybrid and electric vehicles, Types of Electric Vehicles, s ric vehicles, impact of modern drive-trains on energy supplies re characterization, transmission characteristics and mather.	ocial and envi Basics of ver hematical mod	ronmental importance of nicle performance, vehicle dels to describe vehicle
Unit - I	TOPOLOGIES	Periods	9
Hybrid Ele topologies, Electric Driv power flow c	ctric Drive-trains: Basic concept of hybrid traction, intro- power flow control in hybrid drive-train topologies, fuel effici- e-trains: Basic concepts of electric traction, introduction to ontrol in hybrid drive-train topologies, fuel efficiency analysis	oduction to va ency analysis. o various electros.	arious hybrid drive-train ric drive-train topologies,
Unit – I	I ELECTRIC DRIVES	Periods	9
Electric Pro Configurati	opulsion unit: Introduction to electric components use ion and control of DC Motor drives. Configuration and c on and control of Permanent Magnet Motor drives, drive	d in hybrid ontrol of Intro system effici	and electric vehicles, oduction Motor drives, ency.
Unit - I	ELECTRIC HYBRID VEHICLES	Periods	9
Inotor, Siz supporting Vehicles, B Unit – V Introduction Introduction	subsystems. Energy Storage: Introduction to Energy Storage attery based energy storage and its analysis, Hybridization of a ENERGY MANAGEMENT STRATEGIES n to energy management strategies used in hybrid of different energy management strategies, implement to various charging techniques and schematic of charging sta	electric vehi different energy electric vehi entation issue	ogy, Communications, its in Hybrid and Electric y storage devices. 9 icle, classification and es of energy strategies.
Introduction	to various charging teeninques and schemate of charging sta	Total Periods	45
Text Books			1
1. M Fu	ehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Findamentals", CRC Press, 2010.	lybrid Electric	, and Fuel Cell Vehicles:
2. Iq	bal Hussein, Electric and Hybrid Vehicles: Design Fundament	als, CRC Press	s, 2003
1. S. St	Onori, L. Serrao and G. Rizzoni, "Hybrid Elec rategies", Springer, 2015.	tric Vehicles	: Energy Management
$\begin{array}{c c} 2. & SI \\ C \\ \hline 3 & SI \end{array}$	onverters', CRC Press, 2011 ra -Ramirez, R. Silva Ortigoza, "Control Design Techniques in	n Power Electr	onics Devices",
$\frac{J}{I}$	ringer,2006 1 Boldea and S.A Nasar, "Electric drives", CRC Press, 2005		
4. Io 5. Iq	pal Hussein, "Electric and Hybrid Vehicles: Design Fundamer	ntals", CRC Pro	ess, 2003.
E-Resource	S		
1. ht	ps://www.bharathuniv.ac.in/colleges1/downloads/courseware_ee	e/Notes/CE3/B	EE033%20E&HV.pdf
2. <u>ht</u>	ps://nptel.ac.in/course.html		
3. <u>ht</u>	ps://www.eng.mcmaster.ca/mech/content/electric-and-hybrid	-vehicles	
4. <u>ht</u>	ps://afdc.energy.gov/vehicles/how-do-hybrid-electric-cars-work		

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C	Course)bjective	2	 Provide knowledge about various renewable energy technologies Enable students to understand and design a PV system. provide knowledge about wind energy system. Provide knowledge about various possible hybrid energy systems Gain knowledge about application of various renewable energy technologies At the end of the course, the student should be able to, 														
		C	At the end of the course, the student should be able to, Knowledge CO1: Attained knowledge about various renewable energy technologies K2														
	Course	Ċ	CO1: Attained knowledge about various renewable energy technologies.K2CO2: Ability to understand and design a PV system.K3														
C	Outcome		C O3: U	Unde	rstand	l the o	concept of	variou	ıs win	d ene	ergy	syster	n.				K3
		Ċ	C O4: (Gaine	ed kno	owled	ge about	various	possi	ble h	nybrio	d ener	gy syst	tems.			K2
		Ċ	CO5: A	Attaiı	ned ki	nowle	edge abou	variou	is app	licati	ions of	of ren	ewable	energy	technolo	gies.	K3
Pre	e-requisi	ites F	ower	Elect	ronic	s, Gei	neration,	Fransm	issior	& E	Distril	butior	1			-	
	(3/2/1 i	ndicate	es stre	ngth c	CO / of corr	PO Mapp elation) 3-	ing Strong,	2 – M	ediun	n, 1 -	Weak			CO/P	SO Maj	pping
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	CO 2	3	2	3	2	2			_	_			2	3	2	1	2
	CO 4	3	2	3	2	2				_			2	3	2	1	1
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Din 1. 0 2 3. 1 Inc	Direct 1. Continuous Assessment Test I, II & III 2. Assignment 3. End-Semester examinations Indirect																
1.	Course -	enu s	ui vey														24

Content of	the syllabus		
Unit – I	INTRODUCTION	Periods	9
Primary en	ergy sources, renewable vs. non-renewable primary energy sourc	es, renewable	e energy resources
in India, Cu	arrent usage of renewable energy sources in India, future potentia	l of renewabl	e energy in power
Unit - II	SOLAP ENERCY	Pariods	0
Solar Radi	ation and its measurements. Solar Thermal Energy Conversion	from plate	Solar Collectors
Concentrati Thermal En Direct Sola charger, de Advances i Solar Cars,	ing Collectors and its Types, Efficiency and performance of col- nergy use of low and medium, high temperature and recent advar ar Electricity Conversion from Photovoltaic, types of solar cells omestic lighting, street lighting, and water pumping, power n PV Applications: Building Integrated PV, Grid Connected PV Solar Energy Storage system and their economic aspects.	llectors, Appl nces in indust and its appli generation Systems, Hy	lications of Solar ry and buildings. ication of battery schemes. Recent brid Systems and
Unit – III	WIND ENERGY	Periods	9
Wind energy wind turbin wind electr environme	gy principles, wind site and its resource assessment, wind assessment ne components, wind energy conversion systems (WECS), Cla ic generating and control systems, characteristics and application ntal aspects, economic aspects.	ent, Factors i ssification of s. Hybrid sys	influencing wind, WECS devices, tems - safety and
Unit - IV	BIO-ENERGY	Periods	9
gas generat Advantage Application	tion, types of biogas plants, selection of site for biogas plant, cla and disadvantages of biogas generation, thermal gasification of n of biomass and biogas plants and their economics.	ssification of biomass, bio	biogas plants, bmass gasifies,
Unit – V	OTHER TYPES OF ENERGY	Periods	9
Energy con of harness thermodyna plants and t	iversion from Hydrogen and Fuel cells, Geo thermal energy Reso ing the energy, potential in India. OTEC, Principles utilizati amic cycles. Tidal and wave energy: Potential and conversion their economics.	urces, types of on, setting of techniques,	of wells, methods of OTEC plants, minihydel power
Torrt Doolro		Fotal Periods	45
1 I I I I I I I I I I I I I I I I I I I	Twidell & Wier 'Renewable Energy Resources' CRC Press(Ta	vlor & Franci	s)
1. 2	D P Kothari K C Singhal 'Renewable energy sources and emerge	ving technolog	pies' PHI
Z. References:			5 ,
1.	Tiwari and Ghosal/ Narosa, 'Renewable energy resources'.		
2.	D.S.Chauhan, S.K. Srivastava, 'Non – Conventional Energy Re Publishers, 2006.	sources', Nev	v Age
3.	B.H.Khan, 'Non – Conventional Energy Resources', Tata Mc G	raw Hill, 200	6.
E-Resource	s:		
1.	https://nptel.ac.in/courses/103103206		
2.	https://www.youtube.com/watch?v=cZSYukWvpsE		
3.	https://mrcet.com/downloads/digital_notes/ME/IV%20year/Ren s.pdf	ewable%20E	nergy%20Source
4.	https://www.brainkart.com/subject/Renewable-Energy-Systems	_354/	

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									L	Т	Р	С		CA	ESE	Total	
P23P	SE07	O P	Optimization Techniques in Power System30034060											60	100		
G		Т	The student should be made to,														
Cour	se	• Learn the difference between optimal reasoning Vs human like reasoning															
Object	tive	• Understand the concepts of artificial neural networks															
		Learn different knowledge representation techniques															
		• Understand the concepts of optimization techniques.															
			Learn General Design Methodology for Neuro-Fuzzy Systems Analyze the applications of AL techniques to Electrical Engineering													ions	
		At the end of the course, the student should be able to, Knowledge Level															
		C	01:	Analy	yze ar	nd des	sign kn	owled	ge ba	sed s	vsten	ns inten	ded for	r comput	er	K2	
Cou	rse	in	nplen	nenta	tion c	of opti	imizati	on tecl	hniqu	ies	-			•			
Outco	ome	C	02:	Reali	ze the	e conc	cepts of	f Gene	tic A	lgorit	hms	and PSC)			K3	
		C	03:	Reali	ze the	e conc	cepts of	f ACO	and	ABC	Algo	orithms.				K3	
		C	:04:	Able	to rea	lize t	he con	cepts o	of opt	imiza	tion	based of	n Shuf	fled frog	;-	K4	
		le	aping	$\frac{g \text{ and }}{1}$	BAT	algo	rithms		·	. 1			1	11 11		V5	
			05:	Appl	y Mu	lti obj	ective	optim	zatio	n tec	hniqu	les to re	al-wor	ld proble	ems.	КЭ	
requi	Pre- isites	P	ower	Syste	em Oj	perati	on and	Contr	ol								
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3.	End-	Seme	ster e	xamii	nation	S											
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I.	Cours	se - er	ia sur	vey													

Content of the syllabus

Unit – I FUNDAMENTALS OF SOFT COMPUTING TECHNIQUES Periods

9

9

Definition-Classification of optimization problems-Unconstrained and Constrained optimization Optimality conditions- Introduction to intelligent systems–Soft computing techniques-Conventional Computing versus Swarm Computing – Classification of meta–heuristic techniques– Single solution based and population based algorithms – Exploitation and exploration in population based algorithms – Properties of Swarm intelligent Systems – Application domain – Discrete and continuous problems – Single objective and multi objective problems.

Unit – II	GENETIC ALGORITHM AND PARTICLE SWARM	Periods	9
	OPTIMIZATION		

Genetic algorithms – Genetic Algorithm versus conventional Optimization Techniques–Genetic representations and selection mechanisms; Genetic operators- different types of crossover and mutation operators – Bird flocking and fish Schooling – anatomy of a particle- equations based on velocity and positions –PSO topologies – control parameters – GA and PSO algorithms for solving ELD problem without loss, Selective Harmonic Elimination in inverters and PI controller tuning.

Unit – III	ANT COLONY OPTIMIZATION AND ARTIFICIAL BEE	Periods	
	COLONY ALGORITHMS		

Biological ant colony system – Artificial ants and assumptions – Stigmergic communications – Pheromone updating – local global–Pheromone evaporation–ant colony system–ACO models–Touring ant colony systemmax min ant system–Concept of Elitist Ants–Task partitioning in honey bees Balancing foragers and receivers –Artificial bee colony (ABC) algorithms–binary ABC algorithms -ACO and ABC algorithms for solving Economic Dispatch without loss and PI controller tuning.

Unit – IV SHUFFLED FROG-LEAPING ALGORITHMS AND BAT Periods OPTIMIZATION ALGORITHM

Bat Algorithm-Echolocation Of bats – Behavior of micro bats – Acoustics of Echolocation- Movement of Virtual Bats – Loudness and Pulse Emission – Shuffled frog algorithm-virtual population of frogs comparison of memes and genes – memeplex formation – memplex updation – BA and SFLA algorithms for solving ELD without loss and PI controller tuning.

Unit - VMULTI OBJECTIVE OPTIMIZATIONPeriods9Multi-Objective optimization introduction-Concept of Pareto optimality – Non-dominant sorting technique-
Pareto fronts-best compromise solution-min max method-NSGA-II Algorithm and application To general two
objective optimization problems.9Total Periods45

Text Book	TS
1.	Xin-she Yang, "Recent Advance in Swarm Intelligence and Evolutionary Computation", Springer
	International Publishing, Switzerland, 2015.
2.	Kalyanmoy Ded, "Multi-Objective Optimization using Evolutionary Algorithms", John Wiley &
	Sons, 2001.
3.	James Kennedy and Russel E Eberheart, "Swarm Intelligence", the Morgan Kaufmann Series in
	Evolutionary Computation, 2001
Reference	S
1.	Eric Bonabeau, Macro Dorigo and Guy Theraulaz, "Swarm Intelligence- From natural to Artificial
	Systems", Oxford universityPress,1999.
2.	David Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson
	Education,2007.
3.	Konstantinos E. Parsopoulos and Michael N. Vrahatis, "Particle Swarm Optimization and
	Intelligence: Advances and Applications", Information science Reference Books, IGIGlobal,, 2010.
4.	N P Padhy,"Artificial Intelligence and Intelligent Systems", Oxford University Press,2005.
E-Resourc	ces
1.	Optimization of Power system operation, Jizhong Zhu, Willy publication, Second edition, 2015
2.	Modern Optimization Techniques with Applications in Electric Power Systems, Soliman Abdel-
	Hady Soliman, Abdel-Aal Hassan Mantawy, Springer, 2015
3.	Optimization Methods Applied to Power Systems, Volume 1 & 2, Francisco G. Montoya Ra´ul

Ba~nos Navarro, MDPI, 2018

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Cou Objec	rse ctive	 The student should be made to, To provide knowledge about different types of renewable energy systems. To analyze the various power converters used in solar energy systems. To analyze the electrical generator used for wind energy systems To analyze power converters used for wind energy conversion systems. To understand the importance hydro power and its working. 														
		At	At the end of the course, the student should be able to, Knowledge Level													
	CO1: Analyze the impacts of renewable energy technologies on the environment and demonstrate them to harness electrical power												1	K2		
Cou Outc	rse	CO2: Design the power converters such as AC-DC, DC-DC, and AC-AC converters for Solar energy systems.														K 4
oute	ome	CO3: Select a suitable Electrical machine for Wind Energy Conversion Systems.														K4
		CO4	: Des	sign the	e powe	er conv	erters	for Wi	nd ene	ergy sy	ystems.				K2	
		CO5	: Ana	lyze th	e imp	acts of	Hydro	Elect	ric Pov	ver pla	ant and its	elemen	ts.		I	K2
Pre-req	quisites	S -														
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					Pro	gramme	e Outco	omes (P	Os)					Р	SOs	
COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO 10) PO 11	PO12	PSO1	PSO2	PSO3	PSO4
C01	3	3	3	2	2	-	-	-	-	2	2	3	2	1	1	-
CO 2	3	2	3	2	2	-	-	-	-	2	2	3	2	1	1	-
CO 3	3	2	3	2	2	-	-	-	-	2	2	3	2	1	1	-
CO 4	3	2	3	2	2	-	-	-	-	2	2	3	2	1	1	-
CO5	3	2	3	2	2	-	-	-	-	2	2	3	2	1	1	-
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	1.Co	urse -	end su	urvey												

	f the syllabus		
Unit –	I INTRODUCTION TO RENEWABLE ENERGY SYSTEMS	Periods	9
Classificatio	n of Energy Sources - Importance of Non-conventional energy sources - Advan	tages and disac	lvantages
of conventio	nal energy sources - Environmental aspects of energy - Impacts of renewable e	energy generation	on on the
environment	- Qualitative study of renewable energy resources: Ocean energy, Biomass e	energy, Hydro	energy, -
Solar Photo	voltaic (PV), Fuel cells: Operating principles and characteristics, Wind Energy:	Types, control	strategy,
operating are	ea Wind Turbine types-Rotor Selection-Rotor design considerations- Tip speed ra	atio-No. of Blac	les-Blade
profile			
Unit - I	I POWER CONVERTERS AND ANALYSIS OF SOLAR PV SYSTEMS	Periods	9
Review of re	eference theory fundamentals –Construction, Principle of operation and analysis:	Squirrel Cage I	nduction
Generator (S	CIG), Doubly Fed Induction Generator (DFIG) – Permanent Magnet Synchronou	us Generator (P	MSG).
Unit – I	II ELECTRICAL MACHINES FOR WIND ENERGY CONVERSION SYSTEMS (WECS)	Periods	9
Solar PV Sy	stems: Solar PV characteristics, Grid requirement for PV, Power electronic co	nverters used f	for solar
PV, Control	techniques, MPPT, Grid connected and Islanding mode, Grid synchronization,	PLLs, battery of	charging
in PV syster	ns.		
Unit - I	V POWER CONVERTERS AND ANALYSIS FOR WIND SYSTEMS	Periods	9
Introduction	to Hydro Power Energy Need for hydropower energy and its power estimation	-Block diagram	n of Small
Hydro Powe	er Station. Dam, Details of desilting tank. Storage & Balancing reservoir. H	Pen Stock, Pip	e Line &
Tunneling.	Surge Tank, Valve House, Turbines. Synchronous Generator. Protection	& Control e	quipment
Synchronou	s Generator & its Construction, working, types- SCADA- Supervisory control and	d data acquisiti	on, ICCS-
Integrated co	omputer control system.		
Unit –	V ANALYSIS OF HYDRO POWER	Periods	9
Stand-alone	operation of fixed and variable speed WECS-Grid integrated SCIG and PMS	G based WECS	S, Control
techniques -	V/f control and self-control of synchronous motor: Margin angle control and	l power factor	control -
permanent n	hagnet synchronous Motor-Three phase voltage/current source fed synchronous n	notor.	
	Total Periods	4	5
Text Book	<u>s</u>		
1.	Suleiman M. Sharkh, Mohammad A. Abu-Sara, Georgios I. Orfanoudakis, H	Babar Hussain,	"Power
	Electronic Converters for Microgrids" Wiley-IEEE Press, April 2014.		
2.	$\mathbf{H}_{\mathbf{n}}$		" CDC
3	Press.	newable Energ	y" CRC
Э.	Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013.	nics for Renewa	y" CRC able and
4.	Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011.	nics for Renewa	y" CRC able and d Wind
4. Reference	Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011.	nics for Renewa	y" CRC able and d Wind
3. 4. Reference 1.	Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011. B.H.Khan "Non-conventional Energy sources ",Tata McGraw-hill Publishing 2017.	Photovoltaic ar Company, Nev	y" CRC able and d Wind v Delhi,
3. 4. References 1. 2.	Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011. B.H.Khan "Non-conventional Energy sources ",Tata McGraw-hill Publishing 2017. Rai. G.D, "Non-conventional energy sources", Khanna publishers, 2010	Photovoltaic an Company, Nev	y" CRC able and d Wind v Delhi,
3. 4. References 1. 2. 3.	 Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011. B.H.Khan "Non-conventional Energy sources ",Tata McGraw-hill Publishing 2017. Rai. G.D, "Non-conventional energy sources", Khanna publishers, 2010 S.N. Bhadra, D. Kastha, & S. Banerjee "Wind Electrical Systems", Oxford University of the second secon	Photovoltaic ar Company, New versity Press, 20	y" CRC able and d Wind w Delhi,
3. 4. References 1. 2. 3. 4.	 Praig Elli Euo, Hong Fe, "Advanced DC/AC inverters: Applications in Ker Press. Sudipta Chakraborty, Marcelo G. Simões, William E. Kramer, "Power Electron Distributed Energy Systems" Springer 2013. Remus Teodorescu, Marco Liserre, Pedro Rodriguez, "Grid Converters for I Power Systems" Wiley-IEEE Press, January 2011. B.H.Khan "Non-conventional Energy sources ",Tata McGraw-hill Publishing 2017. Rai. G.D, "Non-conventional energy sources", Khanna publishers, 2010 S.N. Bhadra, D. Kastha, & S. Banerjee "Wind Electrical Systems", Oxford Univ Rashid. H "Power electronics Hand book", Academic press,2nd Edition, 2006. 	Photovoltaic an Company, New zersity Press, 20	y" CRC able and d Wind v Delhi, 009
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Pro	gramn	ne		Μ	.E.		Pro	gramm	e Code	202	F	Regula	tion		2023			
Dej	partme	nt	POWI ELEC ENGI	ER SYS TRICA NEERI	STEMS AL AN ING	S ENGI D ELEO	NEER CTRO	ING / NICS			Sen	nester						
Cou	rse Co	de	Course Name Periods Per Week Credi						it	N	Maximum Marks							
				0000000	1 (01110		L	Т	Р	C		CA		ESE	Tot	al		
P2.	3AC00)1	Resear Metho	ch Pro dologie	cess an es	ıd	2	0	0	0		100		-	10	0		
Course The main objective of the course is Objective To understand the importance of Research • To acquire knowledge in Data Collection and Analysis • To effectively write reports																		
		-	At the column		ne cou	rse, the	student	snould			• • • •	1	r		ige Le	vei		
		CO1:Understand research design methodologies													K2 K2			
Cour	Course CO2: Understand research design methodologies														K2 K4			
Outco	ome	F	CO4:F	ollow re	esearch	ethics		mation						K2				
		-	CO5:U Informa	Indersta ation To t, and c	nd that echnolo reativit	today's ogy, but y.	world tomori	is cont	rolled b rld will	by Com be rule	pute ed by	r, rideas	,	К2				
Pre-r	equisi	tes																
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05	PO	PO	PO	PO			PO	(1 0 3) PO	PO	PO	р	PO	PS	/3 PS	PS	PS		
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CO 2	3	3	3	2					2				2		2			
CO 3	3	3	3	2					2				1		1	1		
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CO 5	3	3	3	2									I		2	I		
Dire	ect 1. Co 2. As rect 1. Co	ontinuo signm ourse -	ous Asse nent and	essment Semina	t Test I ar	, 11 & 11	I											
																40		

Content of	the s	vllabus								
Unit - I	[INTRODUCTION TO RESEARCH	Periods	9						
Meaning of	f rese	arch problem, Sources of research problem, Criteria Ch	aracteristics o	f a good research						
Meaning of	f Rese	earch- Types of Research- Research Process- Problem det	finition- Objec	tives of Research-						
Research de	esign-	Approaches to Research- Quantitative vs. Qualitative App	broach- Resear	ch Methods versus						
Methodolog	gy -Re	search and Scientific Method-Research Process-Criteria of	Good Research	h.						
Unit – I	Ι	RESEARCH DESIGN	Periods	9						
Meaning of Research Design-Need for Research Design- Features of a Good Design-Important Concepts										
Relating to 1	Resea	rch Design-Different Research Designs-Basic Principles of	Experimental	Designs.						
Unit – II	Π	DATA COLLECTION	Periods	9						
Data Collec	ction:	Collection of Primary Data-Observation Method-Interv	iew Method-C	Collection of Data						
through Qu	uestio	nnaires-Collection of Data through Schedules-Difference	ce between Q	Questionnaires and						
Schedules-C	Collec	tion of Secondary Data- Processing Operations-Elements	s/Types of Ar	alysis-Statistics in						
Research.										
Unit – I	V	DATA ANALYSIS AND INTERPRETATION	Periods	9						
Data analys	sis -	Statistical techniques and choosing an appropriate sta	tistical technic	que - Hypothesis,						
Hypothesis	testin	g - Data processing software (e.g. SPSS etc.) - statistical inf	erence - Interp	pretation of results.						
Unit - V	/	REPORT WRITING	Periods	9						
Types of re	eseard	h report: Dissertation and Thesis, research paper, revie	w article, sho	rt communication,						
conference	prese	ntation etc., Referencing and referencing styles, Research J	ournals, Index	ing and citation of						
Journals, Int	tellec	ual property, Plagiarism.								
		,	Total Periods	45						
References										
1.	C. R Inter	. Kothari, "Research Methodology – Methods and Tech national Publishers	niques", 2nd	Edition, New Age						
2	Bord	ens, K. S. and Abbott, B. B., "Research Design and Meth	ods – A Proce	ess Approach", 8th						
Ζ.	Editi	on, McGraw-Hill, 2011								
2	Robe	rt P. Merges, Peter S. Menell, Mark A. Lemley, "	Intellectual	Property in New						
5.	Tech	nological Age", 2016.								
Davis, M., Davis K., and Dunagan M., "Scientific Papers and Presentations", 3rd Edition,										
4.	Elsev	ier Inc.								
E-Resource	es									
1										
1.	<u>https</u>	//www.oreilly.com/library/view/research-methodology/978	9353067090/							

A CONTRACTOR		,	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: College of the second se													
Pro	gramm	e	M.E.			Program	nme Co	ode		202]	Regula	tion		2023	
Dej	partmer	nt	POWE ELEC ENGIN	ER SYS TRICA NEERI	STEMS AL AN NG	S ENGI D ELEO	NEER CTRO	ING / NICS			Sen	nester				
Cou	rea Ca	do.		Course	Nomo		Perio	ods Per	Week	Credi	t	l	Maxin	num Ma	arks	
Cou	rse Coo	le		Course	Name		L	Т	Р	C		CA		ESE	Tot	al
P23	BAC00	2	Pedago	ogy Stu	dies		2	0	0	0		100)	-	10	C
Cour Obje	se ctive		 Understand the concept of programme design through evidences. Illustrate the practice of innovative teaching methodology. Analyze the method of teacher education. Enhance the infrastructure in the class room. Elaborate the directions of future recearch 													
			At the end of the course, the student should be able to Knowledge Level												el	
Cour Outc	se ome	CO1:Describe about the concept of programme design through evidences K10wledge Level														
			CO2:D	emonst	rate the	e practic	e of in	novativ	e teach	ing me	thod	ology		<u> </u>	K2	
			CO3:E	valuate	the met	thod of t	eacher	education be class	on room					1	<u>54</u> 73	
		·	CO4.E	efine th	e direc	tions of	future i	research						[K3	
Pre-r	equisit	es														
					CO/P	O Mapp	oing						CO/	PSO Ma	apping	
	(3/2	2/1 inc	licates str	ength o	f correla	ation) 3-	Strong,	2 – Mec	lium, 1 ·	- Weak						
Cos				1 = -	Program	nme Out	comes	(POs)		1 = - 1	_	1 = -	PSO	s		
	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	РО 7	PO 8	PO 9	РО 10	Р О 11	PO 12	PS O1	PSO 2	PS O 3	PS O 4
CO 1	3	3	3	2									2			
CO 2	3	3	3	2							-		2	2		
CO3	3	3	3	2						2	2		1			
CO 4	3	3	2	2						2	Z		1			
	se Asse	ssme	nt Meth	nds	1								-			
Dire	Direct 1. Continuous Assessment Test I, II & III 2. Assignment and Seminar Indirect															
<u> </u>				-												

Content of	he syllabus			
Unit -	INTRODUCTION	[Periods	9
Introductio	and Methodology: Aims and rationale	, Policy backgrour	nd, Conceptua	l framework and
terminolog	, Theories of learning, Curriculum, Tea	cher education. Co	onceptual fram	nework, Research
questions.	verview of methodology and Searching.			
Unit – I	THEMATIC OVERV	IEW	Periods	9
Thematic of	erview: Pedagogical practices are being use	ed by teachers in for	rmal and infor	mal classrooms in
developing	countries. Curriculum, Teacher education.	·		
Unit – I	I PEDAGOGICAL PRAC	TICES	Periods	9
Evidence of	n the effectiveness of pedagogical practi-	ces Methodology f	for the in dep	oth stage: quality
assessment	of included studies. How can teacher edu	cation (curriculum	and practicum	n) and the school
curriculum	nd guidance materials best support effective	e pedagogy? Theor	y of change. S	trength and nature
of the body	of evidence for effective pedagogical practice	es. Pedagogic theory	and pedagogic	cal approaches.
Teachers' a	titudes and beliefs and Pedagogic strategies.			
Unit – I	PROFESSIONAL DEVELO	OPMENT	Periods	9
Professiona	development: alignment with classroom pra	actices and follow-u	p support -Pee	r support from the
head teache	and the community. Curriculum and assessi	ment Barriers to lear	ning: limited r	esources and large
class sizes.			-	
Unit - V	RESEARCH GAPS AND FUTUR	E DIRECTIONS	Periods	9
Research g	ps and future directions, Research design, (Contexts, Pedagogy,	, Teacher educ	cation, Curriculum
	ent, Dissemination and research impact.	r	Fotal Periods	45
References				
1.	Ackers J, Hardman F (2001) Classroom inte 245-261.	raction in Kenyan pi	rimary schools	, Compare, 31 (2):
2.	Agrawal M (2004) Curricular reform in s	schools: The impor	tance of evalu	ation, Journal of
	Alwaammana K (2002) Taaahar taakina in	Change dage it	unt? Multi ait.	toophon advection
3.	research project (MUSTER) country report 1	. London: DFID.	int? Multi-site	teacher education
E-Resource		· · · · ·		
1.	https://nptel.ac.in/courses/121/105/1211050	010/ CO-ORDINATI	ED BY : IIT K	HARAGPUR
2.	https://nptel.ac.in/courses/109/105/1091051	22/ CO-ORDINATE	ED BY : IIT K	HARAGPUR

*			VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: College of College													
Pro	gramm	e	M.E.]	Program	nme Co	de		202	2	Regula	ation		2023	
De	partmer	nt	POWE ELEC ENGIN	ER SYS TRICA NEERI	TEMS L ANI NG	S ENGI D ELEO	NEER CTRO	ING / NICS			Sei	nester				
Cou	ırse Coo	de		Course	Name		Perio	ds Per	Week	Cred	it		Maxir	num M	larks	
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P2.	3AC00	3	Disaster Management200100)	-	10	0
Cour Obje Cour Outc	rse ctive rse ome requisit	es	 L re C p E re C aj c C aj c C At the e CO1:U CO2:A CO3:D CO4:R CO5:E 	earn to eduction Critically ractice Develop elevanc Critically pproach ountry of Categor end of th nderstan nalyze isaster isk mar	o demon and h y evalu from m an ur e in spe y unde nes, pla or the c ize the e cours ad the e differen manage ageme the Ris	onstrate umanita iate dis iate dis inderstar ecific ty erstand nning a countrie <u>Risk A</u> e, the st ffects of nces bet ement te nt techr sk assess	a crit arian re saster r perspec nding c pes of c the s nd prog s they v Assessi f disaste tween d echniqu niques	ical ur sponse. isk rec ctives. of stand disaster trength grammi work. <u>ment in</u> hould b er lisasters tes	derstan luction dards of s and c s and ng in d <u>n nation</u> e able t s and ha level	nding and l of hur conflict weak ifferer nal lev o azards	of k numa nanit t situ t cou vel a	anitaria tarian ations. es of untries nd glo	ncept n respo disa , parti bbal le	s in d ponse nse an ster n cularly evel.	isaster policy d prac nanager their h dge Lev K2 K2 K3 K3 K4	risk and tical nent ome el
					CO/P	O Mapp	oing						CO/	PSO M	apping	
C.	(3/2	2/1 ind	icates str	rength of	correla	tion) 3-	Strong, 2	2 - Med	ium, 1 -	- Weak			DCO			
Cos	PO 1	PO 2	PO 3	PO 4	Program	Ime Out	comes (POS)	PO 0	PO	PO	PO	PSO	S PSO	PSO	PSO
		102	103	104	103	100		100	10,9	10	11	12	1	2	3	4
CO 1					2	2	2				2	1	1			
CO 2					2	2	2				2	1	1			
CO 3					2	2	2				2	1	2			
CO 4					2	2	2				2	1	2			1
CO 5					2	2	2				2	1	2			1
Cour	Course Assessment Methods Direct															

2. Assignment and Seminar

Indirect

1. Course - end survey

Content of	f the sy	llabus								
Unit -	·I	INTRODUCTION	Periods	9						
Introducti	ion Di	saster: Definition, Factors and Significance; Difference	Between Haza	and Disaster;						
Natural a	nd Mai	made Disasters: Difference, Nature, Types and Magnitude.	ГГ							
Unit –	II	REPERCUSSIONS OF DISASTERS AND	Periods	9						
		HAZARDS								
Repercussi	ions of	Disasters and Hazards: Economic Damage, Loss of Human	and Animal L	ife, Destruction of						
Ecosystem	. Natu	al Disasters: Earthquakes, Volcanisms, Cyclones, Tsunami	s, Floods, Drou	ghts and Famines,						
Landslides	and A	valanches, Man-made disaster: Nuclear Reactor Meltdown	, Industrial Ac	cidents, Oil Slicks						
and Spills,	Outbro	eaks of Disease and Epidemics, War and Conflicts.								
Unit – l	ш	DISASTER PRONE AREAS IN INDIA	Periods	9						
				-						
Disaster Pi	rone A	reas in India Study of Seismic Zones; Areas Prone to Floo	ds and Drough	ts, Landslides and						
Avalanche	s; Area	as Prone to Cyclonic and Coastal Hazards with Special Ref	erence to Tsun	ami; Post-Disaster						
Diseases an	nd Epi	demics								
		DISASTER PREPAREDNESS AND								
Unit – 1	IV	MANAGEMENT PREPAREDNESS	Periods	9						
Disaster Pr	repared	lness and Management Preparedness: Monitoring of Phen	omena Trigger	ring A Disaster or						
Hazard; Ev	valuati	on of Risk: Application of Remote Sensing, Data from Me	teorological an	d Other Agencies,						
Media Rep	oorts: C	overnmental and Community Preparedness.								
Unit –	V	RISK ASSESSMENT	Periods	9						
Risk Asse	ssment	Disaster Risk: Concept and Elements, Disaster Risk I	Reduction, Glo	bal and National						
Disaster R	Risk Si	tuation. Techniques of Risk Assessment, Global Co-Ope	eration in Risl	Assessment and						
Warning, I	People	's Participation in Risk Assessment. Strategies for Surviva	al. Disaster Mi	tigation Meaning,						
Concept a	nd Stra	ategies of Disaster Mitigation, Emerging Trends in Mitig	ation. Structur	al Mitigation and						
Non-Struct	tural M	litigation, Programs of Disaster Mitigation in India.								
		,	Fotal Periods	45						
Reference	S									
	R. N	shith, Singh AK, "Disaster Management in India: Perspect	ives, issues and	d strategies "New						
1.	Roya	l book Company.								
2.	Sahn	i, Pardeepet.al. (Eds.)," Disaster Mitigation Experiences an New Delhi	nd Reflections'	', Prentice Hall of						
	Goel	S. L., Disaster Administration and Management Text	And Case Stu	dies".Deen&Deen						
3.	Publi	cation Pvt. Ltd., New Delhi.								
E-Resourc	es									
1.	http	s://www.digimat.in/nptel/courses/video/124107010/L36.htm	nl							
2.	2. https://media.ifrc.org/ifrc/what-we-do/disaster-and-crisis-management/disaster-preparedness/									
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Pro	ogramm	e	M.E.		I	Program	nme Co	de		202	F	Regula	tion	1	2023	
De	partmer	nt	POWE ELEC ENGIN	L CR SYS FRICA NEERI	STEMS AL ANI NG	ENGI DELE	NEER CTRO	ING / NICS			Sen	nester				
Cou		de		Course	Nomo		Perio	ds Per	Week	Credi	t	l	Maxir	num M	arks	
COL		le	· ·	Course	INAILIC		L	Т	Р	С		CA		ESE	Tot	al
P2	3AC00	4	Value I	Educat	ion		2	0	0	0		100)	-	10	0
Course • To introduce the value of education and self- development. • To interpret good values in students. • To elaborate the importance of character. • To distinguish the relationship and their cooperation. • To interpret the religions and equality. • At the end of the course, the student should be able to Knowledge Level															el	
Cour Outc	rse come		C O1: Ui C O2: Ai C O3: Im	ndersta nalyze nportan	stand education valuesK2ze importance of cultivation valuesK2tance of personality developmentK3											
		(C O4: Cl C O5: E	haracte xamine	r mainte the reli	enance gions a	nd hon	esty.							K3 K4	
Pre-I	requisit	es -	-										•			
	(3/2	2/1 indi	cates str	ength o	CO / PO f correla	O Mapp tion) 3-5	oing Strong. (2 – Med	ium. 1 -	- Weak			CO/	PSO M	apping	
Cos					Program	nme Out	comes (POs)					PSO	s		
	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									2		-	
CO 2	3	3	3	2									2			
CO 3	3	3	3	2									2			
CO 4	3	3	3	2									2			
CO 5	3	3	3	2									2			
Cour	se Asse	ssmen	t Metho	ods												
Dire	ect 1. Con 2. Ass	ntinuou	is Asses	ssment ' Seminai	Test I, I r	I & III										
Ind	irect	80														
	1. Co	urse - e	end surv	ey												

Content of the s	vllabus									
Unit - I	INTRODUCTION	Periods	9							
Values and se	If-development -Social values and individual attitudes.	Work ethics,	Indian vision of							
humanism. Mor	al and non- moral valuation, Standards and principles, Value	judgments.								
Unit – II	IMPORTANCE OF CULTIVATION OF VALUES	Periods	9							
Importance of	cultivation of values. Sense of duty. Devotion, Self-relia	nce. Confiden	ce, Concentration.							
Truthfulness, C	leanliness. Honesty, Humanity. Power of faith, National Un	nity. Patriotism	n. Love for nature,							
Discipline.										
Unit _ III	PERSONALITY AND BEHAVIOR	Periods	9							
	Unit – III DEVELOPMENT Pe									
Personality and	Behavior Development - Soul and Scientific attitude. I	Positive Think	ing. Integrity and							
discipline. Punc	tuality, Love and Kindness. Avoid fault Thinking. Free from	anger, Dignity	of labour.							
Unit – IV	RELATIONSHIP MANAGEMENT	Periods	9							
Universal broth	erhood and religious tolerance True friendship. Happiness Vs	suffering, love	e for truth.							
Aware of self-d	estructive habits. Association and Cooperation. Doing best fo	r saving nature	2.							
Unit - V	CHARACTER AND COMPETENCE	Periods	9							
Character and	Competence -Holy books vs Blind faith. Self-managemen	nt and Good I	health. Science of							
reincarnation. E	quality, Nonviolence, Humility, Role of Women. All religion	ns and same m	essage. Mind your							
Mind, Self-cont	rol. Honesty, Studying effectively.									
		Fotal Periods	45							
References			_							
1. Cł Ui	nakroborty, S.K. "Values and Ethics for organizations Theory niversity Press, New Delhi 2011.	and practice",	Oxford							
E-Resources										
1. htt	ps://www.ncbi.nlm.nih.gov/pmc/articles/PMC5132380/									
2. htt Ha	ps://www.examrace.com/Study-Material/Education/Value-Eoundouts.html	lucation-YouT	ube-Lecture-							

	CONAL PROT)	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN																					
			(Autono	omous l	Institutio	on, Aff	iliated	to Ann	a Uni	versit	y,Che	nnai)	TI I	WRheinland ERTIFIED WWW.tox.com ID 9105048155	回激级								
	NOMEN EMPOWERNEN	7		EKANANDHA COLLEGE OF ENGINEERING FOR WOMEN Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Programme Code 202 Regulation 2023 ER SYSTEMS ENGINEERING / ZTRICAL AND ELECTRONICS Semester 2021 Reservent 2023 Course Name Periods Per Week Credit Maximum Marks Total 10 0 0 100 - 100 nain objective of the course is To understand the premises informing the twin themes of liberty and freedom from civil rights perspective. To identify the growth of Indian opinion regarding modern Indian intellectual constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism. To interpret the various administration in states. end of the course, the student should be able to Knowledge Level Define the history of Indian Constitutional rights and duties. K3 Understand the functions of Local administration in states. CO/PO Mapping rength of correlation) 3-Strong, 2 – Medium, 1 - Weak Prof <																				
Pr	rogrami	ne	M.E. POW	FP SV	STEM	Program	mme C	ode	,	2	02	Regu	lation		2023									
D	epartme	ent	ELEC ENG	CTRIC	AL AN	D ELE	CTRO	ONICS			S	emeste	r	EN 2023 imum Marks ESE Total - 100 and freedom from indian intellectuals hts as well as th ent of the Bolshevi stitution. Knowledge Level K2 K3 K2 K3 K2 K4 K4 S 1 PSO Mapping Ds 1 PSO 2 3 a a a a										
Co	ourse Co	ode		Course	e Name	•	Peri	ods Per	Week	Cr	edit	C	Maxiı	num M	arks	a1								
P	23AC0	05	Const	itution	of Ind	ia	2	0	0		0	1()0	-	100)								
Cou Obj	rse ective		The n	nain ob To und civil rig To iden constitu emerge To illus Revolu To cate To inte	jective erstand ghts per ntify th ational nce of a strate th tion and egorize	of the co the pre- spective role an nationho he role co d its imp the go he vario	ourse i mises i e. with of ad enti- bod in to of social boact on vernamous ad	is nformi Indian tlemen the earl alism in the ini tce boo minist	ng the opinio t to ci y years n India tial dra lies in ration	twin t n reg vil an of In after fting the o in sta	heme ardin dian the co of the rgani tes.	g mod conomi nationa ommer Indiar zation	berty and lern In c right ilism. ncemen n Const	nd freed dian ir ts as v t of the itution.	dom fro ntellectu vell as e Bolsh	om a uals' the evik								
Cou	rse		At the CO1:I	end of Define t Categor	the cou he histo ize the	ory of Ir importa	studen Idian C	t shoul Constitu constit	d be ab tion utional	rights	s and	duties.	ŀ	Knowledge Level K2 K3										
Out	come		CO3·I	CO3:Understand the functions of Local administration K2																				
					troto th				in the e	maani	Totion				VA									
			C04:1							rgam		1.		K4										
			C05:F	rioritiz	the lo	cal and	distric	t admir	iistratic	on in s	states.				K4									
Pre	requis	ites																						
	(2)2	/1 · 1·		.1 .() Mappi	ing		• •	XX7 1			CO/P	SO Ma	pping									
05	(3/2	/1 1nd1	cates str	ength of	Program	$\frac{100}{100}$ $3-8$	comes ($\frac{2 - \text{Med}}{POs}$	1um, 1 -	wear	<u> </u>		PSOs											
05	PO 1	PO	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO1	PSO	PSO	PSO								
	101	2	100	10.	100	100	107	100	107	10	11	12		2	3	4								
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02	3	3	2	2									1											
03	3	3	2	2									1											
04	3	3	2	2									1											
05	3	3	2	2									1											
Cou Din Inc	Course Assessment Methods Direct 1. Continuous Assessment Test I, II & III 2. Assignment and Seminar																							
	1. C	ourse -	end sur	vey																				

Content of	the syllabus										
Unit -	I INTRODUCTION	Periods	9								
History of I	Making of the Indian Constitution: History Drafting Committee, (Composition &	& Working)								
Unit – I	II PHILOSOPHY OF THE INDIAN CONSTITUTION	Periods	9								
Philosophy	of the Indian Constitution: Preamble, Salient Features										
Unit _ I	II CONTOURS OF CONSTITUTIONAL RIGHTS&	Periods	Q								
	DUTIES	renous	,								
Contours of	f Constitutional Rights& Duties: Fundamental Rights- Right to Ec	uality- Right t	o Freedom								
Right agai	nst Exploitation- Right to Freedom of Religion ,Cultural an	d Educational	Rights, Right to								
Constitutio	nal Remedies, Directive Principles of State Policy, Fundamental I	Duties									
Unit – I	V ORGANS OF GOVERNANCE	Periods	9								
Executive, Qualification	President, Governor, Council of Ministers, Judiciary, Appointons, Powers and Functions.	ntment and Tr	ansfer of Judges,								
Unit - V	V LOCAL ADMINISTRATION	Periods	9								
Local Adn	inistration: District's Administration head: Role and Importan	ce, Municipali	ities: Introduction,								
Mayor and	role of Elected Representative, CEO of Municipal Corporation.	Panchayat raj:	Introduction, PRI:								
Zila Panch	ayat. Elected officials and their roles, CEO Zila Panchayat:	Position and	role. Block level:								
Urganizatio	onal Hierarchy (Different departments) Village level: Role of Elec	ted and Appoin	ited officials,								
importance	of grass foot democracy	Total Periods	45								
References											
1.	The Constitution of India, 1950 (Bare Act), Government Publica	tion.									
2.	Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution	on, 1 st Edition,	2015.								
3.	3. M. P. Jain, Indian Constitution Law, 7th Edition., Lexis Nexis, 2014.										
E-Resource	28										
1.	https://nptel.ac.in/courses/129/106/129106002/ CO-ORDINAT	$\mathbf{FD} \overline{\mathbf{RV} \cdot \mathbf{HT}} \mathbf{M}$									
			IADRAS								

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Pre	ogramm	ne	M.E.]	Program	nme Co	de		202	R	Regula	ation		2023	
De	partme	nt	POWI ELEC ENGI	ER SYS TRICA NEERI	STEMS AL ANI ING	S ENGI D ELEO	NEER CTRO	ING / NICS			Sem	nester				
Co	urse Co	de		Course	Name		Perio L	ds Per	Week P	Credi	t	N CA	/laxim	um Ma	arks E To	otal
P2	3AC0()6	Englis Paper	h for R Writin	esearcl g	1	2	0	0	0		100)	_	1	00
Cou Obje	Course • Illustrate the improve your writing skills and level of readability Objective • Categorize to write in each section. • Understand the skills needed when writing a Title • Ensure the good quality of paper at very first-time submission. • Elaborate the concept of writing skills for submission of paper. At the end of the course, the student should be able to Knowledge Lev CO1:Understand forming and brake up sentences. K2															1
Carry	***	Knowledge Level K2														
Out	Course CO2:Importance of finding plagiarism. Outcome CO2: S														K4	
Out	ome		CO3: S	Summar	ize the c	concept	of litera	ture rev	views.]	K2	
			CO4: E	Extend t	the focu	is on sk	ill deve	lopmer	nt activi	ities.]	K2	
			CO5:]	Develop	the wr	iting ski	ills in th	e paper	•]	K3	
Pre-	requisit	tes														
	(3/2	2/1 ind	icates st	rength o	CO / Po	O Mapp tion) 3-	oing Strong, 2	2 – Med	ium, 1 ·	- Weak			CO/I	PSO Ma	apping	
Cos					Progran	nme Out	comes (POs)					PSOs			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO 1	3	3	3	2									1			2
CO 2	3	3	3	2									1			2
CO 3	3	3	3	2									1			1
CO 4	3	3	3	2									1			1
CO 5	3	3	2	2									1			1
Cour Dir Ind	rse Asse ect 1. Co 2. Ass irect 1. Co	ntinuo signma urse -	nt Meth	ods ssment Seminar vey	Test I, I r	I & III										

Signature of the BOS Chairman, EEE

Content of	the syllabus										
Unit -	I PLANNING AND PREPARATION	Periods	9								
Planning a	nd Preparation, Word Order, Breaking up long sentences, Str	ucturing Paragra	phs and Sentences,								
Being Con	cise and Removing Redundancy, Avoiding Ambiguity and Vag	ueness.									
Unit –	II CLARIFICATIONS	Periods	9								
Clarifying	Who Did What, Highlighting Your Findings, Hedging	and Criticising,	Paraphrasing and								
Plagiarism, Sections of a Paper, Abstracts. Introduction.											
Unit – l	II LITERATURE REVIEW	Periods	9								
Review of	the Literature, Methods, Results, Discussion, Conclusions, The	Final Check.									
Unit – I	V SKILL DEVELOPMENT - I	Periods	9								
Key skills	are needed when writing a Title, key skills are needed when	writing an Abs	tract, key skills are								
needed whe	en writing an Introduction, skills needed when writing a Review	of the Literatur	e.								
Unit - `	V SKILL DEVELOPMENT - II	Periods	9								
Skills are r	needed when writing the Methods, skills needed when writing	the Results, skil	Is are needed when								
writing the	Discussion, skills are needed when writing the Conclusions, us	eful phrases, how	w to ensure paper is								
as good as	it could possibly be the first- time submission		1								
		Total Period	ls 45								
Reference	8										
1.	Goldbort R (2006) Writing for Science, Yale University Press	(available on Go	ogle Books)								
2.	Day R (2006) How to Write and Publish a Scientific Paper, Ca	ambridge Univer	sity Press								
3	Adrian Wallwork, English for Writing Research Papers	, Springer Nev	W York Dordrecht								
5.	Heidelberg London, 2011										
E-Resourc	es										
1.	https://nptel.ac.in/courses/110/105/110105091/ CO-ORDINA	TED BY : IIT F	KHARAGPUR								
2.	https://www.udemy.com/topic/research-paper-writing										

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Pro	gramm	e	M.E.		P	rogram	nme Co	de		20)2	Regu	lation		2023		
Dep	artmer	nt	POWE ELECT ENGIN	R SYS FRICA IEERII	TEMS L ANI NG	ENGI) ELE(NEERI CTRON	ING / NICS			S	emeste	r				
Cour	rse Cou	de	(Ourse	Name		Perio	ds Per	Week	Cre	dit	•	Maxim	um Ma	arks		
Cou		ue			Name		L	Т	Р	C	1	C	A	ESE	Total		
P23	SAC00	07	Persona through Enlight	llity De Life enment	velopn t Skills	nent	2	0	0	0)	10	00	-	100		
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			At the e	he end of the course, the student should be able to Knowledge Level													
			CO1:Id	D1:Identify goals K2													
Cours	se		CO1:Identify goalsK2CO2:Analyze Personality developmentK2														
Outco	ome		CO3:M	ake use	of app	ropriate	e life an	d care	er goal	s				-	<u>x</u> 3		
			CO4: D	eveloni	ng rela	tionshi	ns with	others	or gour	5					<u>X3</u>		
			CO5: U1	nderstar	nd the v	value of	diversi	itv]	K2		
Pre-r	equisit	es															
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(3/2	2/1 indic	cates	strength o	f correla	tion) 3-	Strong,	2 – Med	lium, 1	- Weak				-50 Ma	thbung			
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PO 1	PO 2	PO 3	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		
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Cours	se Asse	ssme	nt Metho	as													
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U	nit - I				NEE'	TISAT	AKAN	I – I				Perio	ds		9		
Neetis	satakan	n-Ho	listic dev	elopme	nt of p	ersonal	ity										
Verse	s- 19,2	0,21,	,22 (wisd	om)													
Verse	s- 29,3	1,32	(pride &	heroisr	n)												

Verses- 26,2	8,63,65 (virtue)		
Unit – II	NEETISATAKAM – II	Periods	9
Neetisatakar	n-Holistic development of personality		
Verses- 52,5	3,59 (dont's)		
Verses- 71,7	'3,75,78 (do's)		
Unit – II	APPROACH TO DAY TO DAY WORK AND	Periods	9
	DUTIES		
Approach to	day to day work and duties.		
ShrimadBha	gwadGeeta :		
Chapter 2-V	erses 41, 47,48,		
Chapter 3-V	erses 13, 21, 27, 35,		
Chapter 6-V	erses 5,13,17, 23, 35,		
Chapter 18-	V erses 45, 40, 48.	Dariada	0
Unit – IV	STATEMENTS OF BASIC KNOWLEDGE	Periods	9
Statements C	gwadGaata		
Chapter? Ve	gwaddeela.		
Chapter 12 -	$V_{\text{erses}} = 13 - 14 - 15 - 16 + 17 - 18$		
Unit - V	PERSONALITY OF ROLF MODEL	Periods	0
Personality (of Role model	Terrous)
ShrimadBha	gwadGeeta:		
Chapter2-Ve	gwaddeeta. Prses 17		
Chapter 3-V	erses 36.37.42.		
Chapter 4-V	erses 18, 38,39		
Chapter18 –	Verses 37,38,63		
		Total Periods	45
References			1
1	"Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita	Ashram (Publicati	on Department),
1.	Kolkata		
2.	Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopi	nath,	
3.	Rashtriya Sanskrit Sansthanam, New Delhi.		
E-Resources	3		
1.	https://library.um.edu.mo/ebooks/b17771201.pdf		
2.	https://www.staticcontents.youth4work.com/university/Docum ach/29f57018-6412-4dee-b24b-ac29e54a0f9e.pdf	ents/Colleges/Coll	legeSummaryAtt

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Cou	rse Cod	e	С	ourse l	Name		Perio	ds Per	Week	Cred	lit		Max	imum	Mark	S	
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P23	AC00		NIVEI ALUE	RSAL I S	HUMA	N	2	0	0	0		1	.00		-	100	
Cours Objec	se ctive	Tł • •	 To assist students in understanding the differences between values and skills, and in understanding the need, basic guidelines, content and the process of value education. To help students initiate a process of dialog within themselves to understand what they 'really want to be' in their lives and professions To help students understand the meaning of happiness and prosperity for human beings. To help students understand harmony at all the levels of human living and to lead an ethical life t the end of the course, the student should be able to 														
		ethical life At the end of the course, the student should be able to CO1 Fundamental for the course in the student should be able to															
		C sta	01: Ev art appl	aluate	the signed the signed the signed by the second s	hificanc	e of va and pa	lue inp ofessio	outs in f	formal	educ	ation	and		K4		
Cours	se me	C ac C	O2: Dis cumula ompete	tinguis tion of nce of a	h bet physic an indiv	ween al facil vidual, o	values ities, th etc.	and e Self a	skills and the	s, hap Body,	opine Inten	ss a tion a	und und		K2		
oute	me	C re	O3: An spect in	alyze the the state of the stat	he valu ife and	e of ha profess	rmonio sion	us relat	ionship	based	on tr	ust an	d		K2		
		C ar	O4: Ex d natur	amine (e.	the role	of a hu	ıman be	eing in	ensurin	g harm	ony i	in soc	iety		K3		
		C le	O5: Un ad an et	derstar thical li	nd the h fe	armony	y at all 1	he leve	els of hu	ıman li	ving	and to	C		K3		
Pre-r	equisito	es															
	(2/2	/1 : 4:		(CO / PO) Map	oing	2 M-	d' 1	West	_		CO/	PSO M	Iappi	ng	
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s	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2	PS O 3	PSO 4	
01	1	1		3	3	1	2	3	3	2	3	1	1				
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205	2	1	2	1	2	1	3	3	2	2	1		1				
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				5												E 4	

Content of	`the sy	llabus		
Unit	- I	Introduction-Basic Human Aspiration	Periods	9
The basic	e huma	an aspirations and their fulfillment through Right unders	tanding and R	esolution, Right
understan	iding a	nd Resolution as the activities of the Self, Self being cer	ntral to Human	Existence; All-
encompas	ssing I	Resolution for a Human Being, its details and solution	of problems	in the light of
Resolutio	n.		[]	
Unit -	- II	Right Understanding (Knowing)	Periods	9
The dom	ain of	right understanding starting from understanding the h	uman being (the knower, the
experienc	er and	the doer) and extending up to understanding nature/existen	1 ce - 1 ts 1 n terco	onnectedness and
co-exister	nce; an	d finally understanding the role of human being in existence	e (human condu	ict).
Unit –	III	Understanding Human Being	Periods	9
Understar	nding t	he human being comprehensively as the first step and the co	ore theme of the	is course; human
being as	co-exi	stence of the self and the body; the activities and poter	itialities of the	e self; Basis for
		Understanding Nature and Evistance	Periode	0
Unit –	- IV	Understanding Nature and Existence		9
A compre	enensiv	e understanding (knowledge) about the existence, Nature	e being include	ed; the need and
process c	or to ac	tivities of the Self: Realization Understanding and Contemp	a self-evaluation	on), particularly
awaKellill	Ig to ac	Understanding Human Conduct	Parioda	0
Understar	- v	Human Conduct different aspects of All encompassi	a Resolution	/understanding
wisdom	science	etc.) Holistic way of living for Human Being with Allen c	omnassing Res	olution covering
all four d	imensi	ons of human endeavor viz realization thought behavior	and work (nat	rticination in the
larger ord	ler) lea	ding to harmony at all levels from Self to Nature and entire	Existence	theipation in the
			Total Period	s 45
Text Books	s			
I CAT DOOM		Gaur R Asthana G P Bagaria 2019 (2nd Revised Edition)	A Foundation	Course in
1.	Hur	nan Values and Professional Ethics ISBN 978-93-87034-47	7-1 Excel Bool	ks. New Delhi
	Pret	nvir Kanoor Professional Ethics and Human Values Khan	a Book Publis	hing New
2.	Dell	ni 2022	nu Dook I uons	1111 <u>2</u> , 140 w
Deference				
Kelerence	s E-Re	sources		
1.	Ivan	Illich, 1974, Energy & Equity, The Trinity Press, Worceste	er, and Harper	Collins, USA
2	E.F.	Schumacher, 1973, Small is Beautiful: a study of economi	ics as if people	mattered, Blond
۷.	& B	riggs, Britain		
E-Resourc	es			
1.	https	s://nptel.ac.in/courses/109104068		
2.	http	s://fdp-si.aicte-india.org/UHV-I		

		V	VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN (Autonomous Institution, Affiliated to Anna University ,Chennai) Elayampalayam, Tiruchengode – 637 205 Image: Coll and														
Prog	ramme	N	1.E.		Pro	ogramr	ne Cod	le		202	R	egulat	ion		2023		
Depa	artment	P E E	OWEI LECT NGIN	R SYST RICAI EERIN	TEMS E L AND I IG	NGIN ELEC	EERI TRON	NG / ICS			Seme	ester					
Cours	se Code	e	С	ourse N	Jame		Period	s Per V	Week	Credit		N	laxim	um M	arks		
							L	Т	Р	С		CA		ESE	Tot	al	
P23/	AC009	, 0	nline (Course			2	0	0	0		100		-	100	0	
Course Object	e tive	A	 Illustrate about various online certification courses. Understand the importance of online certification courses. Distinguish about job opportunities. Make use of this course can prepare the competitive examination. Classify the online tools for course. 														
At the end of the course, the student should be able to Knowledge Level															CI		
Course	e	C	CO1: Evaluate the programming skills. K3														
Outco	me	C	CO2: Identify online certifications.														
		C	03: Ap	praise t	he value	of the	course	es and j	job opp	ortunit	ies		K5				
		C Li	04: Ca teracy.	ategoriz	ze in Qua	antitati	ive Rea	isoning	g and T	echnolo	ogical	1			K4		
		C	05: D	evelop t	he ICT t	ools fo	r the sp	ecific o	course.						K4		
Pre-re	quisite	s															
						Mon	ina							DSO N	Ionnin	a	
	(3/2	2/1 indic	cates str	ength of	correlati	ion) 3-9	Strong,	2 – Me	dium, 1	- Weak				150 1	rappin	g	
Cos]	Program	ne Out	comes ((POs)					PSO	s			
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO	PO 12	PSO	PS	PSO	PS	
CO 1	3	3	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										2				
CO 2	3	3	2	2						2			2			2	
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CO 5	3	3	2	2							2		2	3	2	2	
		1			I						1					<u> </u>	

Course Assessment Methods

Direct

1. Online Assignments and Assessments

Indirect

1. Course - end survey

LIST OF COURSES

OnlineCourses such as :

- 1. NPTEL Courses
- 2. SWAYAM Courses
- 3. IIT-B Spoken Tutorials
- 4. UDEMY Courses
- 5. CCNA Courses
- 6. MOOC Courses

7. Microsoft Virtual Academy Certification courses etc.,