	THE TEAT IN TECH (DE	PROTECTION AND PROPERTY OF A STREET AND A STREET AND A STREET ASSESSMENT OF A STREET ASSESSMENT ASS	JORGINS	
Teaching Scheme		PS2101: Power System Analysis Fxamina	Sis Examination Scheme	
Lectures	03 Hrs/week	MSE	20	
Total Credits	its 03	ESE	60	
	Ш	Duration of ESE		lrs 30 Min
Prerequisi	Prerequisite :Power system, Network Analysis			
Course Ou	Course Outcomes (CO): Students will be able to			
COI	Calculate voltage phasors at all buses, given the data using various methods of load flow	n the data using various metho	ods of load flow.	
202	Kank various contingencies according to their severity	eir severity	•	
CO3	Estimate the bus voltage phasors given various quantities viz. power flow, voltages, taps, C	ious quantities viz. power flow	v, voltages, taps,	СВ
CO4	Estimate closeness to voltage collapse and calculate PV curves using continuation nower fl	calculate PV curves using con	tinuation power	flow
	Course	Course Contents		CO
Unit 1	Load flow: Overview of Newton-Raphson, Gauss-Siedel	aphson, Gauss-Siedel		CO1
	 fast decoupled methods, convergence properties, sparsity techniques, handling Quax violations in constant matrix, inclusion in frequency effects AVR in load flow, handling of discrete variable in load flow 	ce properties, sparsity techniq , inclusion in frequency effects rete variable in load flow	lues, handling s	. 0
Unit 2	 Fault Analysis: Simultaneous faults 			C02
	generalized method of fault analysis	İS		
Unit 3	 Security Analysis: Security state diagram, contingency analysis, generator shift, distribution factors 	agram, contingency analysis,	generator shift,	CO3
	 line outage distribution factor, multiple line outages overload index ranking 	tiple line outages		
Unit 4				CO3
Unit 5	State Estimation: Sources of errors in measurement	in measurement		CO3
	 Virtual and Pseudo 			
	 Measurement, Observability 			
	WSL method, bad data correction.			
Unit 6	 Voltage Stability: Voltage collapse 			C04
	 P-V curve, multiple power flow solution 	lution		
		nultiplies load flow		
Text Books	Voltage collapse proximity indices			
1. J.J. C	. J.J. Grainger & W.D. Stevenson, "Power system analysis", McGraw Hill ,2003	lysis", McGraw Hill ,2003		
2. L.P.	L.P. Singh, "Advanced Power System Analysis and Dynamics", New Age International,	Dynamics", New Age Internat	ional, 2006.	
Reference Books	Books			
	A. R. Bergen & Vijay Vittal, "Power System Analysis", Pearson, 2000			
	A. I. Wood "Power generation operation and control" John Wiley 1004	s", Prentice Hall India, 1986		
D M	P.M. Anderson "Faulted nower system analysis" IEEE Brook 1994	EEE Brace 1005		
Con -	ks			
1. https	https://onlinecourses.nptel.ac.in/noc19_ee62/preview_Power System Analysis,	view Power System Analysis,	IIT Kharagpur	
2. https	https://www.coursera.org/learn/electric-nower-systems			

Chairman Bos

CO 4	CO3	CO2	CO 1	PO →
2	2	1	2 .	PO 1
3	2	3	2	PO 2
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2	1	1	1	PO 4
1	1	2	3	PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern (with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	ı	1	5	5	5	5	MSE
20	1	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

aching Scheme ctures 03 Hrs/week ttorials - tal Credits 03 tal Credits 03 Demonstrate the modellii O2 Construct models for ind O3 Derive and interpret flux O4 Analyse the behaviour of concepts nit 1 Synchronous Machi Park's Transforn Flux-linkage equ nit 2 Voltage and curr Formulation of S Equivalent circu nit 3 Synchronous machi Ext Books P. Kundur, "Power System Stabil E.W. Kimbark, "Power system s eful Links P. M. Anderson & A. A. Fouad https://nptel.ac.in/~siva/2			Government College of Engineering, Karad	ad		
PS2102: Power System Dynamics Examination Scheme		First	Year M. Tech (SEM-I) in Electrical Power	Systems		
### Rectangle Examination Scheme Examination Scheme 3 Hrs/week MSE 20 MSE			PS2102: Power System Dynamics			
3 Hrs/week MSE 20 3 Signal MSE 20 3 Signal	Teachir	lg Scheme	Exami	ination Schem	e	
a lichonous Machines, Control Systems s (CO): Students will be able to trate the modelling of synchronous machine in details system the behaviour of function motors and assess their dynamic behaviour Ind interpret flux-linkage equations for synchronous machines under different operating conditions using per unit systems CO1 Flux-linkage equations Synchronous Machines: Per unit systems Park's Transformation (modified) Flux-linkage equations Voltage and current equations Formulation of State-space equations Synchronous machines Synchronous machines CO1 Equivalent circuit. Sub-transient and transient inductance and Time constants, Simplified models of synchronous machines Small signal model: Introduction to frequency model. Excitation systems and Philips-Heffron model PSS Load modelling Modelling of Induction Motors Prime mover controllers. CO2 Excitation system System Control and Stability", Galgotia, New Delhi, 1981 J Blalek& J. R. W. Bumby, "Power System Dynamics and Stability", John Wiley & Sons, 1997 J Blalek& J. R. W. Bumby, "Power System Dynamics and Control, IIT Bombay iitip.ac.in/~siva/2/021/ee549/index.html JECONORIES (1994).	Lecture		MSE		20	
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3	1	-	1		PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20	,	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

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PO 4	PO3	PO 2	PO I	PO→

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	-	1.	5	5	5	- 5	MSE
20	ı	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Teaching Scheme Lectures O3 Hrs/week Lectures COI Electrical Dwer System Fundamentals, Analog and Digital Electronics, Signals and Systems COIPS Outcomes (CO) Students will be ability to use them propelly CO2 Test Knowledge of working of multi-level VSIs, DC-DC switched mode converters, cyclo-converters CO3 Defend use of power conditioners and their applications CO4 Design power electronic systems CO4 Design power electronic systems CO5 Posace States CO6 Hours CO7 Design power electronic systems CO7 Design power electronic systems CO8 Power System Fundamentals, Analog and Digital Electronics, Signals and Systems and Heir applications CO9 Design power electronic systems Litit 1 Power Electronics systems Litit 2 Power System Fundamentals, Analog and Digital Electronics and Electronics and UPS. Unit 5 An overview of PSDs and their applications CO9 Design aspects of converters, multi-pulse diode rectifier, multi-pulse CO9 O8 Unit 6 Power Controllers (Cyclo-converter) Diode elamped multilevel inverters CO9 O8 Unit 6 Power Electronics and UPS. CO9 O8 Unit 6 Power Electronics and UPS. CO9 O8 Unit 6 Power Converters and drives and elicusis an		0011101101	oon onto	000000000000000000000000000000000000000			ndustries	2
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First Year M. Tech (SEM-I) in Electrical Power Systems	Hours	CO			Course Contents			
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Teaching Scheme Lectures O3 Hrs/week Total Credits Signals and Systems CO01 CO02 Test Knowledge of working of multi-level VSIs, DC-DC switched mode converters, cyclo-converters First Year M. Tech (SEM-I) in Electrical Power Systems PS2123: High Power Converter (Elective I) Examination Scheme Examination Scheme Examination Scheme Examination Scheme Examination of Ese 20 Duration of ESE 02 Hrs 30 Min Duration of ESE 02 Hrs 30 Min Duration of ESE 03 Hrs/week ESE 04 Hrs 30 Min Duration of ESE 05 Hrs 30 Min Duration of ESE 06 Hrs 30 Min Duration of ESE O2 Hrs 30 Min					conditioners and their applications	nd use of power	Defe	CO3
First Year M. Tech (SEM-I) in Electrical Power Systems PS2123: High Power Converter (Elective I) Teaching Scheme Lectures	S.	-converter	ers, cyclo-	d mode converte	orking of multi-level VSIs, DC-DC switche	Knowledge of w	Test	C02
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Government College of Engineering, Karad			S	Power Systems	t Year M. Tech (SEM-I) in Electrical I	Firs		
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CO 2	3	2	3	
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1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	T	ı	5	. 5	5	5	MSE
20	ı	4	4	4	4	4	ISE
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		https://online.stanford.edu/courses/xeiet/200-planning-sustainable-future-wind-water-and-sun	https://online.stanford.e	2.
		rg/learn/wind-energy	https://www.coursera.org/learn/wind-energy	-
			Usefullinks	Use
	esign and	James F.Manwell, Jon G.McGowan, Anthony L Rogers, "Wind energy explained: Theory Design and Application", John Wiley and Sons 2nd Ed, 2010	James F.Manwell, Jon of Application", John Wile	3.
		Roger A.Messenger, Jerry Ventre, "Photovoltaic System Engineering", 3rd Ed, 2010	Roger A.Messenger, Je	2.
ber	rators", October	han, "Distributed Generation: Induction and Permanent Magnet Generators.	Loi Lei Lai, Tze Fun Chan, 2007, Wiley-IEEE Press.	÷
			Reference Books	Refe
Wiley	July 2011,	Math H.Bollen, Fainan Hassan, "Integration of Distributed Generation in the Power System", July 2011, Wiley —IEEE Press	Math H.Bollen, Fainan —IEEE Press	2.
Ed.	logies", 2nd Ed.	RanjanRakesh, Kothari D.P, Singal K.C, "Renewable Energy Sources and Emerging Technologies", Prentice Hall of India ,2011	RanjanRakesh, Kothari D.P Prentice Hall of India ,2011	-
			xt Books	Text
		S	•	
06	CO 4	Economics of Distributed Generation	Unit 6 • Economics	Uni
08	CO 3	Transmission System Operation Protection of Distributed Generators	Unit 5 • Transmissio • Protection o	Uni
		Power Quality Disturbances	۰	
80	CO 2	Impact of Distributed Generation on the Power System	Unit 4 • Impact of D	Uni
06	CO 2	Power Electronic Interface with the Grid	Unit 3 • Power Elect	Uni
		Geothermal Energy, Biomass and Fuel Cells.	Geothermal	
80	CO 1	Introduction to Solar Energy, Wind Energy, Combined Heat and Power Hvdro Energy. Tidal Energy. Wave Energy	Unit 2 Introduction Hydro Ener.	Uni
		Internal Combustion Engines.	 Internal Cor 	
06	C0 1	Introduction, Distributed vs Central Station Generation Sources of Energy such as Micro-turbines	Unit 1 • Introduction • Sources of I	Uni
Hours	CO	Course Contents		
	systems	Formulate economic analyses and develop strategies for optimizing distributed generation systems	CO4 Formulate economic	CC
	stems	Analyse and propose solutions for power quality disturbances in distributed generation systems	CO3 Analyse and propose	CC
		Synthesize the impact of distributed generation on power systems and grid interface:	CO2 Synthesize the impa	CC
		Evaluate diverse energy sources for distributed generation systems	CO1 Evaluate diverse ene	CC
		ents will be able to	Course Outcomes (CO): Students will be able to	Cou
	/stems	Prerequisite: Renewable energy sources, Energy Conversion Technique, fundamentals of power systems	erequisite: Renewable ener	Pre
	02 Hrs 30 Min	Duration of ESE 07		
		ESE 60	Total Credits 03	Tota
		ISE 20	Tutorials 00 Hrs/week	Tuto
		MSE 20	Lectures 03 Hrs/week	Lect
		Examination Scheme	Teaching Scheme	Tea
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		rst Year M. Tech (SEM-I) in Electrical Power Systems	First	
		Government College of Engineering, Karad		

CO 2	CO I	PO→ CO↓
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2	2	PO 2
3	2	PO 3
2	1	PO 4
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CO 4	CO3
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1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

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TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	I		. 5	5	5	5	MSE
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CO2 CO3 CO3 CO4			лепі, Ат	Distribution, Energy Manage	plied to Distribution Automation	techniques app		
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Covernment College of Engineering, Karad				Monitoring	ency in electrical distribution &	Energy efficie		
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 James Norman,

Useful Links

 https://www.coursera.org/learn/electrical-power-distribution

https://www.udemy.com/course/electrical-power-distribution-course/ James Momoh, "Electric Power Distribution, automation, protection & control", CRC Press Course

CO 4	CO 3	CO 2	COI	CO↓	PO →
2	3	3	2		PO 1
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2	2	3	2		PO3
1	2	1	1		PO 4
2	3	2	1		PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5 .	5	5	MSE
20		4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

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Chairman Bos

CO 4	CO 3	CO 2	CO 1	CO↓	PO →
2	3	. 3	2		PO 1
2	2	2	2		PO 2
2	3	2	_		PO3
1	2	1	1		PO 4
2	3	2	1		PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	-	-	5	5	5	5	MSE
20	_	4	4	4	, 4	4	ISE
60	10	10	10	10	10	10	ESE
	20 20	20 20	20 20	5 4 - 4 20 20	5 4 5 4 	5 4 5 4 5 4 - 4 20 20	5 4 5 4 5 4 5 4 5 4 20 20

Chairman Bos

by Daniel J. Hanna Bonnon	porcino, Diconio Dinoco	(Posico)	iala Dynamias	Sustante Valia Demanta (Paria)
-	stems Electric Drives	Prerequisite: Flectrical Machines, Power Electronics, Control Systems, Electric Drives, Rattery	Flectrical Macl	Prerenticite.
02 Hrs 30 Min	Duration of ESE 02 Hrs 30 Min			
60	ESE		03	Total Credits
20	ISE		ı	Tutorials
20	MSE		03 Hrs/week	Lectures
me	Examination Scheme		me	Teaching Scheme
	icles (Elective II)	PS2134: Electrical and Hybrid Vehicles (Elective II)	P	
	ical Power Systems	First Year M. Tech (SEM-I) in Electrical Power Systems	Firs	
	ering, Karad	Government College of Engineering, Karad		

200	Course
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Course Outcomes (
	(CO):
- J 1 -	(CO): Students will be able to
2	will
	be ab
	le to
-	

			300ks	Text Books
		strategies		
		different energy management strategies Implementation issues of energy		
		 Classification of different energy management strategies Comparison of 		
		electric vehicle		
(06)	C04	 Introduction to energy management and their strategies used in hybrid and 		Unit 6
		 Communications, supporting subsystems 		
		energy storage technology		
		 Sizing the propulsion motor, sizing the power electronics Selecting the 	<u> </u>	
(08)	CO1	 Matching the electric machine and the internal combustion engine (ICE) 	01	Unit 5
		Motor drives, drive system efficiency		
		Switch Reluctance		
		control of Permanent Magnet Motor Drives Configuration and control of		ľ
		 Configuration and control of Introduction Motor drives configuration and 		
		 Configuration and control of DC Motor drives 		
(08)	CO ₃	 Introduction to electric components used in hybrid and electric vehicles 	-	Unit 4
		 Fuel efficiency analysis. 		
		 Power flow control in hybrid drive-train topologies 		3
		 Introduction to various hybrid drive-train topologies 		
(06)	CO2	 Basic concept of hybrid traction, 		Unit 3
		Fuel efficiency analysis.		
		 Power flow control in hybrid drive-train topologies 		
		 Introduction to various hybrid drive-train topologies 		
(08)	COI	 Basic concept of hybrid traction, 	19	Unit 2
		Mathematical models to describe vehicle performance		
		Basics of vehicle performance, vehicle power source		8
		 Impact of modern drive-trains on energy supplies 		
		 Social and environmental importance of hybrid and electric vehicles 		
(08)	C01	 History of hybrid and electric vehicles, 		Unit 1
Hours	CO	Course Contents		
ehicles	ectric v	Design and present comprehensive strategies for energy management in hybrid and electric vehicles	De	CO4
		Synthesize mathematical models to describe vehicle performance and power sources		CO3
		Evaluate the societal and environmental significance of hybrid and electric vehicles	E	CO2
		electric vehicles.	ele	
d	brid an	Acquire knowledge about fundamental concepts, principles, analysis and design of hybrid and		COI
		Course Outcomes (CO): Students will be able to	e Out	Cours

1. Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, "Sliding mode control of switching Power Converters" 1. https://intellipaat.com/electric-vehicle-course-iit-roorkee/?utm_source=google&utm_medium=search&utm_term=course%20hvbrid%20and%20electric%20vehicles&utm_campaign=s_iitr_ev_in&gclid=EAIaIQobChMIs5m72MXCgAMV5SqDAx3tcgf1EAAYASAAEgJxHvD_BwE 2. https://www.mygreatlearning.com/pgp-electric-vehicle-design-online-course%utm_source=search&utm_medium=gc9302765&utm_campaign=evd_course-ph-south-ser-lead-pr-pgp_evd&campaign_id=17478854335&adgroup_id=136608836337&ad_id=628213287075&utm_target=kwd-295304205529&Keyword=electric%20vehicle%20training&placement=&gclid=EAIaIQobChMIs5m72MXCgAMV5SqD Ax3lcgf1EAAYAiAAEgLhTPD_BwE 3. https://www.udemv.com/course/electric-hybrid-vehicle-certification-program/? =&utm_source=adwords&utm_medium=udemyads&utm_campaign=LongTail_la_EN_cc.INDIA&utm_content=deal4584 &utm_term=_ag_118445032537_ad_618853564450_kw_de_c_de_c_dm_pl_ti_dsa- 1212271230479_li_9302765_pd&matchtype=&gclid=EAIaIQobChMIs5m72MXCgAMV5SqDAx3tcgf1EAAYBC	1.
1. Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, "Sliding mode control of Useful Links 1. https://intellipaat.com/electric-vehicle-course-iit-roorkee/?utm_source=google&utm_medium=search&utm_term=course%20hybrid%20arcampaign=s_iitr_ev_in&gclid=EAlalQobChMls5m72MXCgAMV5SqDAx3tcgf1EAAY/ 2. https://www.mygreatlearning.com/pgp-electric-vehicle-design-online-course?&utm_source=search&utm_medium=gc9302765&utm_campaign=evd_course-phpgp_evd&campaign_id=17478854335&adgroup_id=136608836337&ad_id=6282132870 295304205529&Keyword=electric%20vehicle%20training&placement=&gclid=EAlalQoAx3tcgf1EAAYAiAAEgLhTPD_BwE 3. https://www.udemy.com/course/electric-hybrid-vehicle-certification-program/?e&utm_source=adwords&utm_medium=udemyads&utm_campaign=LongTail_la.EN_ccampaign=LongT	Rel
1. https://intellipaat.com/electric-vehicle-course-iit- roorkee/?utm_source=google&utm_medium=search&utm_term=course%20hybrid%20ar campaign=s_iitr_ev_in&gclid=EAlalQobChMIs5m72MXCgAMV5SqDAx3tcgf1EAAY/ 2. https://www.mygreatlearning.com/pgp-electric-vehicle-design-online- course?&utm_source=search&utm_medium=gc9302765&utm_campaign=evd_course-ph pgp_evd&campaign_id=17478854335&adgroup_id=136608836337&ad_id=6282132870 295304205529&Keyword=electric%20vehicle%20training&placement=&gclid=EAlalQo Ax3tcgf1EAAYAiAAEgLhTPD_BwE 3. https://www.udemy.com/course/electric-hybrid-vehicle-certification-program/? =&utm_source=adwords&utm_medium=udemyads&utm_campaign=LongTail_la.EN_cc &utm_term=_ag_118445032537_ad_618853564450_kw_de_c_dmplt 1212271230479_li_9302765_pd_&matchtype=&gclid=EAlalQobChMIs5m72MX	1.
	Use
	2.
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AAEOIOOPD RWE	

PO →	PO 1	PO 2	PO3	PO 4	PO 5
СО↓					
CO 1	2	ယ	2	-	1
CO 2	1	2	ယ	1	1
CO3	w	1	1	2	သ
CO 4	2	2	2	_	2

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern (with revised Bloom's Taxonomy) .

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20		-	5	5	5	5	MSE
20	ı	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Chairman BoS

Eirst Year M. Tech (SEM-I) in Electrical P. RM2105: Research Methodology eaching Scheme rerequisite: Technical Writing, Data Analysis, Ethics in Research concerned to Engineering and related areas. CO2 Prepare a research proposal to investigate the problem and achieve co3 Develop skill of writing/publishing a research paper/lopic in conference of Engineering and related areas. Introduction: Meaning and objectives of research, Types of approaches, Research process, Research problem, Election of research problem, Literature review, Meta-analysis, Effect sizes free-green transcous variables, Experimental and control groups, interviews, Questionnaire surveys, Secondary data collection, Data of central tendency and dispersion, mean, median, mode, rang devaluton, interviews, and extraneous variables, Experimental and control groups, interviews, Questionnaire surveys, Secondary data collection, Data of central tendency and dispersion, mean, median, mode, rang devaluton, interviews, and dispersion, mean, median, mode, rang devaluton, interviews, and dispersion, mean, median, mode, rang devaluton, control groups. The search designs in exploratory studies, Experimental and control groups. In the propersion of research designs of central tendency and dispersion, mean, median, mode, rang devalutory studies, Experimental and control groups. In Research Design: Need for sampling, need, and features of good design. Data of central tendency and alternative hypothesis, Level of sign of central tendency studies, Experimental tendency studies, Research designs in Research designs in research designs. In Research designs in the propersion of ANOVA Table and calculation of F-ratio. Init 5 Effective Technical Writing: Research proposal, Techniques, Secondary Devalution, 2012 EX. Kolhari, "Research Methodology Methods and Techniques, Secondary Devalution, 2012 Ference Boolds EX. Experimental research Methodology A Step-By-Step Guide for Trochim, William M.K., "Research Methodology A Step-By-Step Guide for Trochim and the prop	Research		an, M. "Management lucation, New Delhi, 2006	Krishnaswamy, K. N., Sivakumar, Appa Iyer and Mathi Rajan, M. "Management Methodology:Integration of Principles, Methods and Techniques", Pearson Education, New Delhi, 2006	Krishnaswamy, K. N., Methodology:Integration of	4. Kris Meth
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology		3818495	ISBN:	of Intellectual Property", Asia	C. Kanakaia, 2012	
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology		, 2003	ew Delhi, 2nd Edition	Research Methods", Biztantra, Dream tech Press, N	him, William M.K., "9	-
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105; Research Methodology	Delhi	ucation, l	ginners", Pearson E	search Methodology- A Step-By-Step Guide for Be	it Kumar, (2006), "Re	1. Ranj
First Year M. Tech (SEM-I) in Electrical Power Systems RW2105: Research Methodology Examination Scheme 02 Hrs/week				Methodology	m I	Reference
First Year M. Tech (SEM-I) in Electrical Power Systems RMZ105: Research Methodology RMX105: Research Methodology BESE 02 - Hrs/week MSE 20 - Hrs/week Duration of ESE 20 - Hrs/week 20 - Hrs/week Duration of ESE 20 - Hrs/week 20			ion, 2024 (Unit 5, 6)	d Publication Ethics", 1" edition, Springer publication	Y adav,	-
CO1 Column College of Engineering, Karad		3)	lity", 2007 (Unit 2 &	& Runger, George C. "Applied Statistics & Probabi	gomery	
CO2 First Year M. Tech (SEM-1) in Electrical Power Systems RM2105: Research Methodology Examination Scheme 02 Hrs/week Examination Scheme Examination Scheme 02 Hrs/week Examination Scheme Examination Scheme Examination Scheme 02 Hrs/week Examination Scheme Examination Scheme 02 Hrs/week 20 MSE 20 ESE 60 ESE	national	ge	vised edition, New /	Methodology Methods and Techniques, Second re	Kothari, "Research Nisher, 2006 (Units 1 to	
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 ISE 20 ESE 60 Duration of ESE 02 Hrs 30 Min Ethics in Research ESE 02 Hrs 30 Min Ethics in Research areas, identify and define appropriate research ate the problem and achieve results/outcomes from the project.					ks	Text Boo
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 20 ISE 20 20 ESE 02 41 30 Min Ethics in Research. Duration of ESE 02 Hrs 30 Min Ethics in Research areas, identify and define appropriate research reas. Duration of ESE 02 Hrs 30 Min Examination Scheme 20 ISE 20 ESE 00 Duration of ESE 02 Hrs 30 Min Ethics in Research areas, identify and define appropriate research reas. Duration of ESE 02 Hrs 30 Min Examination of EsE 02 Hrs 30 Min Ese 02 Hrs	O1	C04	Licensing	Patents, Trade and Copyright, Process of patenty, Geographical indications. New developments in	transfer of technolog	Unit 6
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20			ůα	ication Ethics: Plagiarism, Citation, Journal induals, research ethics, principals and practice.	Research and publ publishing. SCI journ	
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 ISE 20 ISE 20 ISE 20 ESE 60 Duration of ESE 02 Hrs 30 Min Ethics in Research areas, identify and define appropriate research ate the problem and achieve results/outcomes from the project. ellectual Property Right, Patent rights.	Si	C03	ting, Review paper,	Writing: Research proposal, Technical Paper wri	Effective Technical Report writing, Refer	Unit 5
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 20 ISE 20 20 ISE 20 20 ESE 60 ESE 60 ESE 20 ESE	On .	C02	cance, Type I and ypothesis testing,	Null and alternative hypothesis, Level of signification and one-tailed tests, Procedure of help A Table and calculation of F-ratio.	Hypothesis Testing type II error, Two-1 Preparation of ANOV	Unit 4
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 MSE 20 ISE 20 Duration of ESE 02 Hrs 30 Min Ethics in Research areas, identify and define appropriate research areate the problem and achieve results/outcomes from the project.			teps in sampling,	r sampling, Population, Normal distribution, S sampling, measurement techniques.	Sampling: Need for sample size, errors in	
College of Engineering, Karad (SEM-I) in Electrical Power Systems Examination Scheme Examination Scheme MSE 20 ISE Duration of ESE 20 ESE 02 Hrs 30 Min Ethics in Research Ethics in Research areas, identify and define appropriate research reas. Ethics in Research and achieve results/outcomes from the project. esearch paper/topic in conferences and reputed journals. Ellectual Property Right, Patent rights. Ourse Contents Ves of research, Types of research, Research problem, Selection of research problem, defining Meta-analysis, Effect sizes, Integrating research paper, Errors in research. Base troop of the Advisor Department industrial and condary data collection, Data processing, Measures mean, median, mode, range, variance, standard and condary data collection through observations and condary data collection, Data processing, Measures mean, median, mode, range, variance, standard and condary data collection through observations and condary data collection, Data processing, Measures mean, median, mode, range, variance, standard and collection through observations and condary data collection data collection through observations and condary data collection	v	202	seriptive studies,	ables, Experimental and control groups, Treatmesters, Experimental and control groups, Treatmexploratory studies, Research designs in dechargement	and extraneous variances are Research designs in Experimental research	OHLO
College of Engineering, Karad (SEM-I) in Electrical Power Systems Examination Scheme MSE ISE ISE Duration of ESE O2 Hrs 30 Min Ethics in Research. Ethics in Research ate the problem and achieve results/outcomes from the project. Esearch paper/topic in conferences and reputed journals. ellectual Property Right, Patent rights. ourse Contents ves of research, Types of research, Research problem, Selection of research problem, defining Meta-analysis, Effect sizes, Integrating research problem, defining Meta-analysis, Effect sizes, Integrations and ondary data collection through observations and collection, Data processing, Measures			variance, standard	and dispersion, mean, median, mode, range, tile range, histogram.	of central tendency deviation, inter-quar	
College of Engineering, Karad (SEM-I) in Electrical Power Systems Examination Scheme MSE ISE ISE ISE O20 ESE Duration of ESE O2 Hrs 30 Min Ethics in Research. Ethics in Research Ethics in Resea	4	C01	00	data collection y data collection,	Data Collection an interviews, Question	Unit 2
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20	4	C01	esearch, Research problem, defining tegrating research	ning and objectives of research, Types of reprocess, Research problem, Selection of research terature review, Meta-analysis, Effect sizes, In on of Research gaps, Errors in research.	approaches, Research research problem, Lifindings, identificati	Unit 1
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20	Hours	СО		Course Contents		
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme 20 MSE 20 ISE 60 ESE 02 Hrs 30 Min Ethics in Research. Ethics in Research areas, identify and define appropriate research are the problem and achieve results/outcomes from the project. esearch paper/topic in conferences and reputed journals.			rights.	ormation about Intellectual Property Right, Patent	Illustrate need of inf	C04
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme MSE 1SE 20 ISE 20 ESE 40 Uration of ESE 20 Ethics in Research. Ethics in Research. Ethics in Research. Ethics in Research.		O1	es and reputed journa	ing/publishing a research paper/topic in conference	Develop skill of writer	CO3
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme MSE MSE ISE ESE Duration of ESE Duration of ESE Duration of ESE Ethics in Research. Ethics in Research Essearch areas, identify and define appropriate research		8	Its/outcomes from th	conosal to investigate the problem and achieve results.	Prepare a research n	CO2
College of Engineering, Karad (SEM-I) in Electrical Power Systems 5: Research Methodology Examination Scheme MSE ISE 20 ISE ESE 60 Duration of ESE 02 Hrs 30		research		us research areas, identify	Understand basic c	C01
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology Column				g, Data Analysis, Ethics in Research.	site: Technical Writin	Course C
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology heme 02 Hrs/week Hrs/week 02 ESE ROVERNMENT College of Engineering, Karad RM2105: Research Methodology Examination Schem MSE ESE		30	ESE 02			
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology Scheme Examination Scheme MSE Hrs/week ISE			60	ESE		Total Cre
First Year M. Tech (SEM-I) in Electrical Power Systems RM2105: Research Methodology Scheme Examination Scheme			20	ISE	Hrs/week	Tutorials
First Year M. Tech (SEM-I) in Electrical RM2105: Research Methodok			mation Seneme	MSE	Denen	Lectures
First Year M. Tech (SEM-I) in Electrical Power Systems			ingtion Scheme	KIVIZIUS: Kesearcii Metilodology		Teachine
Government College of Engineering, Karad			r Systems	t Year M. Tech (SEM-1) in Electrical Powe	HIIS	
			2 2	Government College of Engineering, Kai		



Ų, 3 12 Useful Links http://www.palgrave.com/choosing-appropriate-research-methodologies https://www.explorable.com/research-methodology http://www.socscidiss.bham.ac.uk/methodologies.html http://www.humanities.manchester.ac.uk/studyskills/methodology.html Donald R. Cooper, Pamela S. Edition,2006 Schindler, "Business Research Methods", Tata McGraw-Hill Co. Ltd., 8th

Mapping of COs and POs

PO → CO 1 CO 2	PO 1	PO 2 3	P	PO 3	O3 PO4
CO 2	2	2			. 2
CO3	2	3			. 2
CO 4	٥	ယ			S

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20	1	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

001, 002, 003	ability to	whedge, and the	experience and theoretical understanding of various renewable energy sources, technologies, and their applications. The course aims to develop analytical skills, practical knowledge, and the ability to design innovative solutions in the field of renewable energy.	experience and theoretical understar technologies, and their applications. The course aims to develop analy design innovative solutions in the fi	experience a technologies The course design innov
CO			Course Contents		Minimum o
esses a real-	em that addr	wable energy syst	Design and create an innovative and sustainable renewable energy system that addresses a real-world energy challenge.	Design and create an innworld energy challenge.	CO3 De
ical methods and	using statist	e energy systems,	Weigh the performance data obtained from renewable energy systems, using statistical modelling techniques	Weigh the performan modelling techniques	CO2 We
tions.	tal considera	s and environmen	suitable option based on specific energy requirements and environmental considerations.	table option ba	
elect the most	. wind and s	irces, such as solai	Analyse and evaluate different renewable energy sources, such as solar, wind and select the most	alyse and eval	CO1 An
			Course Outcomes (CO): Students will be able to	omes (CO):Stu	Course Outc
				Techniques	Conversion Techniques
Energy	gy Systems, I	Renewable Energ	Prerequisite: Basic Electrical Engineering, Power Electronics, Renewable Energy Systems, Ene	Basic Electric	Prerequisite:
	03 Hrs	Duration of ESE	^	04 Hrs/week	Practical's
	25	ESE		02	Total Credits
	25	ISE		Hrs/week	Tutorials
	1	MSE		1	Lectures
	eme	Examination Scheme		ieme	Teaching Scheme
		Laboratory	PS2106: Renewable Energy Laboratory		
	tems	ctrical Power Sys	First Year M. Tech (SEM-I) in Electrical Power Systems	· 国	
		neering, Karad	Government College of Engineering, Karad		

	CO 2 1	CO 1 2	PO → PO 1	9 00 000
2	2	2	PO 2	
2	2	1	PO 3	
1	_	_	PO 4	
_	2	3	PO 5	

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Chairman BoS Electrical Engineering Department

mme

		Government College of Engineering, Karad	
	First	First Year M. Tech (SEM-I) in Electrical Power Systems	
		PS2107: Advance Simulation Laboratory	
Teaching Scheme	me	Examination Scheme	
Lectures	1	MSE	
Tutorials	Hrs/week	ISE 50	
Total Credits	02	ESE	
Practical's	04 Hrs/week	Duration of ESE 02 Hrs	s 30 Min
Prerequisite:I	rogramming Fu	Prerequisite: Programming Fundamentals, Power System, Control Systems, MATLAB/Simulink,	nk,
Computational Methods	l Methods		×*2
Course Outcor	Course Outcomes (CO): Students will be able to	ts will be able to	
CO1 Anal syste	yse simulation ms, employing	Analyse simulation results to evaluate the performance, stability, and behaviour systems, employing MATLAB, PSIM, ANSYS software's	ur of electrical
CO2 Criti	cally assess th nmendations fo	Critically assess the impact of parameter variations on system responses and make informed recommendations for system optimization.	make informed
CO3 Deve	elop advanced ty to model and	Develop advanced simulation models that integrate multiple software tools, dem ability to model and solve real-world problems.	monstrating the
		Course Contents	CO
Minimum 8e comprehensiv of electrical lanalyze, and	e understanding ower system.	Minimum 8experiments on suitable computational platform to provide students with a comprehensive understanding of various simulation techniques and software tools in the field of electrical Power system. The course aims to equip students with the skills to model, analyze, and optimize complex systems and solve practical engineering problems using	C01, C02, C03
advanced simi	advanced simulation methods		

CO3	CO 2	CO 1	PO → CO↓
2	. 1	2	PO 1
2	. 2	2	PO 2
2	2	1	PO 3
	_	. 1	PO 4
_	2	w	PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Chairman BoS Electrical Engineering Department

numer

4	CO2,	data recovery, Data Storytelling and Data journalism.	Onito
∞	CO3,	Decision Analysis: Formulating Decision Problems, Decision Strategic the without Outcome Probabilities, Decision Trees, The Value of Informulating Decision Making.	Unit 5
10	CO1, CO3		Unit 4
9	CO 1, CO 3		Unit 3
∞	CO1,CO2, CO 4	Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.	Unit 2
9	CO 1, CO 4	Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.	Unit 1
Hours	СО	4 Develop, report, and analyse business data. Course Contents	C04
	t managerial		CO3
n the	ships between the		C02
		se Outcomes (CO):Students will be able to 1 Judge role of business analytics within an organization.	Course CO1
	ramming	Prerequisite: Statistics, Probability and Random Processes, Linear Algebra, Calculus, Programming Fundamentals.	Funda
	30 Min	Duration of ESE 02 Hrs	1 0121
		Hrs/week ISE	Tutorials
		03 Hrs/week	Lectures
		Scheme	Teaching
		OE2118: Business Analytics	
		Government College of Engineering, Karad	
		TOTAL	

Chairman Bos

	C04	
Tex	Text Books	
-	Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G.	
	Schniederjans, Christopher M. Starkey, Pearson FT Press.	
Ref	Reference Books	_
<u>}\</u>	1. Business Analytics by James Evans, persons Education.	
Use	Useful Links	
jesek.	https://www.edx.org/learn/business-analytics	
2.	https://www.coursera.org/specializations/business-analytics	
س	https://www.coursera.org/specializations/business-analytics?utm_source=gg&utm_medium=sem&utm_campaign=B2C_INDIA_google-cybersecurity-certificates_PMax-	
	arte- NRL_within_14D&utm_content=B2C&campaignid=20361657342&adgroupid=&device=c&keyword=&matchtype=&net work=x&devicemodel=&adpostion=&creativeid=&hide_mobile_promo&gclid=EAIaIQobChMIwLqD_MXCgAMVa5pm	

Ah2G2QxvEAMYAyAAEgLI5_D_BwE

CO 4 2	CO3 3	CO 2 3	CO 1 2	CO↓
2	2	2	2	
2	2	ω	2	
1	2	_	1	
2	S	2	1	

1: Slight(Low)

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Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	ı	5	5	5	5	MSE
20	ì	4	. 4	4	4	4	ISE
, 60	10	10	10	10	10	10	ESE

				Sym	Text Books
			advantages of preventive maintenance. Repair cycle concept and importance	advan	
	CO 4	pment,	schedule of preventive maintenance of mechanical and electrical equipment,	sched	
	CO 3,	n and	III. Air compressors, iv. Diesel generating (DG) sets, Program	Pumps,	
4	CO 1,	ols, ii.	ocedure for periodic and preventive maintenance	Steps	Unit 6
			advantages of preventive maintenance.	advan	
		s and	electric motor, repair complexities and its use, definition, need, steps and	electr	
		dies of	, overhauling of electrical motor, common troubles and	comp	
	CO 4	nanical	cleaning and repairing schemes,	degreasing,	
6	CO3,	need,	Periodic and preventive maintenance: Periodic inspection-concept and need	Perio	Unit 5
			of faults in machine tools and their general causes.	of fau	
		Types	compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types	comp	
		iii. Air	thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air	therm	
		notive,	decision tree for problems in machine tools, hydraulic, pneumatic,automotive,	decisi	
	CO 3	, draw	and applications, sequence of fault-finding activities, show as decision tree, draw	and a	
8	CO1,	, need	Fault tracing: Fault tracing-concept and importance, decision tree concept, need	Fault	Unit 4
			affecting the corrosion. Types of corrosion, corrosion prevention methods.	affect	
		factors	Side feed lubrication, vii. Ring lubrication, Definition, principle and factors	vi. Si	
		ication	grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication	greas	
		essure.	ing and applications, i. Screw down s	gener	
	CO3	ethods,	tions, Lubricati	reduc	
6	CO 1,	, wear	sion and their prevention: Wear- types, causes, effects,	Wear	Unit 3
			life of equipment.	life o	
	CO 4	ervice	maintenance, Maintenance cost & its relation with replacement economy, Service	maint	
	2,	ed for	department, Types of maintenance, Types and applications of tools used for	depar	
	1C0	enance	engineering, Primary and secondary functions and responsibility of maintenance	engin	
8	CO	enance	Fundamentals of maintenance engineering: Definition and aim of maintenance	Funda	Unit 2
		(equipment and methods.	equip	
		ghting,	guarding, pressure vessels, etc, Safety colour codes. Fire prevention and firefighting,	guardi	
	CO 4	actories	nazards, types, causes and preventive steps/procedure, describe satient points of factories	nazaro	
«	CO 1,	ectrical	Industrial safety: Accident, causes, types, results and control, mechanical and electrical	Indust	Unit 1
Hours	CO		Course Contents		
			Design systematic fault-tracing approaches for diverse equipment	Design	CO4
			Evaluate corrosion prevention methods and wear reduction techniques	Evalua	CO3
			Synthesize strategies for effective maintenance engineering and equipment upkeep	Synthe	C02
			Analyse the causes, types, and consequences of industrial accidents and hazards	Analy	CO1
			Course Outcomes (CO):Students will be able to	Outcome	Course
		20, 1111	Studies, Basics of Electrical Engineering.	Basics of	Studies,
	ronmenta	ice Envi	anic.	esta ·Fn	Drarage
	30 Min	00 Hrs	Duration of ESE O		Total Credits
		00	115/ WCCN	+	Tatal
		00	ISE		Tutorials
		00	3 Hre/wook MCF	J. Comemic	I ACTURAC
		me		Schem	Teaching Scheme
			OF2 28: Industrial Safety		
			First Year M. Tech (SEM-I) in Electrical Power Systems		
			Government College of Engineering, Karad		

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Reference Books Useful Links Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services. https://www.udemy.com/course/industrial-safety-Maintenance Engineering, H. P. Garg, S. Chand and Company. AEgIwcfD BwE Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

Wapping of COs and POs

https://onlinecourses.nptel.ac.in/noc19_me40/preview

CO 4	CO3	CO2	CO 1	СО↓	PO →
2	3	3	2		PO 1
2	2	2	2		PO 2
2	2	ယ	2		PO3
_	2	1	1		PO 4
2	ယ	2	1		PO 5

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20		4	4	4	4	. 4	ISE
60	10	.10	10	10	10	10	ESE

Chairman BoS

Electrical Engineering Department

			https://www.classcentral.com/course/swayam-operations-research-14219	s://www.classcentral.cor	3. http
			https://www.coursera.org/learn/operations-research-theory	s://www.coursera.org/lea	2. http
			https://onlinecourses.nptel.ac.in/noc19_ma29/preview	s://onlinecourses.nptel.a	1. http
			Timopies of Operations Research, Figuree Hall of fildia 2010	INI W agiloi,	sef
			Harvey M Wagner Principles of Operations Research: Prentice Hall of India 2010	arvey M Wagner F	-
2			Hitler Libermann Operations Research: McGraw Hill Pub. 2009	tler Libermann Oper	3 Po
		2008	h, Jain Brothers, Delhi,	. Pant, Introductio	1.
				Reference Books	Refere
			H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.	M. Wagner, Principle	2. H.M.
				ooks	-EX
6	C04	search, olation	Numerical optimization: Non-linear programming - unimodal function, unrestricted search, Region elimination techniques, Fibonacci Method, Golden Section Methods, Interpolation Methods	Numerical optim Region elimination Methods	Unit 6
6	C03	Nonlinear	Single variable Optimization, Unconstrained multivariable optimization, Nonl programming with equality constraint, Nonlinear programming KKT conditions	Single variable programming wit	Unit 5
∞	CO1, CO3	ninistic	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	Scheduling and inventory models	Unit 4
6	CO 1, CO 3	ing by	Network representation of project, critical path, optimum scheduling of project.	CPM/PERT - Network 1 CPM, crashing of project.	Unit 3
∞	1C0 1C0 2, CO 4	- dual	Formulation of a LPP - Graphical solution revised simplex method - duality theory - simplex method - sensitivity analysis - parametric programming	Formulation of a simplex method -	Unit 2
∞	CO 1, CO 4	implex	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	Optimization Tec Techniques, Sens	Unit 1
Hours	СО		Course Contents		
			Model the real-world problem and simulate it.	Model the real-v	CO4
			tivity analysis	Formulate sensitivity analysis	CO3
			Execute the concept of non-linear programming	Execute the con	CO2
			Construct problems of discreet and continuous variables.	Construct proble	CO1
			Course Outcomes (CO): Students will be able to	Outcomes (CO):St	Course
	tals,	Fundamentals,	Numerical Methods, Optimization Techniques, Programming	Prerequisite:Linear Algebra, Engineering Mathematics	Prereq Engine
	30 Min	02 Hrs	Duration of ESE		
		60	ESE	redits 03	Total Credits
		20	ISE		Tutorials
		20	MSE	s 03 Hrs/week	Lectures
		me	Examination Scheme	ng Scheme	Teaching
			OE2138: Operations Research		
			First Year M. Tech (SEM-I) in Electrical Power Systems		
			Government College of Engineering, Karad		

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CO 4	CO3	CO 2	CO 1	CO↓	PO →
သ	. 3	3	ω		PO 1
2	2	3	ω		PO 2
1	2	3	2		PO3
2	ω	S	3		PO 4
2	1	3	2		PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	ı	ľ	5	5	5	5	MSE
20	I	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Chairman Bos

First Year M. Tech (SEM-1) in Electrical Power Systems	ν.		https://www.udemy.com/course/engineering-cost-management-course/	s://www.uder	2. http
CO2148: Cost Management of Engineering - Karad First Year M. Tech (SEM-I) in Electrical Power Systems OE2148: Cost Management of Engineering Project OS Hrs/week OS Hrs/week OS Hrs/week OS Hrs/week CO21 Analyse cost concepts and their role in decision-making processes Synthesize methodologies for effective project management and execution Course Contents Examinated cost management approaches for performance enhancement Course Contents CO3 Introduction and Overview of the Strategic Cost Management Process Design integrated cost management approaches for performance enhancement Course Contents CO4 Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and CO1, Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a CO2, Database for operational control; Provision of data for Decision-Making. Project meaning, Different types, why to manage, cost overruns centres, various stages of contents and contents. Project execution main clearances and documents Project execution as conglomeration of technical and non-Feelindial activities. Desiled Engineering activities, Proper execution main clearances and documents Project execution as conglomeration of technical and non-Feelindial activities. Project execution and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Volume-Profit Analysis. Project execution and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Breather, Scote Cost Questing of service sector. Lust-in-time approach, Material Requirement Planning, Enterprise Resource Planning. CO3 Various decision-making problems, Standard Costing and Variance Analysis. Octorical Costing and Variance Analysis. Pricing strategies: Pareto Analysis and Value-Chain Analysis. Budgetary Counties. CO3 Various decision-making for cost management. Linear Programming, PERT/CPM, CO4 Transportation pr			era.org/learn/scope-time-management-cost	s://www.cour	1. http
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CO CO CO	4	CO3		Total Qu	Unit 5
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CO 4	CO3	CO 2	CO 1	PO → CO↓
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3	2	3	2	PO 2
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2	1	1	1	PO 4
1	1	2	3	PO 5

1: Slight(Low)

2: Moderate (Medium)

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Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	ì	5	5	5	5	MSE
20	1	4	4	4	4	4 .	ISE
60	10	10	10	10	10	10	ESE

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Systems ation Scheme 20 20 60 100 Hrs 30 Min annace types criteria cro 1, criteria criteria cro 2, criteria criteria cro 1, criteria criteria cro 1, criteria criteria cro 1, criteria cro 1, cro 4 criteria cro 1, cro 3 tration – Liquid uitting, Braiding, cro 3 tration – Moulding cro 3 tration – Moulding cro 3 tration moulding.					es and applica	
Systems ation Scheme 20 20 20 20 20 20 20 2			ılding.	Reaction injection r	winding method - C	
Systems ation Scheme 20 20 60 100 ESE 02 Hrs 30 Min 100 ESE 100 ESE			ament	Autoclave method -	compounds and prepres	
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Systems Systems ation Scheme 20 20 60 100 FISE 02 Hrs 30 Min nance types criteria criteria criteria criteria CO 1posite materials. CO 1, reinforcement and co 4 applications of glass cations of glass cations of glass cation overall State diffusion CO 1, CO 4 cloop CO 4 cloop CO 3 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 3 criteria CO 3 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 3 criteria CO 4 criteria CO 3 criteria CO 3 criteria CO 4 criteria CO 4 criteria CO 4 criteria CO 5 criteria CO 6 criteria CO 7 criteria CO 7 criteria CO 8 criteria CO 9 criteria CO 1, CO 9 criteria C			alding,	applications.	Weaving. Properties and	
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Systems ation Scheme 20 20 60 60		CO 3	ations	Hot isostatic pressing Properties and applicat	technique. Cla	
Systems Systems ation Scheme 20 20 60 10f ESE 02 Hrs 30 Min nance types criteria CO 1posite materials. CO 1, reinforcement and ction) on overall cations of glass cations of glass dapplications of 2, CO 4 ule of mixtures. CO 1, CO 3	6	CO1,	fusion	 Solid State 	Manufacturing	Un
Systems ation Scheme 20 20 60 100 ESE 02 Hrs 30 Min nance types types criteria criteria criteria criton) on overall cations of glass cations of glass cations of glass cations of glass cod d applications of 2, cod cod, cod cod cod, cod						
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Systems ation Scheme 20 20 20 2	2	CO 1,	xtures.	Rule of mixtures, Inverse rule		Un
ation Scheme ation Scheme 20 20 60 n of ESE 02 Hrs 30 Min criteria types types types criteria criteria CO nposite materials. CO 1, reinforcement and criterial criteria cations of glass d applications of 1CO 2,		CO 4		Collicius.	willowers, particle relitio	
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Systems ation Scheme 20 20 60 10 GESE 102 Hrs 30 Min criteria	4		grass	vior fibres and Boron fibres. Properties and applications of	70 111	
ation Scheme 20 20 100 FESE 02 Hrs 30 Min 100 Criteria CO 1, reinforcement and criticals. CO 4 100 CO 4 100 CO 4 100 CO 4	_	3	2122	tion lower supporting and continue of	+	
ation Scheme 20 20 20 1 of ESE				Carry Carry Carry Carrotty Committee Assessed Carry	composite performance	
ation Scheme 20 20 10 of ESE 02 Hrs 30 Min nance types types criteria CO 1, reinforcement and CO 4			overall	ement (size. shape. distribution, volume fraction) on o	2	
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ation Scheme 20 20 20 1 of ESE						4
ation Scheme 20 20 60 1 of ESE 02 Hrs types criteria	Hours	CO		Course Contents	4	
Systems ation Scheme 20 20 60 0 Hrs nance types				systems based on strength and laminar failure criteria	_	0
Systems ation Scheme 20 20 60 1 of ESE 02 Hrs nance types				our and failure criteria of composite materials		0
Systems ation Scheme 20 20 60 n of ESE 02 Hrs				nethods and applications of diverse composite types		0
Systems ation Scheme 20 20 60 n of ESE 02 Hrs				forcement characteristics on composite performance		- 0
ation Scheme 20 20 60 n of ESE 02 Hrs				Il be able to	ourse Outcomes (CO):Students w	Cor
First Year M. Tech (SEM-I) in Electrical Power Systems OE2158: Composite Materials				chanics of Materials, Manufacturing Processes.	rerequisite: Materials Science, Me	D.C
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First Year M. Tech (SEM-I) in Electrical Power Systems OE2158: Composite Materials Scheme O3 Hrs/week Hrs/week ISE			60	ESE		Tot
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First Year M. Tech (SEM-I) in Electrical OE2158: Composite Materia			20	MSE	ectures 03 Hrs/week	Lec
First Year M. Tech (SEM-I) in Electrical Power Systems OE2158: Composite Materials			me	Examination Schen	eaching Scheme	Tes
First Year M. Tech (SEM-I) in Electrical Power Systems				OE2158: Composite Materials		
Government College of Engineering, Narrad				r M. Tech (SEM-I) in Electrical Power Systems	First Ye	
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https://onlinecourses.nptel.ac.in/noc19_me67/preview	https://engineering.purdue.edu/online/courses/mechanics-composite-materials	https://www.classcentral.com/course/swayam-introduction-to-composites-10005	https://www.udemy.com/course/composite-materials/	Useful Links	Composite Materials Design and Applications - Danial Gay, Suong V. Hoa, and Stephen W. Tasi	Composite Materials Science and Applications – Deborah D.L. Chung.

CO 4	CO3	CO2	CO 1	CO↓	PO →
2	2	2	2		PO 1
1	1	2	2		PO2
3	3	3	3		PO 3
1	1	_	1		PO 4
2	2	1	2		PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	. 5	5	5	MSE
20	ı	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

		https://onlinecourses.nptel.ac.in/noc20_ch16/preview	1. http:
		Tinke	Teeful Links
ıs,	Wiley & Sons,	Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley 1996.	2. Bi
	j		-
		Reference Books	Referen
II, Tata	Vol. I &	Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., McGraw Hill Publishing Co. Ltd., 1983.	2. B ₁
		nventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.	-
		ooks	Text Books
		programme in India.	
		Alcohol production from biomass - Bio diesel production - Urban waste to	
		- pyrolysis and liquetaction - biochemic	
4	CO4	processes - Thermo chemical convers	Unit 6
		- Biomass resources and their classification	
4	CO3	Biogas: Properties of biogas (Calorific value and composition) - Biogas plant	Unit 5
		above biomass combustors.	
		bed combustors, Design, construction and operation - Operation of all the	
(CO3		
∞	CO1.		Unit 4
		and electrical power – Equilibrium and kinetic consideration in gasifier	
		Gasifier burner arrangement for thermal heating — Gasifier engine arrangement	
6	CO1,	Biomass Gasification: Gasifiers – Fixed bed system – Downdraft	Unit 3
		yields and applications.	
٥	CO 4	Methods - Yields and application – Manufacture of pyrolytic oils and gases,	Z IIII
0	601 603	Demolysis: Demolysis Transcribert	Thit?
∞	CO1,	Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, dioestors	Unit 1
Hours	CO	Course Contents	
		Evaluate the properties and applications of biogas and its production technologies	C04
		Analyse biomass gasification technologies, operation, and equilibrium considerations	CO3
		Justify biomass pyrolysis processes, yields, and applications	CO2
		Differentiate various waste-to-energy conversion devices and their fuel sources	CO1 .
			Course
		sics.	Prerequ
	Hrs 30 Min	Duration of ESE 02	
		03 ESF	Total Credits
		Hrs/week ISE	Tutorials
		03 Hrs/week	Lectures
		Teaching Scheme Framination Scheme	Peachi
		First Vear M Toch (SFM-I) in Flectrical Power Systems	
		Government College of Engineering, Karad	

2. https://www.udemy.com/course/the-concept-of-waste/

S https://www.classcentral.com/course/swayam-waste-to-energy-conversion-7960

Mapping of COs and POs

CO 4	CO 3	CO 2	CO 1	PO → CO↓
2	2	1	2	PO 1
3	2	3	2	PO 2
1	1	1	2	PO 3
2	2	2	2	PO 4
3	2	3	3	PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20	ı	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Teaching Scheme PS2201i Digital Protection of Power System Examination Scheme MSE 20	1	ress 2009	tudies Pr	ms", Wiley/Research st	Thorp, "Computer Relaying for Power Systems", Wiley/Research studies Pr	A.G. Phadke and J. S. Th	i. Phad	1. A.C
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System Power System Examination Scheme 03 Hrs/week Sign 15							OKS.	Text Bo
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System	0	Ş	- * *		res based algorithms. Differential equation ferential Protection of Transformers. e Differential Protection.			
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System Digital Protection Digital Power System fundamentals	0				id first derivative (Mann and Morrison)			l'nit 6
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System Digital Protection Digital Stammatton Scheme Digital Protection, Power System Fundamentals Duration of ESE Digital Protection Duration of ESE Digital Protection Duration of ESE Duration o	»	CO3		and software	wave-based algorithms			Unit 5
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PS2201:Digital Protection of Power System heme 03 Hrs/week Examination Scheme 20 Hrs/week 2			ion	gnal aliasing ilog to digital conversi	n subsystem: the sampling theorem, signed and hold circuits, multiplexers, and	Error, sam	9 0	
PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System Day		COS	alog	n, analog filtering, ana	nditioning: transducers, surge protection		0	
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System	00	CO1,			nents of digital protection		9	Unit 4
PS2201:Digital Protection of Power Systems PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System					ires meth		9	
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PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System Examination Scheme O3 Hrs/week O3 Hrs/week O3 Hrs/week O3 Hrs/week D3 Hrs/week ESE O4 Duration of ESE O5 Hrs 30 Min Power System Protection, Power System fundamentals Power System Protection of digital relays Stify importance of Digital Relays Stify importance of Digital Relays Ply Mathematical approach towards protection Course Contents Evolution of digital relays from electromechanical relays Performance and operational characteristics of digital protection CO 1, CO 4	6	СО		ns	ical background to protection algorithn		0	Unit 2
PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System PS2201:Digital Protection of Power System Examination Scheme 20		CO 4		gital protection	ice and operational characteristics of di			
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Prince P				als		ower System	isite :F	Prerequ
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https://www.classcentral.com/course/swayam-power-system-protection-19974	https://archive.nptel.ac.in/courses/117/107/117107148/	https://onlinecourses.nptel.ac.in/noc22_ee46/preview	Useful Links	2. "L. P. Singh, "Digital Protection", John Wiley & Sons Inc	1. S. R. Bhide, "Digital Power System Protection" PHI	Reference Books

2	1	2	2	2	CO 4
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	1	2	2	2	CO 1
_	1	103	100	101	CO \

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

		, de 10	100			1.1	32
TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	. 5	. 5	5	5	MSE
20	ı	4	4	. 4	4	4	ISE
60	10	10	10	10	10	10	ESE ·

rerequisite :Control Systems, Power System Opera Old Apply analytical methods for modelling an Old Analytical Methods: Modelling & Idata processing, Real time monitoring usin It Analytical Methods: Modelling& Idata processing, Real time monitoring usin It Analytical Methods: Modelling& Idata processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit Analytical Methods: Modelling& Identifit data processing, Real time monitoring usin It Analytical Methods: Modelling& Identifit Analytical Methods: Mode				urthy	Power System Operation and Control—P.S.R.Murthy	
First Year M. Tech (SEM-III) in Electrical Power Systems PS202:Real Time Control of Power Systems Examination Scheme D3				Abolomobic Vothoni Aboom	ded System Analysis and Control	1
First Year M. Tech (SEM-III) in Electrical Power Systems PS202:Real Time Control of Power System Daration Systems			×		Co o	Refe
CO 4 First Year M. Tech (SEM.LI) in Electrical Power Systems				laand D.P. Kothari	In Electric Energy System—	_
CO First Year M. Tech (SEM-II) in Electrical Power System				wer System"		
First Year M. Tech (SEM-III) in Electrical Power System PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Band					xt Books	Text
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First Vaar M. Tech (SEM-II) in Electrical Power System P\$2202:Real Time Control of Power System P\$2202:Real Time Control of Power System		7.00	tion of	ons for loss minimization and restoration	distribution networks under normal condition	
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COVERIMENT COINCE COLOR		CO 4	tems.	ication of state estimation to power system	estimation of orthogonal decomposition, app	
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Examination Scheme		CO ₃	321	s of series and dynamic shunt compens	changing transformers, fundamental concept	
First Year M. Tech (SEM-II) in Electrical Power System PS2202:Real Time Control of Power System Examination Scheme	6	CO1,	ol, tap	able reactive power, excitation contro	Reactive	Unit
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Day			niod of	scheduling problems Michilieyers men	co-ordinate equation.	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System			mming	range and long range (Dynamic program	solution to hydro thermal scheduling, short i	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power Systems PS2202:Real Time Control of Power System Examination Scheme			hydro	heduling using linear programming,	Dynamic programming methods. Fuel sc	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power Systems PS2202:Real Time Control of Power Systems PS2202:Real Time Control of Power Systems Examination Scheme D3 Hrs/week CO Strudents SEE Co - Hrs/week SEE SEE SEE SEE - Hrs/week SEE SEE SEE SEE - Hrs/week SEE SEE SEE SEE SEE - Hrs/week SEE SEE			-James.	ods such as Dommeltinney, EL Abiad-	programming, Non-linear programming metl	
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Examination Scheme 03 Hrs/week Hrs/week 03 Hrs/week Hrs/week 03 Duration of ESE CO1:Students will be able to ply analytical methods for modelling and real-time monitoring of power system components aluate load frequency control strategies and their application using modern control theory and Al alyse optimal control techniques for economic dispatch and power flow optimization Sign and implement reactive power control strategies in power systems Course Contents CO1, alytical Methods: Modelling& Identification of power system components, Real time CO1, a processing, Real time monitoring using phasor measurement. CO4	×	6	control,	line bias control, flat frequency co		nıı
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Examination Scheme O3 Hrs/week Hrs/week 03 Hrs/week Control Systems, Power System Operation and Control comes (CO):Students will be able to ply analytical methods for modelling and real-time monitoring of power system component aluate load frequency control strategies and their application using modern control theory a alyse optimal control techniques for economic dispatch and power flow optimization sign and implement reactive power control strategies in power systems	Hours	CO		Contents	Course	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Examination Scheme O3 Hrs/week Hrs/week 03 Hrs/week 03 Control Systems, Power System Operation and Control comes (CO):Students will be able to ply analytical methods for modelling and real-time monitoring of power system component aluate load frequency control strategies and their application using modern control theory a alyse optimal control techniques for economic dispatch and power flow optimization				l strategies in power systems	-	CO
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System			ion	mic dispatch and power flow optimization		CO
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First Year M. Tech (SEM-II) in Electrical Power Systems		ıts	omponen	eal-time monitoring of power system co		CO
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System Examination Scheme 03 Hrs/week SE 20 Hrs/week ESE 60 On the Standard Sta				on and Control	erequisite: Control Systems, Power System Operation	Prer
First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System PS2202:Real Time Control of Power System Examination Schen O3 Hrs/week ISE ESE			02 Hrs	Duration of ESE		
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2202:Real Time Control of Power System			me	Examination Schen		Teac
First Year M. Tech (SEM-II) in Electrical Power Systems				e Control of Power System	PS2202:Real Time	
GOVERNMENT COHEGE OF ENGINEERING, NATAU				1-II) in Electrical Power Systems	First Year M. Tech (SEN	
THE REAL PROPERTY AND ADDRESS OF THE PROPERTY				ge of Dighteering, Narad	Government Com	

CO 4	CO3	CO 2	CO 1	PO → CO↓
2		2	2	PO 1
2	2	2	2	PO 2
2	2	2	. 2	PO 3
1	2	1	1	PO 4
2	1	2	1	PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	-	1	5	5	5	5	MSE
20	1	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

	T Court	Government College of Engineering, Karad		
	PS	PS2213: Restructured Power Systems (Elective III)		
Teachin	Teaching Scheme	Examination Scheme		
Lectures	03 Hrs/week	MSE 20		
Tutorials	1			
Total Credits	edits 03	60	N. C.	
Dropon	isita Dowar System Or	Provincitie Dower System Operation and Control Dower System Frommics	OO IMITAL OC	
Course (Outcomes (CO): Students will be able to	ts will be able to		
	Identify the need of re	Identify the need of regulation and deregulation.		
CO2	Define and describe the	Define and describe the Technical and Non-technical issues in Deregulated Power Industry.	try.	
CO3	Identify and give exam	Identify and give examples of existing electricity markets.		
C04	Classify different man	role of various entities in th	e market.	PE
			CO I	Hours
Unit 1	 Fundamentals of 	Fundamentals of restructured system		
	 Market architecture 		201	80
	 Load elasticity 		101	00
1000	 Social welfare maximization 	maximization		
Unit 2	 OPF: Role in v 	OPF: Role in vertically integrated systems and in restructured markets		90
	 congestion management 			90
Unit 3	 Optimal bidding 	1g		
	Kisk assessment			
	 Hedging 		CO2	80
	 Transmission pricing 	pricing		
	 Tracing of power 	wer		
Unit 4	 Ancillary services 			36
	 Standard market design 		CO3	80
	 Distributed ger 	Distributed generation in restructured markets		
Unit 5	 Developments in India 		Ź	20
	 IT applications 	IT applications in restructured markets	400	00
Unit 6	 Working of res 	ms	04	96
Total Dooler	0	PJM, Recent trends in Restructuring		
1. Lor	rinPhilipson, H. Lee Wil	LorrinPhilipson, H. Lee Willis, "Understanding electric utilities and de-regulation", Marcel Dekker Pub., 1998	ub., 199	
2. Ste	ven Stoft, "Power systen	Steven Stoft, "Power system economics: designing markets for electricity", John Wiley and Sons, 2002	02	
Referen	Reference Books			
1. Kar	Kankar Bhattacharya, Jaap E. Academic Pub., 2001	E. Daalder, Math H.J. Boolen, "Operation of restructured power systems",	, Kluwer	т
2 Ma	hammad Shahidehnour	Mohammad Shahidehnour Muwaffar Alomoush "Restructured electrical nower systems: operation trading and	tradina	and
	volatility", Marcel Dekker.	be the state of th	9	
Useful Links	inks			
1. http	s://archive.nptel.ac.in/co	https://archive.nptel.ac.in/courses/108/101/108101005/		
2. http	s://www.amrita.edu/cou	https://www.amrita.edu/course/restructured-power-system-optimisation/		

CO 4	CO 3	CO 2	CO 1	CO↓	PO →
. 3	3	3	3		PO 1
2	2	3	3.		PO 2
1	2	3	2		PO3
2	. 3	3	3		PO 4
2	1	3	2		PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	-	1	5	. 5	5	5	MSE
20	ī	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

First Year M. Teeh (SEM-II) in Electrical Power Systems					https://onlinecourses.nptel.ac.in/noc23_ee55/preview_	onlinecourses.nptel	https://	2.
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme PS2223: Dynamics of Machines (Elective III) Examination Scheme 03Hrs/week 04Hrs/week 03Hrs/week 03Hrs/week 04Hrs/week 03Hrs/week 03Hrs/week 04Hrs/week 04Hrs/week 05Hrs/week 05Hr					courses/108/106/108106023/	//archive notel ac in	httns:	-
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) Hrs/week Hrs/						S	eful Lin	S
First Year M. Tech (SEM-II) in Electrical Power Systems PS223: Dynamics of Machines (Elective III) PS223: Dynamics of Machines.				Butterworth, London. 1967	Theory of Electrical Machines", I	ones, "The Unified	C.V.J	çu
First Year M. Tech (SEM-II) in Electrical Power Systems PS223: Dynamics of Machines (Elective III) PS223: Dynamics of Machines (Elective III) PS223: Dynamics of Machines (Elective III) Hrs/week 03Hrs/week 04Hrs 30 Min Duration of ESE 02 Hrs 30 Min CO0 03 Hrs/week 04 Hrs 30 Min 15 Hrs/week 05 Hrs/week 06 Hrs/week 06 Hrs/week 06 Hrs/week 07 Hrs/week 08 Hrs/week 09 Hrs/s Avinding commutator machine 18 Hrs/week 19 Hrs/week 19 Hrs/week 19 Hrs/week 19 Hrs/wee			12.	Mac Millan Press Ltd. 199	ctrical Machine Dynamics", The	dia&S.A.Nasar,"Ele	.I.Bol	2.
Covernment College of Engineering, Karad				ill Book Company, 1987	Electrical Machines", McGraw H	raus, "Analysis of	.P.C.k	1.
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) Dynamical Machines, Control Systems, Dynamics, Mechanics of Materials Somes (CO): Students will be able to Prunulate Performance characteristics of machine. Electrical Machines, Control Systems, Dynamics, Mechanics of Materials Tomulate Performance and characteristics of machine. Complete voltage and torque equations for primitive 4-winding commutator machine erive and apply complete voltage Equation of Primitive 4 Winding Commutator Machine. Complete Voltage Equation, Analysis of Simple DC Machines using transformed equations. The Three Phase Induction Motor. Transformed Equations. Different Reference Frames for Induction Motor Analysis Transfer Function Formulation Three Phase Salient Pole Synchronous Machines. Dynamical Analysis of Interconnected Machines. Large Signal Transient Analysis using Transformed Equations. Large Signal Transient Analysis using Transformed Equations. Alternator/Synchronous Motor System. Alternator/Synchronous Motor System. CO2 Shaan "Electric Motor Drives, Modelling, Analysis, and Control", Pearson Education2001						sooks	ference I	Re
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week 05Hrs/week 06 07Hrs/week 07Hrs/week 08Hrs/week 09Hrs/so Machines, Dynamics, Mechanics of Materials 09Hrs/so Machine. 00Hrs/so Complete voltage and torque equations for primitive 4-winding commutator machine related to three-phase induction motors using transformed equations. 10Hrs/reach 10Hrs/reac			ication.,200	and Control", Pearson Edu	tor Drives, Modelling, Analysis,	shnan "Electric Mo		2.
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme O3Hrs/week Examination Scheme Examination Scheme O3Hrs/week Examination Scheme O3Hrs/week Examination Scheme O3Hrs/week Examination Scheme O3Hrs/week O2 O3 O3 O3 O4Hrs/week O2 O3Hrs/week O3Hrs/week O4Hrs/week			980	TheMacmillanPressLtd.19	," Electrical Machine Dynamics'	engupta & J.B.Lynr	D.P.S	-
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2723: Dynamics of Machines (Elective III) heme 03Hrs/week 03 ESE 00 ESE Examination Scheme Estartion of ESE 00 ESE Examination of ESE 00 ESE Exa							xt Books	Te
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week 04Hrs/week 05Hrs/week 07Hrs/week 08Hrs/week 09Hrs/week 09Hrs/	04	CO4			or/Synchronous Motor System.		nit 6	Un
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Electrical III) Name	08	COS		ansformed Equations.	gnal Transient Analysis using Tra grator /DC Motor System.		nit 5	Un
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) MSE	06	COZ	le form	ons in State	gnal Transient. Small Oscillation al Analysis of Interconnected Ma		nit 4	Un
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III)) heme O3Hrs/week Examination Scheme Examination of ESE 20	06	C02		sis.	ase Salient Pole Synchronous Mansformation-Steady State Analy		nit 3	Un
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme O3Hrs/week Hrs/week O3 Electrical Machines, Control Systems, Dynamics, Mechanics of Materials vomes (CO): Students will be able to rmulate Performance characteristics of machine. dge dynamics of machine.			r Function	n Motor Analysis Transfer	Reference Frames for Induction			
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme O3Hrs/week Hrs/week O3 Electrical Machines, Control Systems, Dynamics, Mechanics of Materials comes (CO): Students will be able to prive and apply complete voltage and torque equations for primitive 4-winding commutator machine. Stability. Primitive 4 Winding Commutator Machine. Complete Voltage Equation of Primitive 4 Winding Commutator Machine. Complete Voltage Equation, Analysis of Simple DC Machines using the Primitive CO2 Machine Equations.				ormed Equations.	e Phase Induction Motor. Transfi			
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) Examination Scheme O3Hrs/week O3Hrs/week O3Hrs/week CO1 PS2223: Dynamics of Machines (Elective III) Examination Scheme Examination Scheme O3Hrs/week O2 Duration of ESE O2 O2 Hrs 30 Min ESE O2 Duration of ESE O2 O2 Hrs 30 Min Electrical Machines, Control Systems, Dynamics, Mechanics of Materials Duration of ESE O2 O3 ESE O2 O4 O5 O5 O5 O7 O7 O7 O6 O7 O7 O7 O7 O7 O7	10	CO2	Primitive	DC Machines using the	Equation. Analysis of Simple Equations.	Torque Machine	nit 2	Un
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) Examination Scheme MSE 20 ISE 20 Unration of ESE 20 Unration o			achine.	Winding Commutator Ma	e Voltage Equation of Primitive 4			
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) Dynamics of Machines (Elective III) Hrs/week					ator Primitive Machine.			
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First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) PS2223: Dynamics of Machines (Elective III) Duration Scheme	House	3			Course Contonte	rerence frames.	TG	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) Teaching Scheme Lectures O3Hrs/week Tutorials Total Credits O3 Prerequisite: Electrical Machines, Control Systems, Dynamics, Mechanics of Materials Course Outcomes (CO): Students will be able to CO1 Formulate Performance characteristics of machine. CO2 Judge dynamics of machine. Government College of Engineering, Karad Examination Scheme Examination Scheme Examination Scheme Duration of ESE O2 Hrs 30 Min	s and	equation	transformed	se induction motors using	e and characteristics of three-phase	valuate performanc		0
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week Hrs/week 03 Duration of ESE Esemination Scheme 20 JSE 20 20 20 30 Duration of ESE 20 Duration of ESE 20 Ormulate Performance characteristics of machine.	es	r machine	commutato	ns for primitive 4-winding	aplete voltage and torque equation	erive and apply cor		0
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week Hrs/week 03 Duration of ESE Electrical Machines, Control Systems, Dynamics, Mechanics of Materials comes (CO): Students will be able to rmulate Performance characteristics of machine.					achine.	idge dynamics of m		C
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week Hrs/week 03 Duration of ESE Electrical Machines, Control Systems, Dynamics, Mechanics of Materials comes (CO): Students will be able to					ce characteristics of machine.	ormulate Performar		C
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/weekHrs/week 03 03 ESE 03 Duration of ESE 02 Hrs Electrical Machines, Control Systems, Dynamics, Mechanics of Materials					nts will be able to	comes (CO): Stude	urse Out	Co
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III)				Mechanics of Materials	es, Control Systems, Dynamics, 1	:Electrical Machir	erequisit	Pre
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) heme 03Hrs/week Hrs/week 03 ESE Government College of Engineering, Karad Examination Schem MSE ESE				Duration of ESI				
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) Scheme 03Hrs/week Hrs/week Government College of Engineering, Karad Estamination Schem MSE ISE			60	ESE			tal Credit	Tot
First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) Scheme			20	ISE		Hrs/week	torials	Tut
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III) Scheme			20	MSE		03Hrs/week	ctures	Lec
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2223: Dynamics of Machines (Elective III)			cheme	Examination S		heme		Tes
First Year M. Tech (SEM-II) in Electrical Power Systems				ines (Elective III)	PS2223: Dynamics of Machi			
Government College of Engineering, Karad				rical Power Systems	ar M. Tech (SEM-II) in Elect	First Y		
				igineering, Karad	Government College of En			

CO 4	CO 3	CO 2	CO 1	PO → CO↓
2	3	3	3	PO I
2	2	2	2	PO 2
2	1	3	2	PO3
1	2	1	1	PO 4
1	_	2	1	PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20	1	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE



			300ks	oks	Text Books
06	C04	ne Design Energy	Introduction to Computer Aided Electrical Machine Design Energy efficient machines	• •	CHIE
06	CO3,	l cage rotor, Magnetizing	Design of stator and rotor winding, slot leakage flux Leakage reactance, equivalent resistance of squirrel current, efficiency from design data		Unit 5
06	CO3,	ciency, power factor	Choice of specific electric and magnetic loadings, efficiency, power factor Number of slots in stator and rotor Elimination of harmonic torques		Unit 4
08	C03,	n, choice of flux density unce and conductor size,	General considerations, output equation, emf per turn, choice of flux density and current density, main dimensions, leakage reactance and conductor size, design of tank and cooling tubes Calculation of losses, efficiency and regulation Forces winding during short circuit		Unit 3
08	C02	ic loadings Real and apparent ventilation, continuous and	Specific loadings, choice of magnetic and electric loadings flux-densities, temperature rise calculation Separation of main dimension for DC machines Induction machines and synchronous machines Heating and cooling of machines, types of ventilation, intermittent rating		Unit 2
08	C01	edings, choice of magnetic and se calculation, Separation of output equation, emf per turn, dimensions, leakage reactance	Principles of Design of Machines-Specific loadings, choice of magnetic ar electric loadings Real and apparent flux densities, temperature rise calculation, Separation of main dimension for DC machines Induction machines and synchronous machines Design of Transformers-General considerations, output equation, emf per turn, choice of flux density and current density, main dimensions, leakage reactance and conductor size, design of tank and cooling		Cnit
Hours	СО		Course Contents		
netic n data	and magnetic	rs, including losses, efficiency imize machine performance us	Evaluate design considerations and calculations for transformers, including losses, efficiency, and magnetic properties Design stator and rotor windings, analyse leakage flux, and optimize machine performance using design data	Evaluate of properties Design sta	CO3
chines	ctrical machines suitable cooling	padings and dimensions for ele electrical machines, and select	Apply principles of machine design to determine appropriate loadings and dimensions for electrical machines. Analyse factors affecting the efficiency, losses, and heating of electrical machines, and select suitable cooling methods	Apply pi Analyse methods	CO1
S.	1 Materials.	ystem Fundamentals, Electrica	Prerequisite: Electrical machine Design, Electrical Machines,, Power System Fundamentals,	isite:Ele	Prerequ
			03		Total Credits
		mination Schem	ne 03 Hrs/week	Schen	Teaching Scheme Lectures 03
		ices (Elective III)	PS2233: Power Apparatus and Devices (Elective III)		
		in Electrical Power Systems	First Year M. Tech (SEM-II) in Electi		
		ing, Karad	Government College of Engineering, Karad		



Reference Books

1. | Sawhney A. K, "A course in Electrical Machine Design", Dhanpat Rai & Sons, 5ºEdition **Useful Links** https://www.udemy.com/topic/electrical-design/ https://www.udemy.com/course/electrical-power-equipment/ M.G.Say, "The Performance and Design of A.C. Machines", Pitman

Mapping of COs and POs

CO 4	CO3	CO 2	CO 1	CO↓	$PO \rightarrow$
2	ω	2	2	2	PO 1
2	2	2	2		PO 2
1	2	2	2		PO3
1	2	1	1		PO 4
2	1	2			PO 5

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	,	5	5	5	5	MSE
20	-	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

		Design and simulation of variable structure adaptive model following control.	• De	
08	CO4	Introduction to design method based on the use of Lyapunov function.	• Int	Unit 6
	CO4		De	
80	CO3,	ystems (MRAS) -	• Ha	Unit 5
		PFC based on Bilateral Single Phase and Three Phase Converter	• PF	
		Three Phase APFC and Control Techniques	• Th	
		Control Methods for Single Phase APFC.	• Co	
		Active Power Factor Corrected Single Phase Front End	• Ac	
		Passive Filtering, Harmonic Resonance.	• Pa	
	C04		Co	
06	CO3,	t- Passive	• Mi	Unit 4
		Power quality problems created by drives and its impact on drive	• Po	
		Ground systems loads that cause power quality problems.	• Gr	
		Shunt capacitors-transformers. Electric machines.	• Sh	
	CO4		• Tra	
06	CO3,	ts under non-sinusoidal conditions	• Mo	Unit 3
		power system equipment and loads.	po	
		Harmonic distortion of fluorescent lamps-effect of power system harmonics on	 Ha 	
		Three phase power converters-arcing devices saturable devices	• Th	
		Triplex harmonics. Important harmonic introducing devices. SMPS	• Tri	
	CO2	RMS value of a harmonic waveform	• RN	
80	C01,	Harmonics-individual and total harmonic distortion	Ha	Unit 2
		Standards and recommended practices.	• St	
		Power acceptability curves-IEEE guides	• P(
		Flicker factor transient phenomena-occurrence of power quality problems	•	
		Power quality measures and standards-THD-TIF-DIN-C-message weights.	• P(
	CO2		· Qu	8
05	CO1,	ower	• Int	Unit 1
Hours	CO	Course Contents C		
		Relate shunt active power filtering techniques for harmonics.	Relate shur	C04
			techniques	
	control	Design problems of active power factor correction based on static VAR compensators and its con	Design pro	CO3
			components	
	rks and	Develop analytical modelling skills needed for modelling and analysis of harmonics in networks and	Develop ar	CO2
			loads	
nd	ipment an	Differentiate harmonics, harmonic introducing devices and effect of harmonics on system equipment and	Differentia	
		Outcomes (CO): Students will be able to)utcomes (Course (
		Prerequisite: Power Electronics, Electrical Machines	site: Power	Prerequ
	s 30 Min	Duration of ESE 02 Hrs 30	- 7	
		ESE 60	dits 03	Total Credits
		Hrs/week ISE 20	H	Tutorials
		03 Hrs/week MSE 20		Lectures
		Examination Scheme	Scheme	Teaching
		PS2214: Power Quality (Elective IV)		
		First Year M. Tech (SEM-II) in Electrical Power Systems		
		Government College of Engineering, Karad		

Www. Bos

1		
	ext	Text Books
_	-	G.T. Heydt, "Electric power quality", McGraw-Hill Professional, 2007
2		2. Math H. Bollen, "Understanding Power Quality Problems", IEEE Press, 2000
To lead	lefe	Reference Books
hand	•	1. J. Arrillaga, "Power System Quality Assessment", John wiley, 2000
N		2. J. Arrillaga, B.C. Smith, N.R. Watson & A. R. Wood,"Power system Harmonic Analysis", Wiley, 1997
_	Sef	Useful Links
hand	-	https://onlinecourses.nptel.ac.in/noc23_ee63/preview
N	_	2. https://www.udemv.com/course/introduction-to-power-quality/

CO 4	CO3	CO 2	CO 1	PO → CO↓
2	2	2	2	PO 1
_	1	2	2	PO 2
3	3	3	3	PO 3
1	_	1	_	PO 4
2	2	1	2	PO 5

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1		5	5	5	5 .	MSE
20	-	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE
	20 20	20 20	20 20	5 4 - 4 	5 4 5 4 - 4 	5 4 5 4 5 4 - 4 20 20	5 4 5 4 5 4 5 4 20 20

					Tavt Backs
			power line conditioners [EEE standards on power quality.	• III	
4	C04	these problems by	Voltage swells, sags, flicker, unbalance and mitigation of these problems by	• <	Unit 6
		ters, active	Modelling and analysis of FACTS, Controllers Passive filters, active filtering	• fi	
6	CO2		Introduction to interline power flow controller.	• Ir	Unit 5
		ations.	Independent real and reactive power flow control- Applications.	• Ir	
		Q control	Operation and control of UPFC- Basic Principle of P and Q control	• 0	
4	C01	cuit Arrangement	SSR and its damping Unified Power Flow Controller: Circuit Arrangement	• S	Unit 4
			Static synchronous series compensators and their Control	e S	
			Static series compensation - GCSC, TSSC, TCSC	• S	
			Operation and Control –Applications	•	
	CO3	9.00	regulators – TCVR and TCPAR	re	
6	CO1,	nd nhase anole	Static series compensation: TSSC. SSSC -Static voltage and phase angle		Unit 3
			Comparison between SVC and STATCOM.	•	
		STOOM	Compensator control	0	
		ATCOM	TATCOM Operation and control of TEC TOD and ET		
4	CO1,	pensators: SVC	static versus passive vAR compensator, static snunt compensators:	e 0	OHIL &
_		vel.	Reactive compensation at transmission and distribution level.		7
		sation principles –	Reactive power compensation – Shunt and Series compensation principles	•	
		control.	Shunt compensation - Series compensation - Phase angle control.	S	
		compensated line	Benefits of FACTS Transmission line compensation- Uncompensated line	• B	
		line loading	Power flow control-Constraints of maximum transmission line loading	• P	
			Control of dynamic power unbalances in Power System	• 0	
∞	CO 1		Reactive power flow control in Power Systems	• R	Unit 1
Hours	CO		Course Contents		
			Compare IEEE power quality standards	ompare	CO4 (
stems.	VAR Systems.	dysis of such Static	Develop analytical modelling skills needed for modelling and analysis of such Static	evelop	CO3 [
			Systems, PWM, Inverter based Reactive Power Systems and their controls.	ystems,	70
Power	Reactive		Learn various Static VAR Compensation Schemes like Thyristor/GTO Controlled	earn va	CO2 L
		Power Systems.	Compensation Schemes at Transmission and Distribution level in Power Systems.	ompens	0
Power	eactive	ssive and Active R	Acquire knowledge about the fundamental principles of Passive	cquire	CO1 /
	Fe.		<	tcomes	ourse Or
	7	erials, Circuit Theor	Prerequisite: Power Electronics, Power System Protection, Electrical Materials, Circuit Theory	te:Powe	rerequisi
	30 Min	Duration of ESE 02 Hrs	Durat		
		60	ESE	its 03	Total Credits
		20		T	Tutorials
5			03Hrs/week MSE	031	Lectures
		Examination Scheme	Exam	Scheme	Teaching Scheme
		ve IV)	PS2224:FACTS and Power Devices (Elective IV)		
		er Systems	First Year M. Tech (SEM-II) in Electrical Power Systems		
		C. S.	THE STREET STREET STREET		

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	2007
2.	2. X P Zhang, C Rehtanz, B Pal, "Flexible AC Transmission Systems- Modelling and Control", Springer Verlag,
	Berlin, 2006
Re	Reference Books
<u>}</u>	1. N.G. Hingorani, L. Gyugyi, "Understanding FACTS: Concepts and Technology of Flexible AC
	Transmission Systems", IEEE Press Book, Standard Publishers and Distributors, Delhi, 2001.
2.	2. K.S.Sureshkumar, S.Ashok, "FACTS Controllers & Applications", E-book edition, Nalanda Digital
	Library, NIT Calicut, 2003.
3	3. GT Heydt, "Power Quality", McGraw-Hill Professional, 2007.
4	4. T J E Miller, "Static Reactive Power Compensation", John Wiley and Sons, Newyork, 1982.
Use	Useful Links
-	https://onlinecourses.nptel.ac.in/noc23_ee58/preview
س	https://www.classcentral.com/course/swayam-facts-devices-119462

CO 4	CO 3	CO 2	00	PC CC
) 4	3) 2) 1	PO → CO↓
. 2	2	1	2	PO I
÷ ن	2	3	2	PO 2
1	1	1	2	PO 3
2	2	2	. 2	PO 4
3	2	3	3	PO 5

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TO	Cr	Eva	An	AJ	Unde	Rem	Knowle
TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
-							
20	1	1	5	5	5	5	MSE
20		4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

				A
			DOWEL LEUI MEH1888	
		Michael Wiebe, "A guide to utility automation: AMR, SCADA, and IT systems for electric normal." Denn Well 1000		3.
		DA for industry", Newnes, 2003		2.
		A systems", Penn Well Books,2006	William T. Shaw, "Cyber security for SCADA systems", Penn Well Books, 2006	
			Reference Books	Refe
		Gordon Clarke, Deon Reynders: "Practical Modern SCADA Protocols: DNP3,60870.5and Related Systems", Newnes Publications, Oxford, UK,2004		2.
	of	Stuart A Boyer: "SCADA- Supervisory Control and Data Acquisition", Instrument Society of America Publications, USA,2004		-
			-X	Text
		Simulation Exercises	 Case studies, Implementation, 	
			 Industries- oil, gas and water 	
(06)	CO4		improvement	
		Transmission and Distribution sector operations, monitoring, analysis and	 Transmission and Distribution se 	
		plications	0	Unit 6
		rotocols	Open standard communication protocols	
(00)	CO3	fiber optics	 Wired and wireless methods and fiber optics 	
(00)	CO1,CO2,		 Various industrial communication technologies 	
		2.1	0	Unit 5
(00)	CO3	Various SCADA architectures, advantages and disadvantages of each system Single unified standard architecture-IEC61850.	 Various SCADA architectures, advantages and Single unified standard architecture-IEC61850. 	
(00)	CO1,CO2,		Unit 4 • SCADA Architecture	Ont
		Communication Network, SCADA Server, SCADA/HMI Systems	0	
	000	PLC)	 Programmable Logic Controller(PLC) 	
(08)	CO1,CO2,	(1)	 Intelligent Electronic Devices(IED) 	
		(RTU)		
		ponents	0	Unit 3
(00)	CO3	AUTOHIBUTOH	Industries SCADA	
(96)	CO1,CO2,	tions		7 mu
		1 To		
(00)	CO3		 Evolution of SCADA 	
(08)	CO1,CO2,		 Data acquisition systems 	
			nit 1 • Introduction to SCADA	Unit 1
Hours	CO	Course Contents	Cours	
		utomation and industrial sectors		CO4
		Relate the role of intelligent devices and communication protocols in SCADA networks		CO3
	tures	Employ communication technologies in SCADA systems and compare various architectures		CO2
		undamentals and its evolution	O1 Demonstrate understanding of SCADA fundamentals and its evolution	CO1
		of, Communication Systems.	Prerequisite: Power System Operation and Control, Communication Systems. Course Outcomes (CO): Students will be able to	Cour
In	02 Hrs 30 Min	ration of ESE		
			Total Credits 03	Total
	20	ISE	Tutorials 00 Hrs/week	Tutor
	20	MSE	Lectures 03 Hrs/week	Lectu
	e	Examination Scheme	Teaching Scheme	Teac
		PS2234: SCADA systems and Applications(Elective IV)	PS2234: SCADA	
		First Year M. Tech (SEM-II) in Electrical Power Systems	First Year M. Tech (S	
		COCT OR RESERVED CONTRACTOR CONTR		

https://www.udemy.com/course/learn-scada-in-a-day-starting-from-scratch/?gclid=EAIaIQobChMI9dnilsrCgAMVD1orCh1HgQeOEAAYASAAEgKK5fD BwE&matchtype=b&utm campaign=Long Tail la.EN_cc.INDIA&utm_content=deal4584&utm_medium=udemyads&utm_source=adwords&utm_term= 07083 . ad 533133858411 . kw scada+training . de c . dm . pl . ti kwd-1010276589 . li 9302765 . pd ag 788757

https://www.udemy.com/course/arduino-scada-system-interface-with-arduino/

12

Mapping of COs and POs

CO 4	CO3	CO 2	CO 1	PO →
2	2	1	2	PO 1
3	2	2	2	PO 2
_	1		2	PO 3
2	2	2	2	PO 4
w	2	w	3	PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
ı	1	5	5	5	5	MSE
1	.4	4	4	4	. 4	ISE
10	10	10	10	10	10	ESE
	1	- 4	5 4	5 4	5 4	5 4 5 4 - 5 4 - 4

First Year M. Tech (SEM-II) in Electrical Power Systems First Year M. Tech (SEM-II) in Electrical Power Systems First Year M. Tech (SEM-II) in Electrical Power Systems Facting Scheme			Coordination between insulation and protection level Statistical approach	Coordination betwee Statistical approach	
First Vear M. Tech (SEM-II) in Electrical Power Systems PS2215;Power System Transients (Elective V) Difference Power System 20	06	C04	ordination: Principle of insulation co-ordination in Air tation (AIS) and Gas Insulated Substation (GIS)		∪nı
First Vear M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) On Hrs/week			wave	0	
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) Double			tor system		
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) O0 Hrs/week O3 Hrs/week O6 Hrs/week O7 Hrs/week O8 Hrs/week O8 Hrs/week O9 Hrs/week			ams – Attenuation and Distortion		
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Do Hrs/week O3 Hrs/week O6 Hrs/week O7 Hrs/week O8 Hrs/week O8 Hrs/week O8 Hrs/week O9 Hr				terminations	
Government College of Engineering, Karad			efraction, Behaviour of Travelling waves at the line		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Examination Scheme 20 00 Hrs/week 20 03 Hrs/week 20 03 Hrs/week 20 05 Hrs/week 20 05 Hrs/week 20 06 Hrs/week 20 07 Hrs/week 20 08 Hrs/week 20 09 Hrs/week 20 09 Hrs/week 20 09 Hrs/week 20 09 Hrs/week 20 00 Hrs/week			distributed Parameters Wave Equation	32	
Covernment College of Englineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V)	08	CO3	/DC line Travelling waves on transmission line	0	Uni
Covernment College of Englineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V)			, load rejection - over voltages induced by faults		
First Vear M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme O3 Hrs/week Duration of ESE 20			lines		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme PS2215:Power System Transients (Elective V) Duration of ESE 20 O3 Hrs/week Examination Scheme 20 O3 Hrs/week ESE 60 O3 Hrs/week ESE 60 O4 Hrs/week ESE 60 O5 ESE 20 O6 Hrs/week ESE 20 O8 ESE 20 Duration of ESE 02 Hrs 30 Min ESE ESE 20 Duration of ESE 02 Hrs 30 Min ESE ESE 20 ESE ESE ESE 20 ESE ESE ESE ESE Evandamentals of Transient Analysis and Signal Processing system of ESE ESE Evandamental circuit stransients that could occur in power system and their mathematical mulation coordination ESE ESE ESE ESE EVANDAMENTAL COORDINATION STATES ESE ESE EVANDAMENTAL COORDINATION STATES EVANDAMENTAL			ansients - closing and	 Energizing tr 	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Examination Scheme Examination Exect Examination Exect Exect			ort line or kilometric fault	 Switching: Si 	
First Year M. Tech (SEM-II) in Electrical Power Systems P\$2215:Power System Transients (Elective V) P\$2215:Power System Transients (Elective V) Examination Scheme 20			ower footing resistance and Earth Resistance	 Influence of t 	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) Examination Scheme Examination ESE 20	08	C02	tween lightning and power system	e	Uni
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme 03 Hrs/week 00 Hrs/week 03 Hrs/week 00 O Hrs/week 03 Hrs/week 03 Hrs/week 04 Duration of ESE 05 Duration of ESE 06 Urasion of ESE 07 Urasion of ESE 08 Urasion of ESE 09 Urasion of Urasion of ESE 00 Urasion of ESE 00 Urasion of ESE 01 Urasion of ESE 02 Urasion of ESE 03 Urasion of ESE 04 Urasion of ESE 05 Urasion of ESE 06 Urasion of ESE 07 Urasion of ESE 08 Urasion of ESE 09 Urasion of ESE 09 Urasion of ESE 09 Urasion of ESE 09 Urasion of ESE 00			omena of lightning.		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Discription Examination Scheme Examination Scheme 20 20 20 20 20 20 20 2			itching and temporary over voltages, Lightning	 Lightning, sv 	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Discription Disc			is- Z transform- Computation using EMTP	 Modal analys 	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Discription Disc	08	C01	igital computation – Matrix method of solution		Uni
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Damping circuits -Abnormal switching transients, Three-phase circuits Sign various and transients and transients will be able to the transient analysis of Electrical Power System and transients CO1			of power system transients		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme O3 Hrs/week Examination Scheme Examination Scheme 20				and transients	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme O3 Hrs/week			uits -Abnormal switching transients, Three-phase circuits		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme Day Hrs/week PS2215:Power System Transients (Elective V) PS2215:Power System Elective V) Day Hrs/week PS2215:Power System			sform method of solving simple Switching transients		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Examination Scheme MSE 20 103 Hrs/week 03 Hrs/week 03 ESE 04 ESE 05 ESE 06 Urration of ESE 15 O2 Hrs 30 Min Fundamentals of Transient Analysis and Signal Processing Somes (CO):Students will be able to In knowledge of various transients that could occur in power system and their mathematical mulation Sign various protective devices in power system for protecting equipment and personnel ect insulation coordination Course Contents Course Contents	08	C01	circuit analysis of electrical transients	•	Uni
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Duration Scheme 20	Hours	CO	Course Contents		
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Duration Scheme 20 20			for transient analysis		CC
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme			dination	_	CC
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme 03 Hrs/week 00 Hrs/week 03 CO): Students will be able to in knowledge of various transients that could occur in power system and their math mulation First Year M. Tech (SEM-II) in Electrical Power Systems Examination Scheme MSE 20 1SE 20 Duration of ESE 02 Hrs 30 I		ersonnel	tive devices in power system for protecting equipment and per		CC
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V) Duration of ESE 20				formulation	
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) PS2215:Power System Transients (Elective V)	11	nathematica	rious transients that could occur in power system and their ma	_	CC
First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V) heme			s will be able to	Course Outcomes (CO): Student	Cou
Covernment College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems			Transient Analysis and Signal Processing	Prerequisite: Fundamentals of	Pre
First Year M. Tech (SEM-II) in Electrical Power System PS2215:Power System Transients (Elective V) MSE		301	02 Hrs		
First Year M. Tech (SEM-II) in Electrical Power System PS2215:Power System Transients (Elective V) Hrs/week Hrs/week Hrs/week MSE					Tota
First Year M. Tech (SEM-II) in Electrical Power System PS2215:Power System Transients (Elective V) Examination Schem Hrs/week MSE					Tuto
Government College of Enginee First Year M. Tech (SEM-II) in Electr PS2215:Power System Transient				Lectures 03 Hrs/week	Lect
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems PS2215:Power System Transients (Elective V)			Examination Scheme	Teaching Scheme	Tea
Government College of Engineering, Karad First Year M. Tech (SEM-II) in Electrical Power Systems			PS2215: Power System Transients (Elective V)		
Government College of Engineering, Karad			Year M. Tech (SEM-II) in Electrical Power Systems	First	
			Government College of Engineering, Karad		



2.	T. Use		2		Ref	jound.	Tex			Unit 6
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://pdho	nks	Applications CRC Press	irk Gh	A. Ma ıp, LLC	Reference Books	n Green	S		0	6
https://pdhonline.com/courses/e491/e491_new.htm	https://www.udemy.com/course/electrical-power-system-stability-beginner-to-advanced/	Applications" IST edition" ISBN 9781032185583248 Pages 212 B/W Illustrations Published January 27, 2023 by CRC Press	Gevork Gharehnetian Atousa Vazdani Behrooz Zaker "Power System Transients Modelling Simulation and	1. Juan A. Martinez-Velasco "Power System Transients Parameter Determination" © 2010 by Taylor and Francis Group, LLC CRC Press is an imprint of Taylor & Francis Group, an Informa business		1. Allan Greenwood, "Electrical Transients in Power System", Wiley & Sons Inc. New York, 1991		lightning arresters, substation earthling	Protection of system against over voltages	Protective devices CO1, CO4 06

CO 4	CO 3	CO 2	CO 1	PO → CO ↓
2	3	3	2	PO 1
2	2	2	2	PO 2
2	2	3	2	PO3
1	2	1	1	PO 4
2	3	2	1	PO 5

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20		ľ	5	5	5	5	MSE
20	ı	4	. 4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Reference Books Course Outcomes (CO): Students will be able to Learning. Prerequisite: Fundamentals of Programming, Basics of Data Structures and Algorithms, Fundamentals of Machine Total Credits Tutorials Lectures Text Books Unit 2 Teaching Scheme Unit 1 Unit 6 Unit 5 Unit 4 Unit 3 004 CO3 CO2 CO1 Elaine Richand Kevin Knight "Artificial Intelligence", 2nd Edition, Tata Mcgraw-Hill, 2005 Symbolic AI. Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking Connectionist Models: Introduction: Hopfield Network, Learning in Neural Network, Application of Synthesize various AI reasoning methods, including symbolic reasoning under uncertainty and statistical Filler Structures: Conceptual Dependency, Scripts, CYC Game Playing: Overview, And Example Domain: Overview, Mini Max, Alpha-Beta Certainty Factors and Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory Symbolic Reasoning Under Uncertainty: Introduction to Non monotonic Reasoning Relate knowledge representation approaches using predicate logic and rule-based systems Employ heuristic search techniques and analyse production system characteristics Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting Fuzzy Logic. Weak Slot-and-Filler Structures: Semantic Nets, Frames. Strong Slot-and-Theorem, Logics for Non-Monotonic Reasoning. Statistical Reasoning: Probability And Bays Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning Predicates, Knowledge Representation Issues: Representations And Mappings, Approaches to Knowledge Representation. Using Predicate Logic: Representation Simple Facts in Programs, Additional Problems. Generate-And-Test, Hill Climbing, Best-First Search. References, What makes it hard? As constraint satisfaction What is understanding? Hierarchical Planning, Reactive Systems, Other Planning Techniques. Understanding: Cut-off, Refinements, Iterative deepening, The Blocks World, Components of Problem Reduction, Constraint Satisfaction, means -Ends Analysis Design of Search Production Characteristics, Production System Characteristics, And Issues in The References, One Final Word Problems, State Space Search & Heuristic Search Techniques: Defining the Problems as A State Space Search, Production Systems, what are AI Techniques, The Level of The Model, Criteria for Success, Some General What is AI (Artificial Intelligence)? The AI Problems, The Underlying Assumption. reasoning Demonstrate understanding of AI concepts, problems, and techniques Logic, Representing Instance and Isa Relationships, 03 00 Hrs/week 03 Hrs/week Resolution. First Year M. Tech (SEM-II) in Electrical Power Systems Government College of Engineering, Karad Representing Knowledge Using Rules: Procedural Versus PS2225: Al Techniques(Elective V) Course Contents Computable Functions and MSE ESE ISE **Examination Scheme** Duration of ESE 02 Hrs 30 Min 60 20 20 CO3, CO2, CO1, CO4 C₀₄ C02 CO1 CO Hours 80 08 80 90 9 8

Hairman Bos

Electrical Engineering Department

Useful Links • Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach",3rd Edition, Prentice Hall,2009.

https://www.udemy.com/course/artificial-intelligence-az/https://onlinecourses.nptel.ac.in/noc22_cs56/preview

Mapping of COs and POs

PO → CO↓	PO 1	PO 2	PO 3	PO 4	
	3	2	3	1	
)3	3	2	2	1	
CO 4	2	ω	_	1	

1: Slight(Low)

2: Moderate(Medium)

3: Substantial(High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	1	5	5	5	5	MSE
20	1	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Private Priv	Elective V) Cheme 20 20 60 60 E 02 Hrs 30 Min E	V Manichaikulande C Schwanne "Dhysically based Industrial load" IEEET and and S	1. Y.Ma
First Year M. Tech (SEM.H) in Electrical Power Systems P\$2235: Industrial Load Modelling and Control (Elective V) Control (Elective V) Examination Scheme	(Elective V) (Elective V) (cheme 20 20 20 20 CO1 E 02 Hrs 30 Min CO1 CO1 CO2 CO3 CO4	Books	Reference l
First Year M.Tech (SEM-II) in Electrical Power Systems P\$2235:Industrial Load Modelling and Control (Elective V) Column	(Elective V) (Elective V) (cheme 20 20 20 20 E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 acts CO2 CO3 CO4 CO4 CO4 CO4	GellingsandS.N.TalukdarLoad manag	1
First Year M. Tech (SEM-II) in Electrical Power Systems P\$2235:Industrial Load Modelling and Control (Elective V) Control Examination Scheme Examination of Exe Exe	(Elective V) (Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 CO2 CO3 CO4 CO4 CO4 CO4	3Jork" Industrial Load Management-Th erlands,19892	
First Year M. Tech (SEM-II) in Electrical Power Systems	(Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min Strial loads stries, along with filter applicati CO CO1 acts CO2, CO4 CO4 CO4 CO4		Text Books
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V)	(Elective V) (Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 CO2 CO1 CO2 CO3 CO4 CO4 CO4		
First Year M.Tech (SEM-II) in Electrical Power Systems PS235:Industrial Load Modelling and Control (Elective V)	(Elective V) (Elective V) (cheme 20 20 20 20 CO1 E 02 Hrs 30 Min CO1 CO1 CO2 CO1 CO3 CO3 CO4 CO4 CO4		
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V)	Elective V) Cheme 20 20 20		Unit 6
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First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V)	Elective V) Cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min Iter application CO1 acts CO2, CO4 CO3 CO4 C		
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V)	(Elective V) (Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 CO2 CO1 CO2 CO3 CO3 CO3 CO3	Operating and control strategies	
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme	Elective V) Cheme 20 20 60 60 E 02 Hrs 30 Min Istries, along with filter application of the column of the colu		Unit 5
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V)	(Elective V)		
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First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V) Control	(Elective V) (Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 CO1 CO2 CO2 CO4 CO3	 Modelling-Cool storage 	
First Year M. Tech (SEM-II) in Electrical Power Systems P\$2235:Industrial Load Modelling and Control (Elective V) P\$2235:Industrial Load Modelling and Control (Elective V) Control Examination Scheme Examination Scheme 20 20 20 20 20 20 20 2	(Elective V)	 Load profiling 	
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V) Double	(Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min E 02 Hrs 30 Min CO1 CO1 CO1 CO2 CO2 CO3 CO4	 Cooling and heating loads 	Unit 4
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First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) MSE	(Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min strial settings rial loads stries, along with filter CO CO CO1 CO1		Unit 3
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme Examination Scheme O3 Hrs/week Darial MSE 20 ESE 20	(Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min Strial loads strial settings rial loads stries, along with filter application CO CO CO1		
PS2235:Industrial Load Modelling and Control (Elective V) heme PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling Examination Scheme 20	(Elective V) (cheme 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min strial loads strial loads stries, along with filter applicati CO CO CO1	 Bottom up approach-scheduling- 	
PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme Examination Scheme O3 Hrs/week O3 Hrs/week ESE O3 ESE O5	(Elective V) (cheme 20 20 20 60 E 02 Hrs 30 Min E 02 Hrs 30 Min strial settings rial loads rial loads rial rapplicati CO	 Direct load control-Interruptible 	
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First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) heme PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20	(Elective V) (cheme 20 20 60 CO E 02 Hrs 30 Min E 02 Hrs 30 Min CO		
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First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) heme	(Elective V) (cheme 20 20 60 20 02 Hrs 30 Min E 02 Hrs 30 Min strial settings rial loads rial loads rial loads stries, along with filter applications along with filter applications	 Load Curves-Load Shaping Obje 	
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V) Control (Elective V) Examination Scheme	(Elective V) Cheme 20 20 60 E	Management	
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20	(Elective V) cheme 20 20 60 02 Hrs 30 Min E 02 Hrs 30 Min ustrial settings rial loads rial loads stries, along with filter along with filter applicati		Unit 1
Teaching Scheme Lectures PS2235:Industrial Load Modelling and Control (Elective V)	First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20 20	Cours	
First Year M.Tech (SEM-II) in Electrical Power Systems	First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20 20	astify impact of reactive power manager	
First Year M.Tech (SEM-II) in Electrical Power Systems	First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20	oplication	
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme MSE O3 Hrs/week O3 Duration of ESE O2 Basics of Industrial Automation, Fundamentals of Signal Processing. Somes (CO):Students will be able to at e electric energy scenario and demand side management strategies in industrial settings	stems (Elective V) cheme 20 20 60 60 60 E 02 Hrs 30 ustrial settings	pply electricity pricing models and opti	-
First Year M. Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme	(Elective V)	elate electric energy scenario and dema	+
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme MSE O3 ISE O3 Duration of ESE O2 Hrs 30 Basics of Industrial Automation, Fundamentals of Signal Processing.	(Elective V) (cheme 20 60 60 E 02 Hrs 30 E 02 Hrs 30 E 0 2 2 2 2 2 2 2 2 2	tcomes (CO):Students will be able to	Course Ou
First Year M.Tech (SEM-II) in Electrical Power Systems	rst Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective V) Examination Scheme 20	te:Basics of Industrial Automation, I	Prerequisit
First Year M. Tech (SEM-II) in Electrical Power Systems	rst Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective Examination Scheme MSE 20		
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective Examination Scheme O3 Hrs/week ISE 20	rst Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective MSE 20 20		Total Credi
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective g Scheme	rst Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective Examination Scheme 20		Tutorials
First Year M.Tech (SEM-II) in Electrical Power Systems PS2235:Industrial Load Modelling and Control (Elective Scheme	tive	03 Hrs/week	0
tive	tive		Teaching S
First Year M.Tech (SEM-II) in Electrical Power Systems	Government College of Engineering, Karad First Year M.Tech (SEM-II) in Electrical Power Systems	PS2235:Industri	
COVELITIVE COURSE OF THE HEAVENING, THE HA	Government College of Engineering, Karad	First Year M. Tech (
The same of the sa	Covernment College of Engineering Karad	COVERMINE	



-	1	1	1	1
-	3))	COA
2	2	2	3	CO3
3	2	2	2	CO 2
1	2	2	3	CO I
				CO↓
PO 4	PO3	PO2	PO 1	PO →

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	t	í	. 5	5	5	5	MSE
20	-	4	4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

C01, C02, C03	with a e field model, using	b provide students vid software tools in the with the skills to rigineering problems	Minimum 8experiments on suitable computational platform to provide students with a comprehensive understanding of various simulation techniques and software tools in the field of electrical Power system. The course aims to equip students with the skills to model, analyze, and optimize complex systems and solve practical engineering problems using advanced simulation methods.	cperiments on e understandin ower system. optimize com	Minimum 8experiments on comprehensive understanding of electrical Power system. analyze, and optimize compadvanced simulation methods.
CO			Course Contents		
			Analyse the real time problems faced in power system	yse the real tir	CO3 Anal
			Analyse the power system apparatus.	yse the power	CO2 Anal
			Develop a simulation model of a power system.	lop a simulati	CO1 Deve
			Course Outcomes (CO): Students will be able to	nes (CO):Stude	Course Outcon
3	Simulating	Systems, MALLAB	Computational Methods	l Methods	Computational Methods
	Simulia.	Systems MATIAD	Fundamentale Down System Control	I caromaina I	Decaraginita L
30 Min	02 Hrs	Duration of ESE		04 Hrs/week	Practical's
	25	ESE		02	Total Credits
	25	ISE		Hrs/week	Tutorials
	1	MSE		1	Lectures
	me	Examination Scheme		Te	Teaching Scheme
		Elective III)	PS2206: Laboratory 3 (Based on Elective III)		,
		cal Power Systems	First Year M. Tech (SEM-II) in Electrical Power Systems	S. in the	
		ring, Karad	Government College of Engineering, Karad		

	CO3	CO 2	COI	CO↓	PO →
t)	1	2		PO 1
1)	2	2		PO 2
1)	2			PO3
		1	1		PO 4
		2	ω		PO 5

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

Www. E. Chairman Bos

CO1, CO2, CO3	vith a e field nodel, using	provide students was software tools in the with the skills to nugineering problems	Minimum 8experiments on suitable computational platform to provide students with a comprehensive understanding of various simulation techniques and software tools in the field of electrical Power system. The course aims to equip students with the skills to model, analyze, and optimize complex systems and solve practical engineering problems using advanced simulation methods.	Minimum 8experiments on comprehensive understanding of electrical Power system. analyze, and optimize compadvanced simulation methods.	Minimum 8e comprehensiv of electrical analyze, and advanced sim
CO			Course Contents		,
		ge	Apply technical skills to real world power system challenge	ly technical ski	CO3 App
			Evaluate and optimise power system performance	uate and optim	CO2 Eval
			Analyse and solve power system problems	yse and solve	CO1 Ana
			Course Outcomes (CO): Students will be able to	mes (CO):Stude	Course Outco
		ods	Prerequisite: Power System, Control Systems, Computational Methods	ower System,	Prerequisite:
	1	Duration of ESE		04 Hrs/week	Practical's
	1	ESE		02	Total Credits
	50	ISE ·		Hrs/week	Tutorials
	1	MSE		1	Lectures
	me	Examination Scheme		0	Teaching Scheme
		lective 4 and 5)	PS2207: Laboratory 4 (Based on Elective 4 and 5)		
		al Power Systems	First Year M. Tech (SEM-II) in Electrical Power Systems	His	
		ing, Karad	Government College of Engineering, Karad		

CO 1 CO 2	2	2	2	
)	2	2	2	_

1: Slight(Low)

2: Moderate (Medium)

3: Substantial (High)

		Government College of Engineering, Karad	eering, Karad	
		First Year M. Tech in (SEM-II) Electrical Power Systems	trical Power Systems	
		PS2208: Mini Project/ Industrial Training	strial Training	
Teachin	Teaching Scheme		Examination Scheme	eme
Lectures	1		MSE	,
Tutorials	1	Hrs/week	ISE	100
Total Credits	edits 02		ESE	1
Practical's		04 Hrs/week	Duration of ESE	03 Hrs
Prerequ	iisite: Fundan	Prerequisite: Fundamentals of Electrical Engineering, Basics of Power Systems, Fundamentals of Electrical Machines,	ver Systems, Fundamental	ls of Electrical Machines,
Basics o	f Power Elect	Basics of Power Electronics, Fundamentals of Control Systems, Basics of Programming	cs of Programming	
Course	Outcomes (C	Course Outcomes (CO): Students will be able to		
C01	Organise tec	Organise technical reports documenting project objectives, methodologies, findings, and conclusions,	methodologies, findings,	and conclusions,
	adhering to	adhering to professional standards and best practices.		
C02	Support effe	Support effectively with team members or industry professionals, communicate project progress, challenges, and results and present findings in a clear and consists manner.	ionals, communicate proje	ect progress, challenges,
CO3	Demonstrate	Demonstrate the ability to adapt to new technologies, methodologies, and industry trends, showcasing a	odologies, and industry tre	ends, showcasing a
	commitmen	commitment to lifelong learning and professional development	nent.	
		Course Contents		
	Students sho	Students should undergo industrial training or carry out mini project as per the guidelines	ini project as per the guid	delines
	given by res	given by respective guide.		

CO 4	CO3	CO 2	CO 1	CO↓	PO →
2	3	2	3		PO 1
2	2	2	2		PO 2
2	2	2	2		PO3
1	2	S	1		PO 4
2	_	2	_		PO 5

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL 20	Create -	Evaluate -	Analyse 5	Apply 5	Understand 5	Remember 5	Knowledge Level MSE
0 20	ı	. 4	4	5 4	4	4	SE ISE
60	10	10	10	10	10	10	ESE

Teaching Scheme Total Credits Practical 14Hrs/week 07 Government College of Engineering, Karad Second Year (Sem.III) M.Tech. Electrical Power Systems PS2301: Dissertation Phase-I HSE Examination Scheme ISE 100 00

Writing, Basics of Project Management. Prerequisite: Fundamentals of Research Methodology, Basics of Literature Review, Fundamentals of Technical

Plan and budget the technical project by market survey	C04	
Analyse the problem statement using appropriate mode simulation/modelling tools	C03	
Organize research hypothesis	CO2	
Investigate problem statement.	C01	
Course Outcomes (CO): Students will be able to	Course (
0		

Course Contents

coordinator. The candidate has to be irregular contact with his guide and the top of be based on the area in which the candidate has undertaken the dissertation work as per the common instructions for all branches of MTech. The examination shall consist of the dissertation must be mutually decided by the guide and student. The work has to be presented in front of the examiners panel set by Program and PG preparation of report consisting of a detailed problem statement and a literature review. determining solution and must preferably bring out the individual contribution. It should The preliminary results (if available) of the problem may also be discussed in the report. The Dissertation Work should preferably be a problem with research potential and should scientific research, design, generation/collection and analysis of

Syllabus Contents:

The dissertation / project topic should be selected / chosen to ensure the satisfaction of productivity and thus reduce the gap between the world of work and the world of study. need to establish a direct link between education, national development and

The dissertation should have the following:

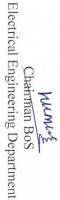
- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey, problem definition
- Motivation for study and objectives
- Preliminary design/ feasibility/ modular approaches
- Report and presentation

Guidelines for Dissertation Phase-I:

- centres OR in industry approved by Program head. The dissertation may be carried out in-house i.e. department's laboratories and
- catalogues should be referred and reported Industry sponsored projects, the relevant application notes, while papers, product The referred literature should preferably include referred Journals. In case of After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives.



- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- survey, detailed objectives, project specifications, paper and/or computer aided Phase-I deliverables: A document report comprising of summary of literature design, proof of concept/functionality, part results, and record of continuous progress.
- specialization shall assess the progress/ performance of the student based on report, presentation and Q&A. Phase I evaluation: A committee comprising of guides of respective
- phase-I work. In case of unsatisfactory performance, committee may recommend repeating the

List of Submission:

Dissertation report prepared using Latex.

Mapping of COs and POs

CO4	CO3	CO2	COI	PO →CO↓
				POI
2	3		2	PO2
	3	1	1	РОЗ
2	3		2	PO4
2	3		2	PO5

1: Slight (Low)

2: Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	ı	ì	5	5	5	. 5	MSE
20	1	4	4	4	4	4	· ISE
60	10	10	10	10	10	10	ESE

Government College of Engineering, Karad Second Year (Sem.-III) M. Tech. Electrical Engineering (Electrical Power Systems) PS2302: MOOCS /OPEN COURSE

	TOMO ON THE COUNTY OF THE COUN	PACE.	
Teaching Scheme	me	Examination Scheme	me
Lectures		MSE	1
Tutorials		ISE	
Total Credits 03	03	ESE	100
Ducaccuicite: I	Proposition Posice of Possess & Skills Emplementals of Communication Posice of Salf Mativation Fundamentals	Design of Solf Moti	votion Eundomontole

Digital Literacy Prerequisite: Basics of Research Skills, Fundamentals of Communication, Basics of Self-Motivation, Fundamentals of

C		
Course	Course Outcomes (CO): Students will be able to	
COI	O1 Select appropriate MOOC course	
CO2	O2 Learn from online sources	
	Course Contents	
	 Online courses available on digital platform like MOOCs/ NPTEL/ Coursera 	
	etc. during the academic semester will be reviewed and listed by	
	departmental faculty board before start of every semester. Suitable course for	
	registered candidate will be recommended by Guide and Program Head	
	considering skillsets and knowledge required for dissertation work of the	
	individual candidate (from the list). It shall have minimum 8-12 weeks	
	duration, peer graded assignment and examination to award grade by online	
	course offering agency. The report of course completed with copy of Grade	
	Report shall be submitted to the examination section.	
	• In case online course is not available, departmental committee will specially	

- design syllabusfor course under self-learning mode and guide will conduct end semester examination to award the grade.

 Students with pending MOOC courses can proceed with Dissertation Phase-I if their work is satisfactory, but results will be kept pending until MOOC courses are completed. Students must pass MOOC courses to be eligible for Dissertation Phase-II final presentation.

Mapping of COs and POs

CO 4	CO 3	CO 2	CO 1	CO↓	PO →
2	3	2	3		PO 1
2	2	2	2		PO 2
2	2	2	2		PO3
1	2	3	1		PO 4
2	- 1	2	1		PO 5

1: Slight (Low)

2 Moderate (Medium)

3: Substantial (High)

Assessment Pattern(with revised Bloom's Taxonomy)

TOTAL	Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
20	1	ī	5	5	. 5	5	MSE
20	ı	4	. 4	4	4	4	ISE
60	10	10	10	10	10	10	ESE

Electrical Engineering Department Chairman BoS mmis

Teaching Scheme Practical 32 lotal 32Hrs/week 16 Government College of Engineering, Karad Second Year (Sem. IV) M.Tech. Electrical Power Systems PS2401: Dissertation Phase-II **Examination Scheme** ISE 100

Technical Writing, Basics of Project Management Prerequisite: Fundamentals of Research Methodology, Basics of Literature Review, Fundamentals of

Course Outcomes (CO):Students will be able to
CO1 | Assemble technical research work.

CO3 CO2 Test his presentation skills for technical paper and report writing Support inferences from the findings and present conclusion. Develop hardware.

co-guide etc. as decided by the Program Head and PG coordinator. consisting of an approved external examiner, an internal examiner and a guide. scope for the study. The work has to be presented in front of the examiners panel discussion. The report must bring out the conclusions of the work and future set up or numerical details as the case may be) of solution and results and statement, literature review, objectives of the work, methodology (experimental detailed project report consisting of introduction of the problem, problem in standard format as provided by the department. The candidate has to prepare a has to submit the report in prescribed format. The dissertation should be presented This phase is a continuation of Dissertation work started in semester III. Student Course Contents

dissertation topic allotted to him. The dissertation stage II is based on a report prepared by the students on

It may be based on:

- Experimental verification/ Proof of concept.
- The viva-voce examination will be based on the above report and work. Design, fabrication, testing of Communication System.

Guidelines for Dissertation Phase-II:

- development verification and testing of the proposed work as per the published in terms of research papers in reputed journals and reviewed focused conferences ORIP/Patents. During phase Accomplished results/ contributions/ student is expected to exert on detail design, innovations should be
- developed system in the form of hardware and/or software. Phase – II deliverables: A dissertation report as per the specified format,
- assess the progress/ performance of the student based on report and recommend for extension of work. Phase-II evaluation: Guide along with appointed external examiner shall presentation. case of unsatisfactory performance, committee may

List of Submission:

Dissertation report prepared using Latex

3: Substantial (High)	3: Subs	edium)	2: Moderate (Medium)	2:]	1: Slight (Low)
1	1	1	1	1	CO4
1	-	1	ı	1	CO3
3	3	3	3	1	CO2
2	2	2	2	ı	COI
5	4	3	2		COL
PO	PO	PO	PO	PO	PO->

Assessment Pattern(with revised Bloom's Taxonomy)

					,	
Create	Evaluate	Analyse	Apply	Understand	Remember	Knowledge Level
E	E	5	5	5	5	MSE
t	4	4	4	4	4	· ISE
10	10	10	10	10	10	ESE
		- 4	- 4 - 4	5 4	5 4	5 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4