Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)						
	AY 2021-22					
	Course Information					
Programme	M.Tech. (Power System Engineering)					
Class, Semester First Year M. Tech., Sem I						
Course Code	5PS501					
Course Name Digital Protection of Power System						
Desired Requisites: Power system protection						

Teaching	Scheme		Examination S	cheme (Marks)		
Lecture	3Hrs/week	T1	T2	ESE	Total		
Tutorial	-	20	20	60	100		
Practical	-						
Interaction	-	Credits: 3					

	Course Objectives				
1	To make students understand digital techniques for realizing various needs of protection.				
2	To strengthen the concepts in power system protection.				
3	To develop the skills necessary to analyse, design and implement digital protecti	ve relays.			
	Course Outcomes (CO) with Bloom's Taxonomy Level				
CO	Interpret the performance of devices like CT, PT and relays used in digital	Apply			
1	protection of Power Systems.				
CO	Analyse the use of digital systems for protection of different parts of power	Analyse			
2	system.				
CO	Estimate and Justify settings of relays for protection of different parts of	Evaluate			
3	power system.				
CO	Designanalog/digital protection scheme for simple electrical systems.	Create			
4					

Modul	Module Contents	Hours
e		
Ι	Review of Relaying Schemes Protection schemes for alternator, transformer, bus bar and induction motors. Transmission line protection using over current- time graded and current graded schemes, drawbacks of these schemes, differential & distance schemes, Electromagnetic CT and PT.	6
Π	Comparators a. Dual Input Comparator: Amplitude comparator, phase comparator, duality between amplitude and phase comparators, cosine-type and	4

	sine-type phase comparators, coincidence type phase comparator.	
	b. Multi Input Comparator: Amplitude comparator, phase comparator.	
	Over Current Relays	
III	Different time-current characteristics of over current relay, Microprocessor/microcontroller based over current relay, Directional over current relay and its implementation using microprocessor/microcontroller based scheme.	8
	Differential Relays	
IV	Circulating current differential protection, percentage differential protection of power transformers, effect of magnetizing inrush, effect of over voltage inrush, hardware and software used for digital protection of transformer.	8
	Distance Protection Relays	
V	Microprocessor/microcontroller based impedance, reactance and admittance relays, and measurement of R and X. Quadrilateral characteristics. Digital protection scheme based upon fundamental frequency signals, hardware and software design.	8
	Recent Developments in Digital Protection	
VI	Digital Relaying techniques based on modern tools of digital signal processing like DFT, Haar Transform, WT etc.	4
	Text Books	
1	Badri Ram, D.N. Vishwakarma, " <i>Power System Protection and Switchgea</i> 2004.	<i>r</i> ", TMH,
2	Y.G. Paithankar, S.R. Bhide, "Fundamentals of Power System Protection", PL	HI, 2003.
	Defevences	
1	L.P. Singh "Digital Protection" New Age Second Edition 2004	
2	A.G. Phadke, J.S. Thorp, "Computer Relaying for Power Systems", Wiley Ind 2012	ia, II Edi.,
	·	
	Useful Links	
1	https://nptel.ac.in/courses/108/107/108107167/	
2	https://nptel.ac.in/courses/108/105/108105167/	

CO-PO Mapping						
	Programme Outcomes (PO)					
	1 2 3 4 5 6					
CO1	2					

CO2				3		
CO3			2			
CO4		2				1
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High						
Each CO of the course must map to at least one PO.						

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course							
Bloom's Taxonomy Level	T1	T2	ESE	Total			
Remember							
Understand							
Apply	10	5	10	25			
Analyse	10	5	20	35			
Evaluate		10	20	30			
Create			10	10			
Total	20	20	60	100			

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
			AY 2	021-22		
			Course I	nformation		
Progr	am	me	M.Tech. (Power	System Enginee	ring)	
Class	, Sei	mester	First Year M. Tec	ch., Sem I		
Cours	se C	ode	5PS502			
Cours	se N	ame	Application of Po	ower Electronics	s to Power systems	
Desir	ed F	Requisites:	Power System Er	ngineering, Pow	er Electronics	
]	Геас	hing Scheme		Examination S	Scheme (Marks)	
Lectu	re	3Hrs/week	T1	T2	ESE	Total
Tutor	ial	-	20	20	60	100
Pract	ical	-				
Intera	actio	on -		Crea	lits: 3	
			Course	Objectives		
1	To	make students und	lerstand concept of	FACTs envisag	ges the use of power	electronics to
-	im	prove system opera	tion by fast & relia	ble control.		
2	To va	cover concepts of rious FACTs contro	FACTs including the factor of the second s	e description, p	rinciple of workinga	nd analysis of
3	To	strengthen the cont	rol of FACTs and s	vstem interaction	ons.	
		Course (Outcomes (CO) wi	th Bloom's Tax	onomy Level	
CO	Ex	plain necessity, op	erating principals a	nd benefits of F	ACTs devices.	Understand
1		1 5/1				
CO	Cł	noose the suitable F.	ACTs device/contro	oller for particul	ar application.	Apply
	A r	aluza the character	mistics of EACTs (ontrollors and a	offect of location of	Analyse
3	AI the	e controller on Powe	er System			Analyse
5			er system.			
Mod	ո		Module (Contents		Hours
e	un		Withduit	Jontents		nours
-		Introduction				
The concept of f			lexible AC transm	ission - reactiv	ve power control in	
electrical pov		electrical power th	ransmission lines -	uncompensated	transmission line -	6
		series and shunt co	ompensation. Over	view of FACTS	devices - Static Var	
		Compensator (SV	C) – Thyristor Sv	vitched Series	capacitor (TCSC) -	
		Unified Power	Flow controller(U	PFC) - Integ	rated Power Flow	
		Controller(IPFC).				

	Static VAR Compensator (SVC) and Applications				
II	Voltage control by SVC – advantages of slope in dynamic characteristics –influence of SVCon system voltage. Applications - enhancement of transientstability – steady state powertransfer – enhancement of power system damping –prevention of voltage instability.	6			
	Thyristor Controlled Series Capacitor (TCSC) and Applications				
III	Operation of the TCSC - different modes of operation – modeling of TCSC – variable reactance model – modeling for stability studies. Applications -improvement of the system stability limit – enhancement of system damping – voltage collapse prevention.	6			
	Emerging FACTS Controllers I				
IV	Static Synchronous Compensator (STATCOM) – operating principle –V-I characteristics	6			
	Emerging FACTS Controllers II				
V	Unified Power Flow Controller (UPFC) – Principle of operation - modes of operation –applications – modeling of UPFC for power flow studies.	6			
	Co-Ordination of FACTS Controllers				
VI	FACTs Controller interactions – SVC–SVC interaction - co-ordination of multiple controllers using linear control techniques – Quantitative treatment of control.	6			
	Text Books				
1	R. Mohan Mathur, Rajiv. K. Varma, " <i>Thyristor – Based Facts Controllers fo</i> <i>Transmission Systems</i> ", IEEE press and John Wiley & Sons Inc., 2002	or Electrical			
	References				
1	A.T. John, <i>"Flexible AC Transmission System"</i> , Institution of Electrical and Electroni Engineers (IEEE), 1999.				
2	NarainG.Hingorani, Laszio. Gyugyl, "Understanding FACTS Concepts and of Flexible AC Transmission System". Standard Publishers, Delhi, 2001.	Technology			
	Useful Links				
c	https://nptel.ac.in/courses/108/107/108107114/				

CO-PO Mapping						
	Programme Outcomes (PO)					
	1 2 3 4 5 6					
CO1			1			
CO2				2		
CO3						2

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

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Assessment

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Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course							
Bloom's Taxonomy Level	T1	Τ2	ESE	Total			
Remember							
Understand	10	10	20	40			
Apply	5	5	20	30			
Analyse	5	5	20	30			
Evaluate							
Create							
Total	20	20	60	100			

Walchand College of Engineering, Sangli					
	(Government Aided Autonomous Institute)				
AY 2021-22					
	Course Information				
Programme	M.Tech. (Power System Engineering)				
Class, Semester	First Year M.Tech., Sem I				
Course Code 5PS560					
Course Name	Research Methodology				

Teaching SchemeExamination Scheme (Marks)Lecture-LA1LA2ESETotalTutorial-303040100Practical-NilInteraction2 Hrs/weekCredits: 2Course Objectives1To develop a research orientation among the students and to acquaint them with fundamentals of research methods.2To develop anderstanding of the basic framework of research process and techniques3To identify various sources of information for literature review and data collection.4To develop an understanding of the thical dimensions of conducting applied research.5To develop understanding about patent process.Course Outcomes (CO) with Bloom's Taxonomy LevelAt the end of the course, the students will be able to,CO1Classify various methods to solve research problem.ApplyCO3Investigate various late analysis techniques for a research problem.CO4Identify various Intellectual Property Rights procedures1What is research, types of research, the process of research, Literature survey and review, Formulation of a research problem.1Research Methods1Research Methods1Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis and interpretation, uni-variate and bi-variate analysis of data, testing of hypotheses.1Quantitative Techniques, Sampling fundamentals, Testing of hypotheses.11Quantitative Techniques, Sampling fundamentals,	Desire	d Requ	uisites:	None				
Teaching SchemeExamination Scheme (Marks)Lecture-LAILA2ESETotalTutorial-303040100Practical-NilInteraction2 Hrs/weekCredits: 2Interaction2 Hrs/weekCredits: 2VerestripVerestrip1To develop a research orientation among the students and to acquaint them with fundamentals of research methods.To develop understanding of the basic framework of research process and techniques3To identify various sources of information for literature review and data collection.To develop understanding of the ethical dimensions of conducting applied research.5To develop understanding about patent process.Course Outcomes (CO) with Bloom's Taxonomy LevelAt the end of the course, the students will be able to,CO1CO2Construct a research problem in respective engineering domain.ApplyCO3Investigate various data analysis techniques for a research problem.Analys cCO4Identify various Intellectual Property Rights proceduresApplyModuleModule ContentsHoursResearch Fundamentals4IIResearch MethodsSing of data, Design of ExperimentIIQuantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis of data, Design of ExperimentIIIQuantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis of data, testing of hypothesis using various tests like Multivariate analysis of data, testing								
Lecture - LAI LA2 ESE Total Tutorial - 30 30 40 100 Practical - Nil Interaction 2 Hrs/week Credits: 2 Course Objectives 1 To develop a research orientation among the students and to acquaint them with fundamentals of research methods. 2 To develop understanding of the basic framework of research process and techniques 3 To identify various sources of information for literature review and data collection. 4 To develop understanding of the chical dimensions of conducting applied research. 5 To develop understanding of the thical dimensions of conducting applied research. 6 Course Outcomes (CO) with Bloom's Taxonomy Level At the end of the course, the students will be able to, Course Outcomes (CO) with Bloom's Taxonomy Level CO1 Classify various methods to solve research problem. Apply CO2 Construct a research problem in respective engineering domain. Apply CO3 Investigate various data analysis techniques for a research problem. 4 CO4 Identify various Intellectual Property Rights procedures Apply Module Module Cont	Теа	aching	Scheme		Examination Sch	eme (Marks)		
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5 To develop understanding about patent process. Course Outcomes (CO) with Bloom's Taxonomy Level At the end of the course, the students will be able to, Apply C01 Classify various methods to solve research problem. Apply C02 Construct a research problem in respective engineering domain. Apply C03 Investigate various data analysis techniques for a research problem. Analys c CO4 Identify various Intellectual Property Rights procedures Apply Module Module Contents Hours Research Fundamentals I What is research, types of research, the process of research, Literature survey and review , Formulation of a research problem. 4 II Research Methods II 4 III Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IIII Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using	4	To de	evelop an unde	rstanding of the e	thical dimensions of	conducting applied	research.	
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CO4 Identify various Intellectual Property Rights procedures Apply Module Module Contents Hours Research Fundamentals Hours I What is research, types of research, the process of research, Literature survey and review , Formulation of a research problem. 4 Research Methods 4 II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 Research Communication 4 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report, writing such as WORD L atax etc. Twrees of journal/conference papers.	CO3	Inves	stigate various	data analysis tech	nniques for a research	1 problem.	Analys	
CO4 Identify various Intellectual Property Rights procedures Apply Module Module Contents Hours Research Fundamentals Hours I What is research, types of research, the process of research, Literature survey and review , Formulation of a research problem. 4 Research Methods II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD L atax etc. Twrees of journal/conference papers 4		T 1	·•• • • • • • •	11 . 1 .	D.1. 1		e	
Module Module Contents Hours Research Fundamentals Research Fundamentals 4 I What is research, types of research, the process of research, Literature survey and review , Formulation of a research problem. 4 Research Methods II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD L tata at Types of journal/conference paper. 4	CO4	Ident	t ify various Int	ellectual Property	Rights procedures		Apply	
Module Module Contents Hours I Research Fundamentals 4 I What is research, types of research, the process of research, Literature survey and review , Formulation of a research problem. 4 Research Methods II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD L stev etc. Twres of journal/conference papers 4	Madu	1.		Mad	lula Contonta		Hanna	
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II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report 4		R	esearch Meth	ods				
II Research design- Meaning, Need and Types , Research Design Process, Measurement and scaling techniques, Data Collection – concept, types and methods, Processing and analysis of data, Design of Experiment 5 III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report 4								
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methods, Processing and analysis of data, Design of Experiment Analysis Techniques III Quantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. 5 Research Communication 4 IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers		N	leasurement a	nd scaling technic	ues, Data Collection	n – concept, types a	nd	
Analysis TechniquesAnalysis TechniquesIIIQuantitative Techniques, Sampling fundamentals, Testing of hypothesis using various tests like Multivariate analysis, Use of standard statistical software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses.5IVResearch Communication4IVWriting a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers4		n	nethods, Proces	ssing and analysis	of data, Design of E	xperiment		
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software, Data processing, Preliminary data analysis and interpretation, Uni-variate and bi-variate analysis of data, testing of hypotheses. Research Communication IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers	111	u	sing various t	ests like Multiva	riate analysis, Use	of standard statistic	cal	
Uni-variate and bi-variate analysis of data, testing of hypotheses. Research Communication IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers		S	oftware, Data	processing, Prel	iminary data analys	is and interpretation	on,	
Research Communication IV Writing a conference paper, Journal Paper, Technical report, dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers		U	ni-variate and	bi-variate analysi	s of data, testing of h	ypotheses.		
IV Writing a conference paper, Journal Paper, Technical report, 4 dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers		R	esearch Comn	nunication				
IV writing a conference paper, Journal Paper, Technical report, 4 dissertation/thesis writing. Presentation techniques, software used for report writing such as WORD. Latex etc. Types of journal/conference papers		1	Uriting a	onfaranco nonc	r Journal Danar	Technical rem	art d	
writing such as WORD I atex ate. Types of journal/conference papers		и Б	issertation/theo	sis writing Preser	tation techniques so	ftware used for rep	$r_{1}, 4$	
withing such as words, have one rypes of journal/contented papers. \square		w w	riting such as	WORD, Latex etc	c. Types of journal/co	onference papers.		
	IV	d	issertation/thes	sis writing. Preser	tation techniques, so	ftware used for rep	ort	

	Intellectual Property Rights	
V	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	5
	Patents and Patenting Procedures	
VI	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs	4
	Text Books	
1	C. R. Kothari, Research Methodology, New Age international	
2	Deepak Chopra and NeenaSondhi, Research Methodology : Concepts and case Publishing House, New Delhi	es, Vikas
	References	
1	E. Philip and Derek Pugh, How to get a Ph. D. – a handbook for students and t supervisors, open university press	heir
2	Stuart Melville and Wayne Goddard, Research Methodology: An Introduction Science & Engineering Students	for
	Useful Links	
1	NPTEL Lectures	

CO-PO Mapping								
		Programme Outcomes (PO)						
	1	1 2 3 4 5 6						
CO1	2		1					
CO2					2	2		
CO3				2				
CO4		2						
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High								
Each CO of the course must map to at least one PO.								

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is	a separate head	of passing. LA1	, LA2 together is	treated as In-Semester
Evaluation				

Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks)								
(For lab Courses)								
Bloom's Taxonomy LevelLA1LA2Lab ESETotal								
Remember								
Understand								
Apply	15	15	20	50				
Analyze	15	15	20	50				
Evaluate								
Create								
Total Marks	30	30	40	100				

Walchand College of Engineering, Sangli							
		(Gove	ernment Aided A	Autonomous Ins	stitute)		
			Course In	formation			
Programm	e.		M.Tech. (P	ower System	Engineering)	
Class. Sem	ester		First Year N	M. Tech., Sen	n I	,	
Course Co	de		5PS551				
Course Na	me		Activity Ba	sed Lab for D	Digital Protect	ion of Pow	ver System
Desired Re	equisites	5	Digital Pro	tection of Po	wer System		
	-		0		•		
Teaching Scheme Examination Scheme (Marks)							
Lecture		-	LA1	LA2	Lab ESE	T	'otal
Tutorial		-	30	30	40		100
Practical		2 Hrs/Week			-	1	
Interaction	1	-			Credits: 1		
			3				
			Course C	Objectives			
1	To dev practic	velop analytical es.	skills of the	e student and	d help to eva	luate mod	ern relaying
2	To ena opport	ble the student t unity for designi	to develop pi ing relaying h	rotective rela	ying concept	s as well a	s provide an
		~ ~ ~					
A + 41 1	- 6 41	Course Outcon	nes (CO) wit	th Bloom's T	l'axonomy Le	evel	
At the end	$\mathbf{D}_{\mathbf{D}}$	ourse, the studen	ts will be abl	e to,	a digital rala	10	Apply
COI	Test di	gital relays to ye	arify the oper	rating charact	teristics	/5.	Apply Applyse &
CO2							Evaluate
CO3	Design group	hardware and c task.	compile prog	rams for simp	ple digital rela	ays, as a	Create
		List o	of Experimer	nts / Lab Act	tivities		
Lab activities/performance shall include mini project, presentations, drawings, case study, report							
writ	writing, site visit, lab experiment, tutorials, assignments, group discussion, programming, and other suitable activities as per neture and requirement of lab course.						
Taxt Rooks							
Badri Ram, D.N. Vishwakarma,"Power System Protection and Switchgear", TMH, 2004.							
	1						
References							

-		
	1	PRDC Relay user manuals
	2	MiPower user manuals
	2	A.G. Phadke, J.S. Thorp, "Computer Relaying for Power Systems", Wiley India, II
	5	Edi., 2012.
		Useful Links
		https://nptel.ac.in/courses/108/107/108107167/
		https://nptel.ac.in/courses/108/105/108105167/

CO-PO Mapping								
	Programme Outcomes (PO)							
	1	2	3	4	5	6		
CO1			3					
CO2				2	2			
CO3 2 2								
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High								

Each CO of the course must map to at least one PO.

Assessment								
There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab ESI	E is a separate head o	f passing. LA1, I	LA2 together is treated as In-Semester Eva	luation.				
Assessment Based on Conducted Typical Schedule (for 26-week Sem) Ma								
		by						
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30				
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30				
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40				
Week 1 indic	ates starting week o	of a semester T	he typical schedule of lab assessments is	shown				

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		

Remember				
Understand				
Apply	20	10	10	40
Analyse	10	10	10	30
Evaluate		10	10	20
Create			10	10
Total Marks	30	30	40	100

Walchand College of Engineering, Sangli						
(Government Aided Autonomous Institute)						
	AY 2020-21					
			Course	Information		
Progr	amme		M.Tech. (Pow	er System Engin	eering)	
Class,	Class, Semester First Year M. Tech., Sem I					
Cours	se Code		5PS552			
Course Name Activity Based Lab for Application of Power Electronics to Pow					onics to Power	
			Systems			
Desire	ed Requi	sites:	Power System	Engineering, P	ower Electronics	
		~ .			~ ~ ~ ~ ~ ~	
	leaching	Scheme	T 4 4	Examination	Scheme (Marks)	
Lectu	re	-		LA2	Lab ESE	Total
Tutor		-	30	30	40	100
Pract	ICAI	2 Hrs/ Week		C	. d:4 1	
Intera	iction	-		Cr		
			Cours	a Objectives		
	To mak	e students unde	erstand concept	of FACTs envis	ages the use of nower	electronics to
1	improve	e system operat	ion by fast & re	eliable control.	ages the use of power	cicculonies to
•	To cove	er concepts of H	FACTs includin	g the description	, principle of workin	g and analysis
2	of vario	us FACTs cont	rollers.	0 1		
3	To stren	gthen the contr	ol of FACTs an	d system interac	tions.	
		Course O	utcomes (CO)	with Bloom's Ta	axonomy Level	
CO	Simula	t ion of variou	is FACTs dev	vices to underst	and principle and	Understand
1	modelli	ng.				
CO 2	Choose	the suitable FA	CTs device/con	ntroller for partic	ular application.	Apply
CO	Analys	e the characteri	stics of FACTs	Controllers and	effect of location of	Analyse
3	the cont	roller on Powe	r System.			J
]	List of Experin	nents / Lab Acti	vities	
Lab ac	tivities/pe	rformance shall	include mini pro	oject, presentation	s, drawings, case study	, report writing,
site vi	sit, lab e	xperiment, tutor	rials, assignment	ts, group discussi	on, programming, and	l other suitable
activities as per nature and requirement of lab course						
		M. 1		xt Books	Duned Friedrich	
1	$ \begin{array}{c} \mathbf{R} \\ E \end{array} \rangle$. Monan Math lectricalTransn	iur, Kajiv. K. <i>iission Systems</i>	varma, <i>Thyrist</i> ", IEEE press an	or – Basea Facts С d John Wiley & Sons	Inc., 2002
			Re	eferences		

1	A.T.John, "Flexible AC Transmission System", Institution of Electrical and Electronic Engineers(IEEE), 1999.					
2	NarainG.Hingorani, Laszio. Gyugyl, "Understanding FACTS Concepts and Technology of Flexible AC Transmission System", Standard Publishers, Delhi, 2001.					
Useful Links						
1						

CO-PO Mapping								
Programme Outcomes (PO)								
	1 2 3 4 5 6							
CO1			2					
CO2				2				
CO3						2		
			:					

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

Assessment						
There are thre	e components of lab	assessment, LA1	, LA2 and Lab ESE.			
IMP: Lab ESE	E is a separate head of	f passing. LA1, I	LA2 together is treated as In-Semester Eva	luation.		
Assessment Based on Conducted Typical Schedule (for 26-week Sem) M						
		by				
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30		
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30		
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40		

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)					
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total	

Remember				
Understand	10	10	10	30
Apply	20	10	10	40
Analyse		10	20	30
Evaluate				
Create				
Total Marks	30	30	40	100

Walchand College of Engineering, Sangli						
			(Government Aided	d Autonomous Institu	te)	
	AY 2021-22					
			Course]	Information		
Progr	amme		M. Tech. (Powe	r System Enginee	ering)	
Class	Class, Semester First Year M. Tech., Sem I					
Cours	Course Code 5PS553					
Cours	se Name		Presentation and	d Technical Repo	rt Writing	
Desired Requisites:						
T	1. 01					
Ieaching Scheme (Hrs) Examination Scheme (Marks)				T ()		
Lectu	re	-			ESE	
Tutor Deced	iai Se s l	-	30	30	40	100
Practi		-		Crued	34~~ 1	
Intera		1		Crea		
			Course	Objectives		
1	To prov	ide an opportu	nity to student to	do work indepen	dently on a topic.	
2	To enco	urage creative	thinking process	in technical repor	rt writing	
3	To enab	le student for s	pood technical ret	ort writing and e	ffective presentatio	ns.
	10 01100	Course O	outcomes (CO) w	vith Bloom's Tax	onomy Level	
At the	end of th	ne course, stud	ents will be able t	0.	<u>y</u>	
CO	Demons	strate the chara	cteristics of techr	nical and business	writing.	Apply
1					8	11.5
CO	Produce	e documents re	elated to technolo	ogy and writing i	n the workplace an	d Create
2	will hav	e improved the	eir ability to write	e clearly, concisel	y, and accurately.	
CO	Use a	variety of ma	terials to produc	e appropriate vis	sual presentation for	or Evaluate
3	docume	nts, such as ins	structions, descrip	otions, and resear	ch reports.	
Course Content						
This course introduces students to the discipline of technical communication. Preparation of visuals to supplement text, workplace communication, descriptions of mechanisms, explanations of processes, and writing reports are the major topics included.						

This course is designed for students enrolled in technical degree programs for making them industry ready.

Text Books

1	Suitable books based on the contents of the topic.				
	References				
1	Suitable books based on the contents of the selected topic and research papers from reputed national and international journals and conferences.				
Useful Links					
1	As per the need of the topic of report and presentation				

CO-PO Mapping							
Programme Outcomes (PO)							
1 2 3 4 5 6							
CO1		3					
CO2		2		1			
CO3 1 2							
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							

Each CO of the course must map to at least one PO.

Assessment							
There are thre	e components of lab	assessment, LA1	, LA2 and Lab ESE.				
IMP: Lab ESE	E is a separate head of	f passing. LA1, I	LA2 together is treated as In-Semester Eva	luation.			
Assessment Based on Conducted Typical Schedule (for 26-week Sem) M							
		by					
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30			
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30			
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40			

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		

Remember				
Understand				
Apply	10	10	10	30
Analyse				
Evaluate	10	10	10	30
Create	10	10	20	40
Total Marks	30	30	40	100

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
		AY	2021-22			
		Course l	Information			
Programme	Programme M.Tech. (Power System Engineering)					
Class, Semeste	r	First Year M. 7	Tech., Sem I			
Course Code		5PS554				
Course Name		Professional SI	kills 1			
Desired Requis	sites:					
Teaching Sch	eme (Hrs)		Examination S	cheme (Marks)		
Lecture	-	LA1	LA2	ESE	Total	
Tutorial	-	30	30	40	100	
Practical	-					
Interaction	1		Cred	its: 1		
		Course	Objectives			
1	To provide	a hands on expe	rience of software	e in solving comp	olex Electronics	
1	engineering	problems.				
2	To enhance	the employability	y of Electronics en	ngineering studen	t.	
	Course O	outcomes (CO) w	ith Bloom's Tax	onomy Level		
At the end of th	e course, stude	ents will be able t	0,			
CO1	Use of th	e software rela	ted to Electroni	cs engineering	Evaluate	
	effectively.					
CO2	Develop th	e solution for H	Electronics engin	eering problem	Create	
	using softw	are.				
CO3	Explain the	e process of pro	oblem solving us	sing computing	Understand	
	tools.					
		C	C + +			
		Cours	ellontent			

This course is based on computing as a tool to design and analyse the Electronics system. In the modern day work environment, the Electronics engineers should be able to simulate and solve complex problems on computers. The Electronics engineer must be highly computer literate. The engineer with strong fundamentals in Electronics Engineering and computer software proficiency is highly in demand from industry. Employability of the student can be enhanced by providing software training in Electronics engineering.

Text Books

1	Suitable books based on the software selected.					
	References					
1	Suitable books based on the contents of software selected					
Useful Links						
1	As per the need of the software training					

CO-PO Mapping Programme Outcomes (PO)						
		<u> </u>	3	4	5	0
CO1	2					
CO2			2			
CO3		3				1
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High						

Each CO of the course must map to at least one PO.

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Litaraation				
Assessment	Based on	Conducte	Typical Schedule (for 26-week Sem)	Marks
		a by		
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember						
Understand	10	10	10	30		
Apply						
Analyze						
Evaluate	10	10	15	35		
Create	10	10	15	35		
Total Marks	30	30	40	100		

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
	AY 2021-22						
			Course Informa	tion			
Progra	ımme	:	M.Tech. (Power System En	ngineering)			
Class,	Seme	ster	First Year M. Tech., Sem I	[
Course	e Cod	e	5PS511				
Course	e Nan	ne	Professional Elective I: Por	wer Apparatu	s Modelling		
Desire	d Req	uisites:	Power System Engineering and Stability	g, A.C. Mach	ines, Power Sy	stem Analysis	
Теа	achin	g Scheme	Examin	ation Schem	e (Marks)		
Lectur	·e	3Hrs/week	T1	Τ2	ESE	Total	
Tutori	al	-	20	20	60	100	
Practio	cal	-			·		
Intera	ction	-		Credits: 3			
			Course Objecti	ves			
1	To j	provide the st	udents the ability to under	stand the pro-	oblem of stab	ility of single	
-	mac	chine connected to infinite bur and multi machine system.					
2	To appr	give the stude oach used in p	ents a sound mathematical ower system.	approach to	wards modelli	ng of various	
		Course	e Outcomes (CO) with Bloo	om's Taxonor	ny Level		
At the	end of	f the course, the	e students will be able to,				
CO1	Con	struct models	of apparatus in power syster	n.		Apply	
CO2	Ana	lyse models for	r stability of power systems.			Analyse	
CO3	Rec	ommend soluti	ions to the problem of power	r system stabi	lity and control	l. Evaluate	
Modu	le		Module Conter	nts		Hours	
		ntroduction to	o Power System Stability P	roblem			
I		51 . C.		. 1 • 1 •		, 6	
		Classification of stability, resolution of stability problem by classical					
		nethod, transfe	ni stability of multi-machine	e system.			
		viouening of Sy	incuronous machine				
П	1	Physical descri	ntion mathematical descrip	tion of synch	ronous machir	e 6	
		lg0 transforma	tion, per unit representation	. equivalent o	circuits for dire	ct	
	8	and quadrature	axis.				
		Excitation Syst	tem				
III		J				6	
	I	Elements of excitation system, types of excitation system, necessity of					

	stabilizing circuits IEEE excitation systems.	
	Prime Movers and Energy supply Systems	
IV	Turbines and governing systems, modeling of steam turbines, steam turbine controls, steam turbine off-frequency capability.	6
	Dynamic modeling of hydro turbine and governors	
V	Hydraulic turbine transfer function, governors for hydraulic turbines, detailed hydraulic system model, guidelines for modeling hydraulic turbines	6
	Load modeling for stability studies.	
VI	Basic load modeling concepts, static load models, dynamic load models, modeling of induction motor, per unit representation, representation in stability studies.	6
	Text Books	
1	P. Kundur, Power System, Stability and Control, Tata McGraw Hill, New Delhi	i, 1994.
	References	
1	K. R. Padiyar, "Power System Dynamic, Stability & Control", B.S. Publication	, 2008.
2	Peter W.Sauer, M.A. Pai, "Power System Dynamics and Stability", Person Asia 1998	Education

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1			3				
CO2				3			
CO3						2	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Bloom's Taxonomy Level	T1	T2	ESE	Total		
Remember						
Understand						
Apply	10	5	20	35		
Analyse	10	10	20	40		
Evaluate		5	20	25		
Create						
Total	20	20	60	100		

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
			A	Y 2021-22			
			Cours	e Information			
Progr	amme		M.Tech. (Pow	ver System Engin	leering)		
Class	, Semeste	r	First Year M.	Tech., Sem I	-		
Cours	se Code		5PS512				
Cours	se Name		Professional E	Elective I: DSP A	pplication to Pc	ower Sys	stem
Desir	ed Requi	sites:	Signals and S	ystems			
]	Feaching	Scheme		Examinatio	n Scheme (Mar	·ks)	
Lectu	re	3Hrs/week	T1	T2	ESE		Total
Tutor	ial	-	20	20	60		100
Pract	ical	-					
Intera	action	-		<u> </u>	redits: 3		
	1		Cour	se Objectives			
1	To prov	vide a mather	natical introdu	ction to the the	eory and applie	cations	oforthogonal
-	wavelet	s and their use	in analysing fur	nctions and func	tion spaces.		
	It includ	les a brief sur	vey of Fourier	series represent	ation of function	ns, Four	ier transform
2	and the	Fast Fourier 1	ransform (FFT)	ansform (FFT) before proceeding to the Haar wavelet system, 1			
	resolutio	on analysis, de	ecomposition a	nd reconstructio	n of functions,	Daubec	chies wavelet
	It aims	at importing sl	rills to develop	us.	laarithma for an	nligation	ng in the erec
3	of Powe	at imparting sr r Systems	this to develop	wavelet-based a	igoritinis for ap	prication	lis in the area
	011000	Course C	Dutcomes (CO)	with Bloom's T	axonomy Leve	1	
CO	Explain	the basic co	ncepts and ter	minology that a	re used in theF	ourier	Understand
1	Techniq	ues, wavelets	Fransforms and	Time frequency	analysis.		
CO	Calcula	te filter bank	coefficients an	nd Apply the co	ncepts of CWT	,STFT	Apply
2	and DW	T for signal ar	nalysis.		1	-	
CO	Constru	ict perfect re	construction w	vavelet filter ba	anks for a par	ticular	Analyse
	applicat	ion and justify	why wavelets	provide the right	tool.		
5							
	_ /						
Mod	ul		Modu	le Contents			Hours
	Fun	damentals of l	Linear Algebra	1:			
			0				
I	Vect	or spaces, E	Bases, Orthogo	onality, Orth	normality, Pro	jection,	4
	Func	tions and fu	nction Spaces,	, Orthogonal fi	unctions, Ortho	normal	
	funct	tions. Orthogon	nal basis function	ons.			

	Signal Representation in Fourier Domain	
П	Fourier series, Orthogonality, Orth normality and the method of finding the Fourier coefficients Complex Fourier series, Orthogonality of complex exponential bases, Mathematical preliminaries for continuous and discrete Fourier transform, limitations of Fourier domain signal processing, Review of Nyquist theorem., Review of Z transform, Application of Fourier family transforms in power systems.	6
	Discrete Wavelet Transform Introduction to Wavelet Transform: The origins of wavelets, Wavelets and other wavelet like transforms, History of wavelet from Morlet to Daubechies via Mallat, Different communities and family of wavelets, Different families of wavelets within wavelet communities	
III	Discrete wavelet transforms: Introduction, Haar Scaling Functions and Function Spaces, Translation and Scaling, Orthogonality of Translates, Function Space Vo, Finer Haar ScalingFunctions, Nested Spaces Haar Wavelet Function, Scaled Haar Wavelet Functions, Orthogonality of $\varphi(t)$ and $\psi(t)$, Normalization of Haar Bases at Different Scales, Standardizingthe Notations, Refinement Relation with Respect to Normalized Bases, Support of a Wavelet System, Triangle Scaling Function, Daubechies Wavelets.	8
	Discrete Wavelet Transform and Relation to Filter Banks	
IV	Signal decomposition (Analysis), Relation with filter banks, Frequency response, Signal reconstruction: Synthesis from coarse scale to fine scale, Up sampling and filtering, Perfect reconstruction filters, QMF conditions, Computing initial sj+1 coefficient, Concepts of Multi-Resolution Analysis (MRA) and Multi-rate signal processing, Applications of DWT in power systems.	8
	Short Time Fourier Transform(STFT) and Continuous Wavelet	
V	Short Time Fourier Transform: Signal representation with continuous and discrete STFT, concept of time-frequency resolution, Resolution problem associated with STFT, Heisenberg's Uncertainty principle and time frequency tiling, why wavelet transform?	6
	Continuous Wavelet Transform: Wavelet transform-A first level introduction, Continuous time-frequency representation of signals, Properties of wavelets used in continuous wavelet transform, Continuous versus discrete wavelet transform.	
VI	Designing Orthogonal Wavelet Systems-A Direct Approach	
L	1	

	Refinement relation for orthogonal wavelet systems, Restrictions on filter coefficients, Condition-1: Unit area under scaling function, Condition-2: Orth normality of translates of scaling functions, Condition-3: Orth normality of scaling and wavelet functions, Condition-4: Approximation conditions (Smoothness conditions), Designing Daubechies orthogonal	6				
	wavelet system coefficients, Constraints for Daubechies' 6 tap scaling					
	function.					
	Text Books					
1	K P Soman, Ramachandran, Resmi, "Insights into wavelets from theory t Prentice Hall,New Delhi,	o practice",				
2	A.N. Akansu and R.A. Haddad, "Multiresolution signal Decomposition: Transforms, Subbands and Wavelets", Academic Press, Oranld, Florida, 1992.					
3	John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing", Pear Hall,2007.	son Prentice				
	References					
1	C. Sidney Burrus, Ramesh A. Gopinath, HaitaoGuo, "Introduction to W WaveletTransform"s, A Primer PH International Editions, 1998.	Vavelets and				
2	Raghuveer M. Rao, Ajit S. Bopardikar, "Wavelet Transforms – <i>Introduction and Application's</i> ", Addison Wesley Pearson Education Asia, 2000.	on to Theory				
3	IEEE Transaction Papers.					
	Useful Links					
1	https://nptel.ac.in/courses/117/101/117101001/					

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1			2			
CO2				2		
CO3						3
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High						

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Bloom's Taxonomy Level	T1	Τ2	ESE	Total		
Remember						

Understand	10	10	20	40
Apply	10	5	20	35
Analyse		5	20	25
Evaluate				
Create				
Total	20	20	60	100

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
				AY 2021-22			
			Cou	rse Information			
Progra	mme		M. Tech. (Po	wer System Engine	eering)		
Class,	Class, Semester First Year M. Tech., Sem I						
Course	e Code	9	5PS513				
Course	e Nam	e	Professional	Elective II: Grid In	tegration of Rene	wable l	Energy
Desire	d Req	uisites:	Power Electr	onics, Renewable I	Energy		
	1.	0.1				<u>``</u>	
le	aching	3 II. s / see als	T 1	Examination	Scheme (Marks))	T- 4-1
Lectur	e al	3 Hrs./week	20	12	ESE		
Iutori	ai Nal	-	20	20	60		100
Intono	cal ation	-		Cr	adita. 2		
Intera	ction	-		Cro	euits: 5		
			Co	urse Objectives			
	To r	nake the stud	ents conversa	ant with configur	rations of renew	able e	nergy grid
1	integ	ration.		unt with configur			nergy grid
2	To pr	ovide the advar	nce knowledge	e about voltage-sou	rced converters &	their c	control.
•	To m	ake the student	s aware of rese	earch avenues in th	e field of renewab	ole grid	integration
3	along	g with DC micro	o-grid concept	s.		C	C
		Course	Outcomes (CO	O) with Bloom's T	axonomy Level		
At the	end of	the course, the	students will b	be able to,			
CO1	Sum	marize two lev	el voltage sour	rce converter in var	rious reference fra	ame.	Understan d
CO2	Appl	y various volta	ge source conv	verters and their con	ntrol.		Apply
CO3	Anal	yse grid synchr	onization tech	niques and DC mic	cro-gird.		Analyse
Modu	le		Moo	dule Contents			Hours
	0	overview of Re	newable Ener	·gy			
I Status & trends			s of renewabl	le energy sources, PV stand-alone	, solar fundamen	ntals,	7
	configurations, wind energy assessment, fixed & variable speed						
		irbines with red	luced & full ca	pacity converters.			
		wo level, three	phase voltag	e-sourced convert	er		
II	Ir	troduction. Tw	vo level voltag	ge sourced-converte	er: structure, prin	ciple	6
		β -frame, model	& control in c	lq frame.	o ievel v SC, mod		

	Three level, three phase, Neutral Point Clamped voltage-sourced	
	converter	
III	Introduction, Three level half bridge NPC, PWM sche e for three level half bridge NPC, switched model & average model for three level half bridge NPC, three level NPC: circuit structure, principle of operation. Three level NPC with impressed dc side voltage.	6
	Grid Imposed frequency VSC system: control in αβ-frame &dq-frame.	
IV	Introduction, structure of grid imposed frequency VSC system, real & reactive-power controller, Dynamic model & current mode control for real-/reactive power controller in $\alpha\beta$ -frame &dq frame, Phase locked Loop.	6
	Grid Synchronization	
V	Grid synchronization techniques for single-phase systems, grid synchronization using the Fourier analysis, grid synchronization using A phase-locked loop, PLL Based on a T/4 transport delay, PLL based on the Hilbert transform.	6
	DC Micro-grid	
VI	Introduction, DC micro-grid system overview, Operation and control of DC micro-grids, DC micro-grid system protection, Application of DC micro-grids to future smart grids.	5
	Iext Books	LON GUSTOMS
1	modeling, control, and applications" IEEE Press John Wiley, 2010.	ver systems_
2	Remus Teodorescu, Marco Liserre, and Pedro Rodriguez, "Grid Con Photovoltaic and Wind Power Systems", John Wiley & Sons, Ltd, 2011.	nverters for
	References	m. Courson?"
1	The Institution of Engineering and Technology, 2017.	gy sources ,
2	Math J. Bollen and Fainan Hassan, "Integration of Distributed Generation is System", IEEE Press, 2011.	in the Power
	Useful Links	
1	http://nptel.ac.in/downloads	
2	http://www.nptelvideos.in	
3	https://ocw.mit.edu/courses/electrical-engineering	

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1			3				
CO2				2			
CO3						2	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							
Each CO of the course must map to at least one PO.							

Assessment The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Bloom's Taxonomy Level	T1	T2	ESE	Total		
Remember						
Understand	10	5	20	35		
Apply	10	5	20	35		
Analyse		10	20	30		
Evaluate						
Create						
Total	20	20	60	100		

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
			A	Y 2021-22			
			Cours	se Information	1		
Progra	ımme		M.Tech. (Power	System Engin	eering)		
Class, Semester First Year M.Tech., Sem I							
Course	e Cod	e	5PS514				
Course	e Nam	ie	Professional Ele Power System	ective II : Neu	Iral Network and	l fuzzy	Application to
Desire	d Req	uisites:	Power system				
Tea	nching	Scheme		Examinatio	on Scheme (Mar	ks)	
Lectur	'e	3Hrs/week	T1	T2	ESE		Total
Tutoria	al	-	20	20	60		100
Practic	cal	-					
Intera	ction	-		(Credits: 3		
			Cour	se Objectives			
1	To m	ake the studer	nt conversant with	n basic knowle	dge of Neural Ne	twork	
2	To n syste	nake the stude	ent conversant w nd control.	vith design and	d programming	knowl	edge for power
3	To r appli	nake the stuc	lent conversant	with basic kn	owledge of fuzz	zy sys	stem and fuzzy
		Course	e Outcomes (CO) with Bloom's	s Taxonomy Lev	el	
At the	end of	the course, th	e students will be	able to,	..		
CO1	Exp	ain the basic l	knowledge of Net	ural Network			Understandin
	Ann	ly the Neural	network and fuzz	w knowledge	about different n	eural	<u> </u>
CO2	netw	orks their a	rchitecture and t	training algori	thm to solve n	ower	трру
001	svste	em problems.		und ungoin	unin to borre p	0 11 01	
CO3	Stud	v the different	t applications of r	neural networks	s and fuzzy logic		Analyse
	1	U			, <u> </u>		, <u> </u>
Module Module Contents					Hours		
	Introduction to Neural Networks						
I Introduction, Biological and Neuron Mode		Organization of the Brain, Biological Neuron, Artificial Neuron Models, Historical Developments, l, McCulloch and Pitts models of neuron, ANN weights sigmoidal functions Bias			6		
II	Image: International state of the state				6		

	Types of Neuron Activation Function, Neural networks architectures, Linearly separable and linearly non separable systems and their examples, Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Hebbian learning rule, Perceptron learning rule etc.	
III	Feed Forward Neural Networks Introduction, single layer Perceptron Models, architecture, Limitations of the Perceptron Model, Applications, Back Propagation Network, architecture, Multilayer Feed Forward Neural Networks. Use of ANN MATLAB tools for programming.	6
IV	Fuzzy SystemsBasic Fuzzy logic theory, history, operation of Fuzzy Logic, Fuzzy relation and extension principle, Fuzzy membership functions and linguistic variables, Mamdani and sugenos models. Use of MATLAB tools of fuzzy logic.	6
V	Application of Neural Network and fuzzy to power system operation and control problemsUse of MATLAB tools of ANN and fuzzy logic for power system applications. Case studies such as load fore-casting, optimal power flow, control applications in FACTS devices, etc.	6
VI	Application of Neural Network and fuzzy to recent power system protection problemsUse of MATLAB tools of ANN and fuzzy logic for protection applications. Case studies such as fault analysis, fault detection, fault classification, fault location, etc.	6
1	S. N. Sivanandam, "Introduction to Neural Networks using MATLAB 6" hill education, 2006.	', Tata McGraw
2	Hagan, Demuth, Mark Beale, "Neural Network Design", CengageLearin Limited, 2011.	ng India Private
	Keterences Stamatios V Kartalopoulos "Understanding neural networks and fu	zzy logic basic
1	concepts and applications", Prentice Hall of India (P) Ltd, New Delhi, 20	00.
2	J.M. Zurada, "Introduction to artificial neural systems", Jaico Publishers,	1992.
3	Timothy Ross, "Fuzzy Logic with Engineering Applications", Tata Publication, 1993	McGraw Hill
4	George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic", PHI L Limited, 1995.	earning Private
5	Research Papers.	

Useful Links				
1	https://onlinecourses.nptel.ac.in/noc21_ge07/preview			

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1						1	
CO2				3			
CO3				2			

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be 1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3, 4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
Bloom's Taxonomy Level	T1	T2	ESE	Total	
Remember					
Understand	10	5	20	35	
Apply	10	5	20	35	
Analyse		10	20	30	
Evaluate					
Create					
Total	20	20	60	100	

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)				
AY 2021-22				
Course Information				
Programme	M.Tech. (Power System Engineering)			
Class, Semester	First Year M. Tech., SemI			
Course Code	5IC502			
Course Name	Constitution of India			
Desired Requisites:				

	Teaching SchemeExamination Scheme (Marks)			rks)		
Lectu	ıre	2	T1	T2	ESE	Total
		Hrs/week				
Tutor	rial	-	20 20 60 100			
Pract	Practical -					
Inter	Interaction - Credits: Nil					
	Course Objectives					
1	1 To review and create awareness on various provisions in the constitution of India.				of India.	
	Course Outcomes (CO) with Bloom's Taxonomy Level					
At the	At the end of the course, students will be able to,					
CO	Explain the premises informing the twin themes of liberty and freedom understand				m understand	
1	from a civil	rights perspect	ive.			
	Address the growth of Indian opinion regarding modern Indian understand				an understand	
CO	intellectuals constitutional role and entitlement to civil and economic					
2	rights as well as the emergence of nationhood in the early years of Indian					
	nationalism					
CO	CO Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the					he understand
						he
5	Indian Constitution					

Module	Module Contents	Hours			
T	History of Making of the Indian Constitution Drafting	Λ			
	Committee, (Composition & Working	+			
	Philosophy of the Indian Constitution :				
II		4			
	Preamble, Salient Feature				
	Contours of Constitutional Rights:				
TIT		5			
111	Fundamental Rights; Right to Equality; Right to Freedom; Right	5			
	against Exploitation; Right to Freedom of Religion; Cultural and				

Educational Rights; Right to Constitutional Remedies; Directive							
	Principles of State Policy; Fundamental Duties.						
IV	IVOrgans of Governance:IVParliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions				5		
	Local	Administration	1:				
V	Distric Import Elected raj: In roles, Organi Role o democ	District"s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy				5	
	Electio	on Commission	:				
VI	/I Election Commission: Role and Functioning.Chief Election Commissioner and Election Commissioners.State Election Commission: Role and Functioning.				5		
	Institut	te and Bodies fo	r the welfare o	f SC/ST/OBC	and women.		
			Text Boo	ks			
1	Dr. S. 2015.	N. Busi, Dr. B	. R. Ambedka	r framing of Ir	ndian Constituti	ion, 1st Edition,	
2	2 M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014						
3 D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015							
Keterences 1 The Constitution of India 1050 (Dars Act) Covernment Dublication							
I Ine Constitution of India, 1950 (Bare Act), Government Publication							
Useful Links							
1	1 https://en.wikipedia.org/wiki/Constituent Assembly of India						
2 https://nptel.ac.in/courses/129/106/129106003/							
3	3 https://nptel.ac.in/noc/courses/noc20/SEM2/noc20-lw02/						
4	https://	eci.gov.in/abou	t/about-eci/the-	-functions-elect	toral-system-of-	-india-r2/	
CO-PO Mapping							
		2	Programme (Jutcomes (PO)		
CO1	1	<u> </u>	5	4	3	0	
CO2	2						
---	---	--	--	---	--	---	--
CO3				1		2	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Bloom's Taxonomy Level	T1	T2	ESE	Total		
Remember						
Understand	20	20	60	100		
Apply						
Analyze						
Evaluate						
Create						
Total	20	20	60	100		

Walchand College of Engineering, Sangli								
(Government Aided Autonomous Institute)								
			AY 20)21-22				
			Course In	formation				
Program	nme		M. Tech (Power S	ystem Engin	eering)			
Class, S	emester		First Year M. Tech	h., Sem II				
Course	Code		5PS521					
Course	Name		Power Quality in	Distribution S	Systems			
Desired	Requisi	tes:	Power Systems, P	ower Electro	nics			
		-			~ ~ ~ ~ ~ ~			
Tea	aching S	cheme		Examination	n Scheme (Mar	ks)		
Lecture		3Hrs/wee	T1	Т2	ESE	Total		
T-4		K	20	20	(0)	100		
Ducation	l	-	20	20	00	100		
Interest	ll tion	-		<u> </u>	adita. 2			
Interact	.1011	-		C	reults: 5			
			Course (hiectives				
	To ma	To make the students to understand basic knowledge of causes consequences and						
1	solution	nputerized processes						
	and ele	ctronic system	1 1					
n	To provide a theoretical background to correctly approach the problem of reactive,							
	harmor	nic and unbala	ance compensation.					
3	To und	erstand and a	pply the power theo	ories for com	pensation proble	ems.		
	1	Course C	Outcomes (CO) wit	th Bloom's T	axonomy Leve	I		
	State	and Expla	in the basic con	ncepts of P	ower Quality	Remember		
CO1	disturb	ances, reacti	ve power compen	sation, volta	ige regulation,	1		
COI	power	definitions	and					
	operati		ining of series and s	nunt compen	sators.	Understand		
	Apply	the theory	and algorithms to	o realize ref	erence current	Apply		
CO2	generat	tion, reactive	power compensat	ion, voltage	regulation and	PPPJ		
	harmor	nic compensa	tion.	, 8	8			
	Analys	se theories of	of load compensa	tion, referen	ce generation,	Analyse		
CO3	figures	ofmerits an	d power definition	is, Standards	applicable to			
	Power	Quality.						
	1					~~		
Modul	e		Module Con	itents		Hours		

	Introduction to Power quality	
Ι	Power Quality : Introduction, State of the Art on Power Quality, Classification of Power Quality Problems, Causes of Power Quality Problems, Effects of Power Quality Problems on Users, Classification of Mitigation Techniques for Power Quality Problems.	6
	Power Quality Standards and Monitoring : Introduction, State of the Art on Power Quality Standards and Monitoring, Power Quality Terminologies, Power Quality Definitions, Power Quality Standards, Power Quality Monitoring, Numerical Examples.	
	Power Definitions in Single Phase and Three phase Circuits	
II	Definitions of various powers, power factor and other figures of merit under balanced, unbalanced and non-sinusoidal conditions applicable to single phase circuits. Definitions of various powers, power factor and other figures of merit under balanced, unbalanced and non-sinusoidal conditions. IEEE 1459 power definitions applicable to three phase circuits	6
	Theories of Load compensation	
III	Introduction, State of the Art on Passive Shunt and Series Compensators, Classification of Passive Shunt and Series Compensators, Principle of Operation of Passive Shunt and Series Compensators, Analysis and Design of Passive Shunt Compensators, Modelling, Simulation, and Performance of Passive Shunt and Series Compensators, Numerical Examples	6
	Active Shunt Compensation	
IV	Introduction, State of the Art on DSTATCOMs, Classification of DSTATCOMs, Principle of Operation and Control of DSTATCOMs, Analysis and Design of DSTATCOMs, Modelling, Simulation, and Performance of DSTATCOMs, Numerical Examples.	6
	Active Series Compensation	
V	Introduction, State of the Art on Active Series Compensators, Classification of Active Series Compensators, Principle of Operation and Control of Active Series Compensators, Analysis and Design of Active Series Compensators, Modelling, Simulation, and Performance of Active Series Compensators, Numerical Examples.	6

	Unified Power Quality Compensators				
VI	Introduction, State of the Art on Unified Power Quality Compensators, Classification of Unified Power Quality Compensators, Principle of Operation and Control of Unified Power Quality Compensators, Analysis and Design of Unified Power Quality Compensators, Modelling, Simulation, and Performance of UPQCs, Numerical Examples.	6			
Text Books					
1	Dr. Mahesh Kumar, IIT Chennai, "Power Quality in Distribution S	ystems".			
2	2 Bhim Singh, Ambrish Chandra, Kamal Al-Haddad, "Power Quality Problems and Mitigation Techniques", Wiley, 2015.				
	References				
1	1 Roger C. Dugan, Mark F. McGranaghan, Surya Santoso, H. Wayne Beaty, " <i>Electrical Power Systems Quality</i> ", Mc-Graw Hill, Edition II, 1996.				
2	2 Angelo Baggini, "Handbook on Power Quality", John Wiley & Sons, New Jersey, USA, 2008				
Useful Links					
1	https://nptel.ac.in/courses/108/106/108106025/				

CO-PO Mapping							
Programme Outcomes (PO)							
	1	2	3	4	5	6	
CO1			3				
CO2				2			
CO3						2	
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course						
Bloom's Taxonomy Level	T1	T2	ESE	Total		

Remember	5	5	10	20
Understand	5	5	10	20
Apply	10	5	20	35
Analyse		5	20	25
Evaluate				
Create				
Total	20	20	60	100

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
			AY	2021-22			
			Course	Information			
Progra	amme		M.Tech. (Power S	System Engineer	ring)		
Class, Semester First Year M.Tech., Sem II							
Course	e Code	2	5PS522				
Course	e Nam	e	PLC and Embedo	led Systems			
Desire	d Req	uisites:	Instrumentation	Fechniques, Elec	trical Measuremen	nts,	
			Microcontroller a	and Applications			
Tor	ahina	Sahama		Examination	Sahama (Marks)		
Lectur	acining .0	3Hrs/week	T1	T2	FSF	r	Total
Tutori	ट al		20	20	60 60		100ai
Practi	ai cal		20	20	00		100
Intera	ction			Cre	dits: 3		
Intera	ction						
			Cours	e Objectives			
1	To ex	ploit the PLC	and Embedded Co	ontrol for industr	ial automation.		
2	To de	eveloping prog	grams using ladder	logic for industr	rial automation.		
3	To a Cont	nalyse the period.	erformance of auto	omation systems	s employing PLC	and 1	Embedded
		Course	Outcomes (CO)	with Bloom's Ta	axonomy Level		
At the	end of	the course, the	e students will be a	able to,			
CO1	Inter Indus	pret features strial Automat	s of PLC and E ion.	Embedded Contr	rol Systems used	1 for	Apply
CO2	Use l	adder logic pr	ogramming techni	que for various I	PLC applications.		Apply
CO3	Eval	uate the perfe	ormance of PLC r	network configur	rations, PLC func	tions	Evaluate
	used	for different a	pplication				
Modu	le		Modu	le Contents			Hours
I	In In m	ntroduction to ntroduction, A nodule, PLC O	o PLC Advantages, Disadvantages, Parts of PLC, PLC Input				6
	a computer, PLC memory and interfacing, Power Supply for PLC						
	P	LC program	ming				
PLC programming II Ladder Logic Symbols, Latching and Unlatching of PLC, Programming on/ off inputs to produce on/off outputs, relation of digital gate logic to contact / coil logic, creating ladder diagrams from process control			ming gic to ontrol	6			

	description.					
	PLC Timer and Counter Functions					
III	PLC timer functions, Types of PLC timers, Programming of Non-retentive timers for various applications, Programming of ON timers, OFF timers, PLC counter functions, Programming of UP, DOWN counters, Case studies related to Industrial Automations					
	PLC Arithmetic, Comparison and Branch functions					
IV	PLC Arithmetic functions, PLC comparison functions, Conversion functions, Master control relay functions, PLC jump functions, Jump with return and Jump with No return functions, Programs related to Arithmetic, Comparison and Branch functions					
	Advanced PLC functions					
V	Data move system, Data handling functions, Digital bit functions and applications, Sequencer functions, Analog PLC operations, PID control of continuous process, PID modules & tuning, Typical PID functions					
	PLC Networking					
VI	Networking of PLCs, Levels of Industrial Control, Types of Networking, Network Communications, Cell control by PLC Networks, Factors to consider in selecting a PLC	6				
	Text Books	1 0				
1	John W. Webb, Ronald A. Reis, " <i>Programmable logic controllers</i> , pri applications", PHI publication, Eastern Economic Edition, 1994.	nciples &				
	References	the de mand				
1	¹ John R. Hackworth and Peterson, "PLC controllers programming methods and applications", PHI,2004.					
2	Gary dunning, "Introduction to PLC, Thomson learning", Edition III, 2006					
3	William H. Bolton, "Programmable logic controllers", Newnes, Edition VI, 2	2006.				
	Useful Links					

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1			2				
CO2			2				
CO3				2			

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

Assessment (for Theory Course)

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course							
Bloom's Taxonomy Level	T1	T2	ESE	Total			
Remember							
Understand							
Apply	20	10	40	70			
Analyse							
Evaluate		10	20	30			
Create							
Total	20	20	60	100			

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
			AY 2	2021-22		
			Course I	nformation		
Progr	amme		M. Tech. (Powe	er System Enginee	ering)	
Class,	, Semeste	er	First Year M. Te	ech., Sem II		
Cours	se Code		5PS571			
Cours	se Name		Activity Based	Lab for Power Qu	uality in Distributi	on Systems
Desire	ed Requi	sites:	Power Systems,	, Power Electronie	cs	
7	Faa ahima	C ab arra a		Examination S	ah ama (Maulua)	
Lastu	reaching	Scheme	TA1	Examination S	Lob ESE	Tatal
Tutor	re iol	-	20	20		100
Droot	181 iool	- 2 Hrs/Waak	30		40	100
Intore				Crod	ite. 1	
Intel a		_			11.5. 1	
			Course	Objectives		
1	To educ	ate the students	with the practice	al aspects of Powe	er Quality issues	
-	To deve	elons the critics	al thinking in sol	lving nower qual	ity problems with	contemporary
2	Power (Duality Theorie	s.	tring power quar	ny problems with	contemporary
3	To enha	nce research sk	ills of students to	Power Ouality is	ssues.	
	10 01110	Course O	utcomes (CO) w	ith Bloom's Taxo	onomy Level	
СО	Calcula	te power com	ponents and ot	her figures of m	erit under distor	ed Apply
1	conditio	ons.	1	8		11.5
СО	Analys	e Power Quality	Problems and p	rovide suitable re	medy.	Analyse
2			1			
СО	Evalua	te theories of le	oad compensatio	n, reference gene	ration using suita	ole Evaluate
3	simulat	ion tool.	_	_	_	
]	List of Experime	ents / Lab Activit	ties	
Lab a	ctivities/I	Lab performanc	e shall include n	nini-project, prese	entations, drawing	s, case studies,
report	writing,	site visit, lab e	experiment, tutor	ials, assignments,	group discussion	, programming
and ot	her suita	ble activities, as	s per the nature a	nd requirement of	the lab course.	
Text Books						
1	Dr. M	Mahesh Kumar,	IIT Chennai, "Pe	ower Quality in D	Distribution System	
า	Bhin	n Singh, Ambi	rish Chandra, Ka	amal Al-Haddad,	"Power Quality	Problems and
Z	Mitig	gationTechnique	es", Wiley, 2015.			
			Refe	erences		
1	Roge	er C. Dugan, M	lark F. McGranag	ghan, Surya Santo	oso, H. Wayne Be	aty, " <i>Electrical</i>
T	Pow	er Systems Qua	<i>lity"</i> , Mc-Graw I	Hill, Edition II, 19	996.	

2	Angelo Baggini, "Handbook on Power Quality", John Wiley & Sons, New Jersey, USA, 2008					
Useful Links						
1	https://nptel.ac.in/courses/108/106/108106025/					

CO-PO Mapping							
	Programme Outcomes (PO)						
	1	2	3	4	5	6	
CO1			2				
CO2				2			
CO3						3	
The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High							
Each CO of the course must map to at least one PO.							

Assessment						
There are three components of lab assessment, LA1, LA2 and Lab ESE.						
IMP: Lab E	SE is a separate he	ead of passing.	LA1, LA2 together is treated as In-S	Semester		
Evaluation.						
Assessmen	Based on	Conducted	Typical Schedule (for 26-week	Marks		
t		by	Sem)			
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30		
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30		
Lab ESELab activities, attendanceLab Course FacultyDuring Week 15 to Week 18 Marks Submission at the end of Week 1840						
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab						

activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							

Understand				
Apply	10	10	10	30
Analyse	10	10	20	40
Evaluate	10	10	10	30
Create				
Total Marks	30	30	40	100

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
			A	Y 2021-22	/		
			Cours	se Information			
Progra	ımme		M.Tech. (Powe	r System Engineeri	ng)		
Class,	Semes	ster	First Year M.Te	ech., Sem II			
Course	e Code	e	5PS572				
Course	e Nam	e	Activity Based	Lab for PLC and E	mbedded System	S	
Desire	d Req	uisites:	Instrumentation	n Techniques, Elect	rical Measuremer	nts,	
			Microcontroller	r and Applications			
Tea	aching	Scheme		Examination S	cheme (Marks)		
Lectur	'e	-	LA1	LA2	Lab ESE	Total	
Tutori	al	-	30	30	40	100	
Practio	cal	2 Hrs/Week					
Intera	ctio	-		Cred	its: 1		
n							
			~				
	m 1	1		rse Objectives	1		
<u> </u>	To de	evelop progran	nming skills usin	ig PLC for Industria	al Automation		
2	To in	troduce the us	e of PLC for solv	ving real world pro	blems.		
3	To us	se PLC for con	trol applications	in electrical engine	eering		
A , ,1	1 0	Course	Outcomes (CO) with Bloom's Tax	xonomy Level		
At the	end of	the course, the	e students will be	e able to,		A 1	
	Exec	ute experimen	its based on PLC	and SCADA syste	ms	Apply	
<u>CO2</u>	Cons	struct basic co	ntrol systems us	ing PLC and SCAL	ОА. ·	Analyse	
03	Desi	gn ladder logic	c programs for va	arious PLC applicat	10ns.	Create	
			List of Experi	iments / Lab Activ	rities		
Lab ac	tivities	s/Lab performa	ance shall includ	e mini-project, pre	sentations, drawing	ngs, case studies,	
report	writing	g, site visit, la	b experiment, tu	torials, assignment	s, group discussion	on, programming	
and oth	er sui	table activities	, as per the natur	e and requirement of	of the lab course.		
			Т	ext Books			
1	John	W. Webb, 1	Ronald A. Reis	s, "Programmable	logic controller	rs, principles &	
1	appli	ications", PHI	publication, Eas	tern Economic Edit	tion, 1994.		
			F	References			
1	John <i>appli</i>	R. Hackwor	rth and Peterso , 2004.	on, "PLC control	lers programmin	ng methods and	

2	Gary dunning, "Introduction to PLC", Thomson learning, Edition III, 2006
3	William H. Bolton, "Programmable logic controllers", Newnes, Edition VI, 2006.

Useful Links

CO-PO Mapping							
		Programme Outcomes (PO)					
	1	2	3	4	5	6	
CO1			2				
CO2				2			
CO3	2						

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

Assessment							
There are thre IMP: Lab ESI	There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing, LA1, LA2 together is treated as In-Semester Evaluation						
Assessment	Based on	Conducted by	Typical Schedule (for 26-week Sem)	Marks			
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30			
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30			
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40			
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab							

considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)						
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total		
Remember						
Understand						

Apply	10	10	10	30
Analyse	10	10	10	30
Evaluate				
Create	10	10	20	40
Total Marks	30	30	40	100

Walchand College of Engineering, Sangli					
	(Governm	ent Aided Autono	nous Institute)		
		AY 2021-22	2		
Course Information					
Programme		M.Tech. (Pow	ver System Er	igineering)	
Class, Semester First Year M. Tech., Sem II					
Course Code		5PS573			
Course Name		Industrial Pro	ject		
Desired Requisites:					
		5			
Teaching Scheme Examination Scheme (Marks)				(s)	
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	40	100	
Practical					
Interaction	2Hr/Week		Cree	dits: 2	
		Course Object	ives		
1	To understand industr	ial problems.			
2	To suggest engineerin	ig solutions to t	he defined pro	blem.	
	Course Outcomes	(CO) with Blo	om's Taxonoi	ny Level	
At the end of the	course, the students wi	ill be able to,			
CO1	Chose, Formulate a	clear problem.			Apply
CO2	Select and apply appropriate engineering methods and tools Create for solving the problem.				Create
CO3 Develop the project and its results following an established project methodology.				Evaluate	
CO4 Present the project results.				Analyse	

List of Experiments / Lab Activities

Industrial Project:

The Industry project will involve the selection of appropriate real time industry problem by understanding the working of particular industry application. Formulate the problem, select design and methodology to find the solution. Construct an electrical system by using appropriate hardware software tools. Each student should conceive, design and develop the idea leading to a project/product. The student should submit a soft bound report at the end of the semester. The final product as a result of Industry project should be demonstrated in phases at the time of examination.

This will help student to understand structured management in industry, sustainable					
development, with consideration to both scientific and ethical aspects and its presentation with					
technical report.					
	Text Books				
1	To be used based on selected project				
	References				
1	Industry 4.0 : fourth Industrial Revolution guide to Industry 4.0				
Useful Links					
1	-				

CO-PO Mapping								
		Programm	e Outcomes	(PO)				
1 2 3 4 5 6								
CO1	3	2						
CO2				2		2		
CO3			2					
CO4		2						
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High Each CO of the course must map to at least one PO.								

Assessment								
There are three c	There are three components of lab assessment, LA1, LA2 and Lab ESE.							
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation								
Assessment	Based on	Conducted by	Typical Schedule	Marks				
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30				
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12	30				

			Marks Submission at the end of Week 12		
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40	
Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations,					

drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level							
Bloom's	I A 1	I A 2	FSF	Tatal			
Taxonomy Level				IULAI			
Remember							
Understand							
Apply	30	10	5	45			
Analyse		10	5	15			
Evaluate		10	10	20			
Create			20	20			
Total	30	30	40	100			

Walchand College of Engineering, Sangli					
(Government Aided Autonomous Institute)					
AY 2021-22					
		Course Inform	ation		
Programme		M.Tech. (Powe	er System Engin	eering)	
Class, Semester		First Year M. 7	Fech., Sem II		
Course Code		5PS574			
Course Name		Professional S	kills 2		
Desired Requisit	tes:				
Teachin	g Scheme	I	Examination Sc	heme (Mai	·ks)
Lecture	-	LA1	LA2	ESE	Total
Tutorial	-	30	30	40	100
Practical	-				
Interaction	1 Hr/Week		Credi	its: 1	
		Course Objec	tives		
1	To provide a hands Engineering proble	on experience o ms.	f software in so	lving compl	ex Electrical
2	To enhance the emi	plovability of El	ectrical Enginee	ring student	t.
	Course Outcome	es (CO) with Bl	oom's Taxonon	nv Level	
At the end of the	course, students will	be able to,		J	
C01	Use of the softwar effectively.	re related to Ele	ectrical Enginee	ring	Evaluate
CO2	Develop the solution of the problem using software solution.	ution for Elec ware.	ctrical Enginee	ring	Create
CO3	Explain the proceeding tools.	ocess of prob	lem-solving u	sing	Understand
		Course Con	tent		
This course is based on computing as a tool to design and analyse the Electrical Engineering system. In the modern day work environment, the Electrical Engineer should be able to simulate and solve complex problems on computers. The Electrical Engineer must be highly computer literate. The engineer with strong fundamentals and computer software proficiency is highly in demand from industry. Employability of the student can be enhanced by providing software training.					
Text Books					
l	Suitable books base	ed on the softwa	re selected.		
		Reference	S		
Keterences					

	1	Suitable books based on the contents of software selected				
	Useful Links					
	1	As per the need of the software training				

CO-PO Mapping									
		Programme Outcomes (PO)							
	1	1 2 3 4 5 6							
CO1	2								
CO2			2						
CO3		3				1			
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High									
Each CO of the course must map to at least one PO.									

Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE.

IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester Evaluation.

Assessmen	Based on	Conducted by	Typical Schedule (for	Marks
t			26-week Sem)	
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
Lab ESE	Lab activities, attendance, journal	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand	10	10	10	30			
Apply							
Analyse							
Evaluate	10	10	15	35			
Create	10	10	15	35			
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli						
	(Government Aided Autonomous Institute)					
			AY 20	21-22		
			Course In	formation		
Progra	amm	e	M. Tech (Power Sy	vstem Engin	eering)	
Class,	Sem	ester	First Year M. Tech.	., Sem II		
Cours	e Co	de	5PS523			
Cours	e Nai	me	Professional Electiv	ve III: Pow	ver System Dy	namics
Desire	d Re	quisites:	Power Apparatus M	odelling		
Tea	ichin	g Scheme	Ex	amination	Scheme (Ma	rks)
Lectu	re	2Hrs/week	T1	T2	ESE	Total
Tutori	al	-	20	20	60	100
Practi	cal	-				
Intera n	ctio	-		Cr	edits: 2	
			Course O	bjectives		
1	To i	ntroduce the co	ncept of small signal a	nd transient	stability analys	is of power systems.
2	To p	provide solution	s to SSR problem and	voltage stab	ility problem.	
		Course	Outcomes (CO) wit	h Bloom's	Taxonomy Lo	evel
At the	end c	of the course, t	he students will be a	ble to,		
CO1	Dis	tinguish vario	us categories of syst	em stability	<i>.</i>	Understand
CO2	Ana stab	alyse models, ility of variou	use analytical too s types.	ols to decid	de upon the	Analyse
CO3	Rec stab	commend var vilities of powe	rious methods to in er system.	nprove vari	ious type of	Evaluate
Modu	ıle		Module Cont	ents		Hours
Introduction to small signal stability ofISmallSignalStabilityanalysisofsinglemachineconnected toinfinitebussinglemachineconnected toinfinitebussinglemachinesingle <th>ility of pow s of sing step model inite bus.</th> <th>ver system gle machine development</th> <th>4</th>			ility of pow s of sing step model inite bus.	v er system gle machine development	4	
П	II Power system Small signal s		of small signal stability a stabilizer, Simulation of Power System onse using power systemstabilizer in the tability model of single machine connected			6

	Large scale power systems					
III	Dynamic equalization of large scale system systems. Step by step reduction of large scale model to a smaller model for analysis purpose.	6				
IV	Transient stability analysis Introduction to Direct method of transient stability analysis by roller ball analogy. Development of model using energy concept, and analysis of model for transient stability.	4				
V	Sub synchronous resonance Introduction to Sub-Synchronous oscillation & sub- synchronous resonance. Effect of series compensation of transmission line. Induction generator effect, stability of hydro turbines.	4				
VI	Voltage stability Reactive power compensation and Voltage stability. Development of model of power system for voltage stability. Sensitivity analysis and QV modal analysis for voltage stability. Methodsof improving stability.	4				
1 P. 19	Text Books Kundur, " <i>Power System, Stability and Control</i> ", Tata McGr 994.	raw Hill, New Delhi,				
References						
1K. R. Padiyar, "Power System Dynamic, Stability & Control", B.S. Publication, 2008.						
1	Usetul Links					
1						
 1						

CO-PO Mapping								
		Programme Outcomes (PO)						
	1	2	3	4	5	6		
CO1			3					
CO2				3				
CO3						2		

The strength of mapping is to be written as 1,2,3; Where, 1: Low, 2: Medium, 3: High

Each CO of the course must map to at least one PO.

Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level							
Bloom's Taxonomy Level	T1	T2	ESE	Total			
Remember							
Understand	10	10	20	40			
Apply							
Analyse	10	10	20	40			
Evaluate			20	20			
Create							
Total	20	20	60	100			

	Walchand College of Engineering, Sangli						
			Government Aide	ed Autonomous Ins	stitute)		
				Information			
Progr	amme		M Tech (Powe	er System Engi	neering)		
Class.	Semeste		First Year M.Te	ech., Sem II	neering)		
Cours	se Code		5PS524				
Cours	se Name		Professional El	ective III: EHV	'AC		
Desire	ed Requi	sites:	Power System				
			J				
T	Feaching	Scheme		Examinatio	n Scheme (Ma	rks)	
Lectu	re	2Hrs/week	T1	T2	ESE		Total
Tutor	ial	-	20	20	60		100
Practi	ical	-			Nil		
Intera	nction	-		С	redits: 2		
			Course	e Objectives			
1	To unde	erstand paramet	ters of EHVAC l	ine.			
2	To deve	lop a skill to d	esign and analys	e EHVAC line.			
3	To deve	lop a skill to u	nderstand power	frequency over	voltages deve	loped in 1	EHVAC line.
4	To deve	lop a skill to u	nderstand insulat	tion coordinatio	n based on ligh	ntening.	
~~~	a 11	Course C	Dutcomes (CO)	with Bloom's T	Faxonomy Lev	el	
CO	Outline	e parameters of	EHVAC line and	d develop skills	to design and	analyse	Understand
	EHVAC	line.	1,	1 1 1 1			A 1
	Exami	e power freque	ency over voltag	es developed in	EHVAC line.		Apply
	Fynlair	insulation and	rdination based	on lightoning			Analysa
	Ехріан		ordination based on lightening.			Allalyse	
5							
	<u> </u>						
Modu	ıl		Module	e Contents			Hours
e							
	Intr	oduction, Cal	culation of Lin	e and Ground	Parameters,	Voltage	
	Gra	dients of Conc	luctor and Core	ona Effects.			
т	<b>a</b> .	<b>a</b> . Introduction: Engineering aspects and growth of EHVAC					
I	trans	transmission line trends and preliminaries, power transferability, transient				6	
	stab	inty mint and s	urge impedance	ioauiiig.			
	<b>h</b> . C	alculation of l	Line and Ground	d Parameters [.] F	Resistance, pov	ver loss	
	tem	perature rise,	properties of b	undled conduc	tors, inductand	ces, and	

	capacitances, calculation of sequence inductance and capacitance line parameters of modes of propagations, resistance and inductance of ground return.	
	<b>c</b> . Voltage Gradients of Conductor: Charge potential relations for multi-conductor lines, surface voltage gradients on conductors, distribution of voltage gradient on sub conductors of bundle.	
	<b>d</b> . Corona Effects: I2R and corona loss, corona loss formulae, charge voltage diagram with corona. Attenuation of traveling waves due to corona loss Audible noise; corona pulses; their generation and properties, limits for radio interface fields.	
	Theory of Traveling Waves and Standing Waves	
II	Waves at power frequency, differential equations and solutions for general case, standing waves and natural frequencies, open ended line; double exponential response, response to sinusoidal excitation, line energization with trapped charge voltage, reflection and refraction of traveling waves.	6
	Lightning and Lightning Protection	
III	Lightning strokes to lines, their mechanism, general principals of lightning protection problem, tower footing resistance, lightning arresters and protective characteristics, different arresters and their characteristics.	4
	Over Voltage in EHV Systems Covered by Switching Operations	
IV	Over voltages their types, recovery voltage and circuit breaker, Ferro resonance over voltagescalculation of switching surges single phase equivalents.	4
	Power Frequency Voltage Control and Over Voltages	
V	Generalized constants, charging current, power circle diagram and its use, voltage control shuntand series compensation, sub synchronous resonance in series capacitor compensated lines and static reactive compensating systems.	4
	Insulation Coordination	
VI	Insulation coordination, Insulation levels, voltage withstand levels of protected equipment's andinsulation coordination based on lightning, Design of EHVAC lines.	4
	Taxt Books	
1	Rakosh Das Begamudre, "EHVAC Transmission Engineering", Wiley East	ern Limited.
	3rd Edition2008.	,

References							
1	1 TwianGonen, "EHVAC and HVDC Transmission System Engineering – Analysis and Design"JohnWiley and Sons 1988.						
2	2 EHV – AC and HVDC Transmission Engineering & Practice : S.V. Rao						
3	TwianGonen, "Electric Power Transmission System Engineering-Analysis and Design", John Wileyand Sons 1988.						
Useful Links							
1	NPTEL Lectures						

CO-PO Mapping						
	1	2	Programme		(PO)	(
		Z	3	4	5	0
<b>CO1</b>	3					
CO2				3		
CO3						2
The strength of ma	apping is to b	e written as	1,2,3; Wher	e, 1:Low, 2:	Medium, 3:1	High

Each CO of the course must map to at least one PO.

# Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level						
<b>Bloom's Taxonomy Level</b>	T1	T2	ESE	Total		
Remember						

Understand	10	10	20	40
Apply	10	10	20	40
Analyse			20	20
Evaluate				
Create				
Total	20	20	60	100

Walchand College of Engineering, Sangli								
	(Government Aided Autonomous Institute)							
	AY 2021-22							
			Course Ir	Iformation				
Progra	mme		M. Tech.( Power S	ystem Engineering	g)			
Class,	Semes	ter	First Year M. Tech	., Sem II				
Course	e Code	<u>)</u>	5PS525					
Course	e Nam	e	Professional Election	ive IV: Computer A	Aided Power	System Analysis		
Desire	d Req	uisites:	Power System					
Те	aching	g Scheme	]	Examination Sch	eme (Marks)			
Lectur	e	2 Hrs./week	T1	T2	ESE	Total		
Tutori	al	-	20	20	60	100		
Practio	cal	-						
Intera	ction	-		Credits	: 2			
	T	1 .1 . 1	Course (	Dbjectives		.1 1		
	To m	akes the studen	its conversant with c	lifterent power sys	stem analysis	methods.		
2	To pr	ovide basic kno	owledge of formatio	on of Y bus method	<u>S.</u>			
3	lo pi	ovide different	power system com	outer analysis meth	nods using co	mputer.		
A + +1+ -		Course	outcomes (CO) wi	th Bloom's laxon	iomy Level			
At the	Evel	the course, the	students will be abi	e lo,	140	Lindonston		
CO1	схрі	am various me	thous of analysing s			d		
CO2	Appl	y the Network	Topology knowledg	ge for power syster	n analysis.	Apply		
CO3	Stud	y Power flow a	nalysis and econom	ic dispatch of gene	eration.	Analyse		
Modu	le		Module (	Contents		Hours		
		nalytical Simp	olifications					
Ι	T co so ai	Three Component method, Two-Component method, sequence network connections for different faults, Analysis of unsymmetrical shunt and series faults using three-component (symmetrical component method) and two-Component method.			vork and hod)			
	N	etwork Topolo	ogy					
II	Introduction, Elementary graph theory, Connected graph, tree, co-tree, basic cutsets, basic loops, Incidence matrices, Element-node, Bus incidence, Tree-branch path, Basic cutset, augmented cut-set, Basic loop and Augmented loop, Primitive network, Impedance form and Admittance form.				tree, Bus 4 Basic and			

	Network Matrices						
III	Introduction, formation of Ybus by method of Inspection, method of Singular Transformation, Step by Step building algorithm for formation of Ybus. Formation of Bus Impedance Matrix, Modification of Zbus for addition of a branch, addition of link, removal of an element.						
IV	Network Fault and Contingency CalculationsFault calculations using Zbus, fault calculations using the Ybus table of factors, Contingency analysis for Power systems. Using the Ybus table of factors for contingencies. Analysis of Unsymmetrical faults using Bus Impedance Matrix.	6					
V	<b>Power flow analysis</b> Formulation of the problem and power flow equations. Application of numerical techniques to solve load flow problems using bus admittance matrix and bus impedance matrix in the bus – frame of reference such as Gauss, Gauss – Seidel, Newton – Raphson methods, Decoupled load flow methods etc.	4					
VI	Optimal Dispatch of generationPerformance Curves, economic dispatch of generation without and with transmission-line losses, Iterative technique, approximate penalty factor, Derivation of transmission loss formula, Calculation of loss- coefficient using Ybus and sparse matrix techniques.	4					
	Text Books						
1	Pual M. Anderson, "Analysis of faulted system", The Iowa state university pr 1973.	ress/ AMES,					
2	K. Uma Rao, "Computer Techniques and Models in Power systems", I. K. Publishing house Pvt. Ltd. New Delhi, 2007.	International					
	<b>Keferences</b>	0 1111					
1	I. J. Nagrath and D. P. Kothari, " <i>Power System Engineering</i> ", Tata M. Publishing Co., 1994.	c-Graw Hill					
2 Hadi Sadat, " <i>Power system analysis</i> ", 1st edition, Tata Mc-Graw company ltd., 2002.		l publishing					
3 George L. Kusic, "Computer Aided Power System Analysis", PHI, 2003.							
4	Research Papers.						
	Useful Links						
1	http://nptel.ac.in/downloads.						
2	http://www.nptelvideos.in						
3	https://ocw.mit.edu/courses/electrical-engineering.						

CO-PO Mapping							
			Programm	e Outcomes (PC	<b>)</b> )		
	1 2 3 4 5 6						
CO1	CO1 2						
CO2						3	
CO3				1			
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High							
Each CO of the course must map to at least one PO.							

#### Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level						
Bloom's Taxonomy Level	T1	T2	ESE	Total		
Remember						
Understand	10		20	30		
Apply	10	10	20	40		
Analyse		10	20	30		
Evaluate						
Create						
Total	20	20	60	100		

Walchand College of Engineering, Sangli							
	(Government Aided Autonomous Institute)						
			AY	2021-22			
			Course	Information			
Progr	amme		M.Tech. (Power	System Engine	eering)		
Class,	, Semes	ster	First Year M. Te	ch., Sem II			
Cours	se Cod	9	5PS526				
Cours	se Nam	e	Professional Ele	ctive IV: HV E	ngineering		
Desire	ed Req	uisites:	Power System				
			1				
T	eachin	g Scheme		Examination	Scheme (Mar	·ks)	
Lectu	re	2	T1	T2	ESE	Total	
		Hrs/week					
Tutor	ial	-	20	20	60	100	
Pract	ical	-					
Intera	action	-		Cr	redits: 2		
	_		Course	e Objectives			
1	To un	derstand the bre	akdown mechanis	sms in gaseous,	liquid and soli	d insulation	
2	To un	derstand metho	ds of generation	and measurem	ent of high vol	tage, impulse voltage	
	and in	npulse current.	<u> </u>	• 1 • 1 • 1/	• •		
3	lo la	y a foundation f	or higher studies	in high voltage	engineering	-1	
CO	<b>C</b>	Course Course	Outcomes (CO) V	with Bloom's I	axonomy Leve	alid Understand	
	<b>Sum</b> insula	tions	own mechanisms	s in gaseous,	inquid and	solid Understand	
	Analy	the HV gene	pration equipment	and their appli	cation	Analyse	
$\frac{1}{2}$		se the fiv gene	ration equipment	and then appin		Fildryse	
CO	Desig	n and construc	t a simple HV ga	dget/ model.		Create	
3			1 0	6			
						·	
Modu	ul		Module (	Contents		Hours	
e							
	Br	eakdown In Ga	aseous Medium				
Townsend mecha			inism of breakd	lown in gases	s, streamer (k	anal)	
I mechanism of bre		akdown in gases	, derivation of	breakdown crit	erion 4		
for Townsend and		streamer mechan	isms. Panchen'	s law for break	down		
	VO VO	itage in gases,	effect of pressure and gap distance on breakdown				
		nage. eakdown In I i	auid and Solid I	nsulation			
II		CANUUWII III LI	Yulu allu Soliu II	usulativii		4	

	Comparison of pure and commercial liquids for insulation, breakdown in pure liquids, effect of hydrostatic pressure on breakdown strength. Breakdown in commercial liquids - suspended particle theory, cavitation and bubble theory, thermal breakdown, stressed oil volume theory. Types of breakdown mechanisms in solids - intrinsic, electromechanical, treeing and tracking, thermal breakdown, electrochemical, breakdown due to internal discharges. Breakdown in composite dielectrics, applications of solid dielectrics like paper, mica, glass and ceramics.			
	Generation Of High Voltages			
III	Generation of high D.C. voltages by rectifiers, voltage doubler and multiplier circuits, electrostatic machines - Van de Graaff generator, electrostatic generator. Generation of high A.C. voltages by cascade transformer set, resonant transformer, Tesla coil for generation of high frequency A.C. voltage.	4		
	Generation Of Impulse Voltage and Current			
IV	Standard impulse wave shape, analysis of model and commercial impulse generation circuits, wave shape control, Marx circuit, tripping and control of impulse generation. Generation of switching surges, generation of impulse current.	6		
	Measurement Of High Voltage and Current			
V	Peak voltage measurement by Chubb - Fortescue method, spark gaps, sphere gap, uniform field gap, rod gap, electrostatic voltmeter, measurement of high voltage by an ammeter in series with high impedance, use of rectifier and voltage divider. Measurement of high A.C., D.C. and impulse currents by resistive shunts- Hall generator, current transformer with electro-optical signal converter, squirrel-cage shunt, Rogowski coil.	6		
	High Voltage Testing and Partial Discharges			
VI	High voltage testing of - insulators, bushings, circuit breakers, cables, transformers, lightning arrestors and power capacitors. Phenomenon of partial discharges (PD), internal and surface discharges, effects of PD, equivalent circuit of PD phenomenon, measurement of apparent charge. PD detection - straight detection method, wide band and narrow band detection circuits. Bridge detection method, calibration of PD detectors.	4		
	Tart Daaka			
	E. Kuffel& W.S. Zaengl, " <i>High Voltage Engineering Fundamentals</i> "Po	ergamon Press.		
	1992			
2	M.S. Naidu & V. Kamaraju"High Voltage Engineering", 4th Edition	Tata Mc-Graw		

	Hill, 2011
	References
1	C.L. Wadhwa, ""High Voltage Engineering" New Age, 2007.
2	E. Kuffel& Abdullah, "High Voltage Engineering", 1 st Edition, PPO, 1981
	Useful Links
1	https://nptel.ac.in/courses/108/104/108104048/

CO-PO Mapping						
Programme Outcomes (PO)						
	1	2	3	4	5	6
<b>CO1</b>			2			
CO2				3		
CO3	2	2				
	:	·		1		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

#### Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level						
Bloom's Taxonomy Level	T1	T2	ESE	Total		
Remember						
Understand	10	10	20	40		
Apply						
Analyse	10	10	20	40		
Evaluate						
Create			20	20		
Total	20	20	60	100		

# Walchand College of Engineering, Sangli

	(Government Aided Autonomous Institute)						
	AY 2021-22						
	Course Information						
Programme	M.Tech. (Power System Engineering)						
Class, Semester	Class, Semester First Year M. Tech., Sem II						
Course Code	5PS575						
Course Name	Activity Based Elective Lab : Computer Aided Power System						
	Analysis lab						
<b>Desired Requisites:</b>	Power System						

Teachir	ig Scheme	Examination Scheme (Marks)					
Lecture	-	LA1	LA1 LA2 Lab ESE Total				
Tutorial	-	30	30	40	100		
Practical	2 Hrs/Week		:	•			
Interactio	-	Credits: 1					
n							
	:						

	Course Objectives						
1	To make the students conversant with different recent techniques for analysis methods.	power system					
2	To provide basic knowledge of formation of Ybus methods using languages	programming					
3	To provide different computer solution for large interconnected power system networks.						
Course Outcomes (CO) with Bloom's Taxonomy Level							
At the	At the end of the course, the students will be able to,						
<b>CO1</b>	Explain the different computer analysis methods of power system faults.	Understand					
CO2	Apply the Network Topology knowledge for power system analysis.	Apply					
CO3	<b>Study</b> MATLAB programming for Power flow analysis and economic dispatch of generation.	Analyse					

# List of Experiments / Lab Activities

Lab activities/Lab performance shall include mini-project, presentations, drawings, case studies, report writing, site visit, lab experiment, tutorials, assignments, group discussion, programming and other suitable activities, as per the nature and requirement of the lab course.

	Text Books						
1	Pual M. Anderson, "Analysis of faulted system", The Iowa state university press/ AMES, 1973.						
	K. Uma Rao, " <i>Computer Techniques and Models in Power systems</i> ", I. K. International Publishing house Pvt. Ltd. New Delhi, 2007.						

	References			
1	I. J. Nagrath and D. P. Kothari, "Power System Engineering", Tata Mc-Graw Hill Publishing Co., 1994.			
2	Hadi Sadat, "Power system analysis", 1st edition, Tata Mc-Graw Hill publishing company ltd., 2002.			
3	George L. Kusic, "Computer Aided Power System Analysis", PHI, 2003.			
Useful Links				
1	http://www.nptelvideos.in			

CO-PO Mapping							
Programme Outcomes (PO)							
	1	2	3	4	5	6	
CO1				2			
CO2						3	
CO3				1			
	8		1	8	3		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

Assessment									
There are three components of lab assessment, LA1, LA2 and Lab ESE.									
IMP: Lab ESE is a separate head of passing. LA1, LA2 together is treated as In-Semester									
Evaluation.									
Assessmen	<b>Based</b> on	Conducted	Typical Schedule (for 26-week Sem)	Marks					
t		by							
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30					
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30					
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40					

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand	10	10	10	30			
Apply	10	10	10	30			
Analyse	10	10	20	40			
Evaluate							
Create							
Total Marks	30	30	40	100			
	Walchand College of Engineering, Sangli						
---------	-----------------------------------------	---------------------------------	---------------------	--------------------	--------------------	-------------	--------------
	(Government Aided Autonomous Institute)						
			1	AY 2021-22			
			Cour	rse Information			
Progra	mme		M.Tech. (Pow	ver System Engi	neering)		
Class,	Semes	ter	First Year M.	Tech., Sem II			
Course	e Code		5PS576				
Course	e Namo	e	Activity Base	d Elective Lab :	HV Engineering	lab	
Desire	d Requ	uisites:	Power System	n			
Te	aching	Scheme		Examinatio	on Scheme (Mar	ks)	
Lectur	e	-	LA1	LA2	Lab ESE	T	otal
Tutoria	al	-	30	30	40	1	.00
Practic	cal	2 Hrs/Week					
Intera	ction	-			Credits: 1		
			Cou	rse Objectives			
1	To un	derstand the bi	reakdown mech	nanisms in gased	ous, liquid and so	lid insulat	ion
2	To un	derstand meth	ods of generati	ion and measure	ement of high vol	tage, impu	ilse voltage
	and in	npulse current.					
3	To la	y a foundation	for higher stud	lies in high volta	age engineering		
		Course	Outcomes (CC	)) with Bloom's	Taxonomy Leve	el	
At the	end of	the course, the	students will b	e able to,			
CO1	Sum: insula	<b>narize</b> breako ations.	down mechan	isms in gaseo	us, liquid and	solid U	Jnderstand
CO2	Unde	erstand the bas	sic generation a	and measuremer	nt of High voltag	e and U	Inderstand
	High	current for test	ing purposes				
CO3	Anal	yse the HV ger	eration equipn	nent and their ap	plication.		Analyse
	<u> </u>		List of Expe	riments / Lab A	ctivities .	<u> </u>	
Lat	activi	ties/Lab perfor	mance shall in	clude mini-proje	ct, presentations,	drawings	, case
stu	dies, re	port writing, si	te visit, lab exp	periment, tutoria	ls, assignments, g	group disc	ussion,
pro	gramm	ing and other s	suitable activiti	es, as per the na	ture and requirem	ient of the	; 1ab
			,	Text Books			
	E. K1	uffel& W.S. 7:	aengl "High	Voltage Engine	ering Fundament	als "Perga	mon Press.
1	1992						
2	M.S.	Naidu & V. Ka	maraju <i>"High</i>	Voltage Engineer	ring", 4th Edition	n Tata Mc-	-Graw Hill,
	2011						

	References				
1	I. J. Nagrath and D. P. Kothari, "Power System Engineering", Tata Mc-Graw Hill Publishing Co., 1994.				
2	Hadi Sadat, "Power system analysis", 1st edition, Tata Mc-Graw Hill publishing company ltd., 2002.				
3	George L. Kusic, "Computer Aided Power System Analysis", PHI, 2003.				
Useful Links					
1					

CO-PO Mapping								
Programme Outcomes (PO)								
	1	2	3	4	5	6		
CO1			2					
CO2				3				
CO3	2	2						
	÷			•		:		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

Assessment									
There are three	There are three components of lab assessment, LA1, LA2 and Lab ESE.								
IMP: Lab E	SE is a separate h	ead of passing.	LA1, LA2 together is treated as In-S	Semester					
Evaluation.									
Assessmen	<b>Based</b> on	Conducted	Typical Schedule (for 26-week Sem)	Marks					
t		by							
LA1	Lab activities, attendance	Lab Course Faculty	During Week 1 to Week 6 Marks Submission at the end of Week 6	30					
LA2	Lab activities, attendance	Lab Course Faculty	During Week 7 to Week 12 Marks Submission at the end of Week 12	30					
Lab ESE	Lab activities, attendance	Lab Course Faculty	During Week 15 to Week 18 Marks Submission at the end of Week 18	40					

Week 1 indicates starting week of a semester. The typical schedule of lab assessments is shown, considering a 26-week semester. The actual schedule shall be as per academic calendar. Lab activities/Lab performance shall include mini-project, presentations, drawings, programming and other suitable activities, as per the nature and requirement of the lab course.

Assessment Plan based on Bloom's Taxonomy Level (Marks) (For lab Courses)							
Bloom's Taxonomy Level	LA1	LA2	Lab ESE	Total			
Remember							
Understand	20	20	20	60			
Apply							
Analyse	10	10	20	40			
Evaluate							
Create							
Total Marks	30	30	40	100			

Walchand College of Engineering, Sangli								
	(Government Aided Autonomous Institute)							
				e Information				
Progra	ımme		M.Tech. (Power	System Engi	neering)			
Class,	Semes	ster	First Year M. Te	ch., Sem II				
Course	e Code	e	50E106	-				
Course	e Nam	e	Open Elective I:	Control Tech	nniques for Electrical	Drives		
Desire	d Req	uisites:						
			1					
Tea	aching	g Scheme		Examinati	ion Scheme (Marks)			
Lectur	·e	2	T1	T2	ESE	Total		
		Hrs./week						
Tutori	al	-	20	20	60	100		
Practio	cal	-						
Intera	ction	-	Credits: 2					
			1					
			Cours	se Objectives	6			
1	To pi	rovide the late	st knowledge in th	e field of ele	ctrical drives.			
2	To pi	rovide sufficie	nt knowledge in th	ne area of adv	vanced control technic	ques for inductior		
3	Tom	ake the studer	nous machines.	earch in the f	ield of electrical drive	24		
	10 11	Course	e Outcomes (CO)	with Bloom	's Taxonomy Level			
At the	end of	the course, th	e students will be	able to,	v			
CO1	Expl	ain various co	oncept used in AC	and DC drive	es.	Understar d		
CO2	App	ly control tech	niques to AC and	DC drives.		Apply		
CO3	Anal	yze control te	chniques for AC a	nd DC drives	5.	Analyse		
CO4	Eval	uate various c	control schemes of	AC and DC	drives.	Evaluate		
Modu	le		Modu	le Contents		Hours		
I	Basics of drives       I       I         Basics of drives       Types & parts of the Electrical drives, fundamental torque equation, speed torques characteristics DC motor & Induction motor, multi quadrant operation of the drive, classification of mechanical load				tion, nulti 4 load			

 HP operation of the drive, closed loop speed control.

 II
 DC motor drives
 5

torques, steady state stability of the drive, constant torque and constant

		1				
	Methods of speed control, starting and breaking operation, single phase and three phase full controlled and half controlled converter fed DC drives, Multi quadrant operation of separately excited DC shunt motor, dual converter fed DC drives, circulating and non – circulating mode of operation, chopper control of DC shunt motor drives, four quadrant operation of chopper fed DC shunt motor drive.					
III	<ul> <li>Induction motor drives</li> <li>Speed control methods for three phase induction motor, VSI fed induction motor drive, constant torque (constant E/F and constant V/F), constant HP operation, closed loop speed control block diagram., CSI fed induction motor drive, speed torque characteristics of CSI fed drive, closed loop speed control block diagram, comparison of CSI fed and VSI fed induction motor drive, Stator voltage control.</li> <li>Chopper controlled resistance in rotor circuit, slip power recovery using converter cascade in rotor circuit, sub synchronous and super synchronous speed control, Kramer speed control.</li> </ul>	5				
IV	<ul> <li>Modeling of Induction Motor and PWM Techniques</li> <li>abc – dq transformation, transformation from stationary reference</li> <li>frame to synchronously rotating reference frame and vice versa.</li> <li>Equivalent circuits of induction motor in dynamic dq stationary and</li> <li>synchronously rotating reference frame. Permanent magnet</li> <li>synchronous machine dq equivalent circuits. The three phase six step</li> <li>bridge inverter, three phase PWM inverter, PWM techniques such as</li> <li>sinusoidal PWM, hysteresis band current control PWM.</li> </ul>	5				
V	Vector Control and Direct Torque Control of Induction Motor Vector control of induction motor, DC drive analogy, equivalent circuit, phasor diagram. Direct rotor flux oriented vector control and indirect rotor flux oriented vector control, stator flux oriented vector control.Torque equation of IM in terms of stator and rotor flux, direct torque and flux control method (DTC) and self-commissioning of the drive.	5				
VI	Synchronous motor and SRM DrivesVSI fed synchronous motor drives, true synchronous and self-controlmode, open loop and closed loop speed control of Permanent magnetsynchronous machine, brushless DC motor drives.Switched reluctance motor drives, torque equation, converter circuits,operating modes and applications. Solar panel VI characteristics, solarpowered pump, maximum power point tracking and battery operatedvehicles.	4				
Text Books						
1	G. K. Dubey, "Fundamentals of Electrical Drives", Narosa publication, 2002.	2nd edition,				
2	B. K. Bose, "Modern Power Electronics and AC drives", Prentice Hall of India, 1986.	of India Pvt.				

	References								
1	Pe	ter	Vas, "Vector (	Control of AC ma	<i>achines</i> ", Clar	endon Press Oxford,	1999.		
2	Ne Sir	ed ] muli	Mohan, <i>"Ad</i> u <i>ink</i> ", John Wi	vanced Electricated Electricate	<i>al drives – 2</i> 01.	Analysis, control ar	nd modeling using		
3	<b>P</b> .	S. E	Bhimra, "Pow	er Electronics",	2nd edition, K	Channa Publishers.			
				U	seful Links				
1	N	PTH	EL video lec	tures on Electric	al Drives				
				CO-PO Mapp	ing				
			Pro	gramme Outcor	nes (PO)				
	1	2	3	4	5	6			
CO1				1					
CO2				1					
CO3			1	2					
<b>CO4</b>	<b>CO4</b> 1 3								
The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High									
Each CO of the course must map to at least one PO.									

## Assessment

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level							
Bloom's Taxonomy Level	T1	T2	ESE	Total			
Remember							
Understand	10		10	20			
Apply	10	10	20	40			
Analyse		10	20	30			
Evaluate			10	10			
Create							
Total	20	20	60	100			

Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)						
AY 2021-22						
	(	Course Inform	ation			
Programme	M.Tech. (Po	wer System	Engineering)			
Class, Semester	First Year M	I. Tech., Sem	II			
Course Code	5IC501					
Course Name	Value Educa	tion				
Desired						
Requisites:						
Teaching Scheme		Examina	tion Scheme	e (Marks)		
Lecture	2	T1	<b>T2</b>	ESE	Total	
	Hrs/week	• • •	• •		100	
Tutorial	-	20	20	60	100	
Practical	-					
Interaction	-		Cree	lits: 0		
	(	Course Objec		. 1 10		
1	To impart knowledge on value of education and self-					
2	To imbibo a	L.	atudanta			
2	To highlight	importance of	f character			
Cours	e Outcomes	(CO) with Bl	nom's Taxor	omy Level		
At the end of the cours	rse students v	vill be able to				
At the end of the cou	<b>Explain</b> val	ue of education	, on and self- d	evelonment	Understan	
CO1		d				
	Summarize	importance	of good ch	aracter, and	Evaluate	
CO2	Behaviour development.					
		-				
Module		Module	Contents		Hours	
	Values and	self-developr	nent -Socia	l values and		
I	individual a	ttitudes. Worl	c ethics, Ind	ian vision of	6	
1	humanism,	Ū				
	Standards ar	nd principles,	Value judgm	ents.		
	Importance	of cultivation	of values, S	ense of duty.		
т	Devotion,	Self-rel:	lance,	confidence,	E	
	Humonity	Dower of	faith Net	onal Unity	0	
	Patriotism I	ove for natur	e Discipline	onai Onity,		
	Patriotism, I	Love for natur	e, Discipline	•		

Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering, love for truth,	7					
Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature						
faith, Self-management and Good health, science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control. Honesty, Studying effectively	7					
Text Books						
Chakroborty, S.K. "Values and Ethics for organizat and practice", Oxford University Press, New Delhi	ions Theory					
References						
-						
Useful Links						
https://nimsuniversity.org/wp-content/uploads/2018/ ducation-Human-Rights-and-Legislative-Procedures	02/Value-E .pdf					
http://cbseacademic.nic.in/web_material/ValueEdu/Vucation%20Kits.pdf	/alue%20Ed					
https://www.verywellmind.com/personality-developm 25	ment-27954					
https://trudreadz.com/2019/09/10/blind-faith-in-relig s-our-ability-to-critically-think-for-ourselves/	gion-destroy					
	Personality and Behaviour Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour universal brotherhood and religious tolerance, True friendship, Happiness vs. suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature Character and Competence –Holy books vs. Blind faith, Self-management and Good health, science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control. Honesty, Studying effectively <b>Text Books</b> Chakroborty, S.K. "Values and Ethics for organizat and practice", Oxford University Press, New Delhi <b>References</b> - <b>Useful Links</b> https://nimsuniversity.org/wp-content/uploads/2018/ ducation-Human-Rights-and-Legislative-Procedures http://cbseacademic.nic.in/web_material/ValueEdu/V ucation%20Kits.pdf https://trudreadz.com/2019/09/10/blind-faith-in-relig s-our-ability-to-critically-think-for-ourselves/					

**CO-PO** Mapping

Programme Outcomes (PO)								
	1	2	3	4	5	6		
C01	2				1	2		
CO2	1		1			2		

The strength of mapping is to be written as 1,2,3; Where, 1:Low, 2:Medium, 3:High

Each CO of the course must map to at least one PO.

## **Assessment (for Theory Course)**

The assessment is based on 2 in-semester examinations in the form of T1 (Test-1) and T2 (Test-2) of 20 marks each. Also there shall be1 End-Sem examination (ESE) of 60 marks. T1 shall be typically on modules 1 and 2, T2 based typically on modules 3,4 and ESE shall be on all modules with nearly 50% weightage on modules 1 to 4 and 50% weightage on modules 5, 6.

Assessment Plan based on Bloom's Taxonomy Level (Marks) For Theory Course					
<b>Bloom's Taxonomy</b>		T1	Τ2	ESE	Total
Level					
1	Remember				
2	Understand	10	10	30	50
3	Apply				
4	Analyse				
5	Evaluate	10	10	30	50
6	Create				
Total		20	20	60	100