G. PULLA REDDY ENGINEERING COLLEGE (Autonomous): KURNOOL Accredited by NBA of AICTE and NAAC of UGC Affiliated to JNTUA, Anantapur



Scheme – 2017

M.Tech Syllabus (Power Electronics)

Department of Electrical and Electronics Engineering G. Pulla Reddy Engineering College (Autonomous): Kurnool Accredited by NBA of AICTE and NAAC of UGC Affiliated to JNTUA, Anantapuramu

Annexure – II

TWO YEAR M.TECH COURSE (SCHEME – 17)

Scheme of instruction and Examination

(Effective from 2017-18)

M.Tech I Semester

Power Electronics

S.No	Subject	Code	Credits	In	cheme struct iods/v	ion	Duration of end Exam (Hours)	Sche	me of Examina Max. Marks	tion
				L	D/ T	Р		End Exam	Internal Assessment	Total
Ι	Theory									
1.	Electrical Machine Modelling (EMM)	EE801	3	3	-	-	3Hrs	60	40	100
2.	Analysis of Power Converters (APC)	EE802	3	3	-	-	3Hrs	60	40	100
3.	Solid State Power Converters (SSPC)	EE803	3	3	-	-	3Hrs	60	40	100
4.	Digital Signal Processing (DSP)	EE804	3	3	-	-	3Hrs	60	40	100
5.	Elective –I		3	3	-	-	3Hrs	60	40	100
6.	Elective –II		3	3	-	-	3Hrs	60	40	100
7.	Technical English	AU101	-	-	-	-	-	-	-	-
II	Practical									
8.	Basic Simulation of Power Electronic Systems Lab (BSPESL)	EE805	2	-	-	3	3Hrs	50	50	100
			20	18	-	3		410	290	700

ELECTRICAL MACHINE MODELING (EMM)

0 0 1		RONIC	S			Scheme	: 2017
Course Code	Hours	Week		Credits		imum Marks	1
EE801	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Dur	ration:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A CO1: Understand the							
CO2: Understand the			-				ionships.
CO3: Find the electric							
		- 1***		pu		<u> </u>	
Mathematical Models of state, transient and dyna	-	ormance	ed D(C Machin C motor, D		compound mach	ines- stead
from rotating axes to Impedance Matrix- MM symmetrical component	stationa AF distrib t transform	- phase r ry axes putions inations - Re	transf - Phy in the – space eferen	ysical Con air gap in ce vector th ce Frame	concepts of power ncept of Parks tr the development neory Theory	ansformations-7 of phase transf	Fransforme formations
Necessity in electrical m from rotating axes to Impedance Matrix- MM symmetrical component Concept of reference fr rotating reference fram transformation matrices	stationat MF distrib t transform rame – st ne – com	- phase f ry axes outions i nations - Re ationary nutator rmation	transf - Phy in the - space feren y refer trans s to a	ormations, ysical Con air gap ir ce vector the ce Frame rence frame formation rotating re	concepts of power ncept of Parks tr a the development neory Theory at – rotating refere – in phase variab ference frame.	ansformations- of phase transf ence frame - sy	Fransforme ormations nchronousl
from rotating axes to Impedance Matrix- MM symmetrical component Concept of reference from rotating reference fram transformation matrices	stationar MF distrib t transform rame – st ne – com – transfor	- phase r ry axes outions i nations - Re ationary mutator rmation	transf - Phy n the - space feren v refer trans s to a Indu	ormations, ysical Con air gap ir ce vector th ce Frame rence fram formation rotating re ction Mac	concepts of power neept of Parks tr a the development neory Theory He – rotating refere – in phase variab ference frame. hines	ansformations- of phase transf ence frame - sy les – two axis	Fransforme formations nchronousl variables
from rotating axes to Impedance Matrix- MM symmetrical component Concept of reference from rotating reference from	stationar MF distrib t transform rame – st ne – comm – transfor us referen	- phase r ry axes putions i nations - Re ationary mutator rmation ce fram quation	transf - Phy n the - space feren v refer trans s to a Indu es - spe	ormations, ysical Con air gap ir ce vector the rence frame formation rotating re ction Mac steady state ed torque c	concepts of power neept of Parks tr a the development neory Theory ne – rotating refere – in phase variab ference frame. hines e and transient ana characteristics.	ansformations- of phase transf ence frame - sy les – two axis	Fransforme formations nchronousl variables
from rotating axes to Impedance Matrix- MM symmetrical component Concept of reference from transformation matrices Matrix models in vario state equivalent circuit -	stationar MF distrib t transform rame – st e – com - transfor us referen - torque ee nronous m	- phase f ry axes outions in nations - Re ationary mutator rmation ce fram quation S notor in	transf - Phy n the - space feren r refer trans s to a Indu es - s - spe ynchi	ormations, ysical Con air gap ir ce vector th ce Frame rence fram formation rotating re ction Mac steady stat ed torque con ronous Ma ng reference	concepts of power neept of Parks tr a the development neory Theory ie – rotating refere – in phase variab ference frame. hines e and transient ana characteristics. chines ce frame – perform	ansformations- of phase transf ence frame - sy les – two axis	Fransforme ormations nchronousl variables on of stead
from rotating axes to Impedance Matrix- MM symmetrical component Concept of reference fr rotating reference fram transformation matrices Matrix models in vario state equivalent circuit - Matrix module of synch	stationar MF distrib t transform rame – st e – com - transfor us referen - torque ee nronous m	- phase f ry axes outions in nations - Re ationary mutator rmation ce fram quation S notor in	transf - Phy n the - space feren r refer trans s to a Indu es - s - spe ynchi	ormations, ysical Con air gap ir ce vector th ce Frame rence fram formation rotating re ction Mac steady stat ed torque con ronous Ma ng reference	concepts of power neept of Parks tr a the development neory Theory ie – rotating refere – in phase variab ference frame. hines e and transient ana characteristics. chines ce frame – perform	ansformations- of phase transf ence frame - sy les – two axis	Fransforme formations nchronousl variables on of stead

1. Bernard Adkins, Ronald G. Harley, "The general theory of alternating current machines: Application to practical problems", Chapman and Hall, 1978

Web References:

http://nptel.ac.in/courses/108106023/

www.iea.lth.se/publications/Theses/LTH-IEA-1043.pdf

http://www.darshan.ac.in/DIET/EE/396/electrical-machine-modeling-and-analysis/SubjectDetail

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

ANALYSIS OF POWER CONVERTERS (APC)

	ELECTE		S			Scheme	: 2017
Course Code	Hours/	Week	1	Credits		kimum Marks	T
EE802	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Dur	ation:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A						• 1	
CO1: Understand the				•	-	er semi conduc	tor devices
					MCT, and IGCT.	du atan darriasa	
CO2: Understand abo CO3: Understand the							ifiors for P
and RL loads.	periorna		single		quaurant, 1-Ψ and	5-\$ bridge rect	
CO4: Understand the	operation	n of sine	ale sta	are $\Delta C_{-}\Delta C$	Converters (with f	ived and variab	le output
AC frequencies	-	ii or sing	gie sie	ige AC-AC			ic output
	,,,,						
		Powe	er Ser	niconduct	or Devices		
Power diodes, BJT, SC	R. MOSF					e– Their static a	and dynamic
characteristics. Protectio							
			·	Phase Con			
Single phase converter	rs – Hal	f contr				rters with con	tinuous and
0 1			olled	and fully	controlled conve		
Single phase converter Discontinuous mode of techniques of single pha	of operat	ion –	olled their	and fully performan	controlled convence parameters.	Power factor i	mprovemen
0 1	of operat	ion – iers. PW	olled their /M te	and fully performan	controlled convence parameters. For rectifiers – Recti	Power factor i	mprovemen
Discontinuous mode of techniques of single pha	of operat se Rectifi	ion – iers. PW T	olled their /M teo hree	and fully performar chniques fo Phase Con	controlled convence parameters. In parameters of the parameters of	Power factor i fiers with RLE	mprovemen load.
Discontinuous mode of techniques of single pha Three phase converter	of operat se Rectifi s – Half	ion – iers. PW T contro	olled their /M teo hree olled	and fully performar chniques fo Phase Con and Fully	controlled convence parameters. Hor rectifiers – Rectiverters controlled conve	Power factor is fiers with RLE rters with con	mprovemen load. tinuous and
Discontinuous mode of techniques of single pha	of operat se Rectifi s – Half	ion – iers. PW T contro	olled their /M teo hree olled perfo	and fully performar chniques fo Phase Con and Fully	controlled convence parameters. In for rectifiers – Recti tor rectifiers controlled convence cameters. Twelve p	Power factor is fiers with RLE rters with con	mprovement load. tinuous and
Discontinuous mode of techniques of single pha Three phase converter	of operat se Rectifi s – Half operation	ion – iers. PW T contro – their	olled their /M teo hree olled perfor Du	and fully performar chniques fo Phase Con and Fully rmance par al Convert	controlled convence parameters. Hor rectifiers – Rectiverters controlled convencence controlled convencence parameters. Twelve parameters	Power factor is fiers with RLE rters with con ulse converters.	mprovement load. tinuous and
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Discontinuous mode of techniques of single pha Three phase converter Discontinuous mode of Single phase and three mode of operation. 1-φ half and full wave A control– sequence contr and 3-φ cycloconverters Text Books : 1. Muhammad H. H Education, 3 rd Education, 3 rd Education	of operation se Rectifi s – Half operation phase du C voltage ol of AC – advanta Rashid, "F dition, 20	ion – iers. PW T contro – their al conv e contro voltage ages and Power E 03.	olled their /M ter hree olled perfor Du erters control d disa	and fully performan chniques for Phase Con and Fully rmance par al Conver with circu AC conver with R and roller – Pri dvantages.	controlled conve nce parameters. H or rectifiers – Recti verters controlled conve rameters. Twelve p ters alating mode of op rters RL loads – 3-\u03c6 AC nciple of 3-phase h uits, Devices and A	Power factor in fiers with RLE rters with con- ulse converters. peration and nor C voltage contro Matrix converte pplications", Pe	mprovemen load. tinuous and n-circulating llers. PWM r. 1-φ to 1-φ
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Web	Ref	erenc	es:				
1	1	11	•	11		/1	1/070010007050

- http://www.sciencedirect.com/science/book/9780120887958
 http://www.freebookcentre.net/Electronics/Power-Electronics-Books.html
- 3. http://nptel.ac.in/downloads/108105066/
- 4. http://uni-site.ir/khuelec/wp-content/uploads/Mohan-Power-Electronics.pdf
- 5. http://www.e-booksdirectory.com/details.php?ebook=11306

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

SOLID STATE POWER CONVERTERS (SSPC)

0 0 1		RONIC	S			Scheme	: 2017
Course Code	Hours/	Week		Credits	Max	ximum Marks	
EE803	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Dur	ation:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A							
CO1: Understand the						peration of line	
,					nutated inverters.	1 1 1 1 1 0	·
CO2: Determine the j	performar	nce of 1	-Φ vo	ltage sourc	ce inverter with Sin	gle, Multiple, S	ine PWM
techniques.	amonation	ofmul	tilava	linvortora	to nadu as hammani		
CO3: Understand the CO4: Understand ope	1						
CO4: Understand ope							two stage
	-		0	0	DC-DC converters	,	, two stage
(ITY back, push	puii, iiaii	bildge		in ondge)	DC-DC converters	•	
		In	trodu	iction to Ir	verters		
		Compa				a voltage courc	e inverters
Voltage Control and har Sinusoidal PWM -Spac Selective harmonic elim	Pul e Vector	se widt based ethod -	ion in <mark>h mo</mark> PWM third	n inverters. dulated (P 1, Bus clar harmonic i	PWM) Inverters mping PWM - Ad injection method –l		techniques
Sinusoidal PWM -Spac Selective harmonic elim	Pul e Vector ination m	se widt based ethod -	ion in <mark>h mo</mark> PWM third Mult	n inverters. dulated (P I, Bus clar harmonic i i level inve	PWM) Inverters mping PWM - Ad injection method –l erters	vanced PWM Performance con	techniques mparison.
Sinusoidal PWM -Spac	Pul ce Vector ination m Inverters oed multi-	se widt based ethod - - Class -level in	ion in h mo PWM third Mult sificat	a inverters. dulated (P I, Bus clar harmonic i i level inver- tion of Mu ers -Flying	PWM) Inverters mping PWM - Ad injection method –l erters ilti level inverters, capacitor multi-le	vanced PWM Performance con principle of op vel inverters an	techniques mparison. peration and nd H-Bridge
Sinusoidal PWM -Spac Selective harmonic elim Concept of Multi level features of diode clamp Inverter Topology - Cor	Pul ce Vector ination m Inverters oed multi-	se widt based ethod - - Class -level in of multi	ion in h mo PWM third Mult sificat nverte level	a inverters. dulated (P I, Bus clar harmonic i i level inver- tion of Mu ers -Flying	PWM) Inverters mping PWM - Ad injection method –l erters alti level inverters, capacitor multi-le pologies -Introduct	vanced PWM Performance con principle of op vel inverters an	techniques mparison. peration and nd H-Bridge
Sinusoidal PWM -Spac Selective harmonic elim Concept of Multi level features of diode clamp Inverter Topology - Cor	Pul ce Vector ination m Inverters oed multi- mparison and step- ode regul	se widt based ethod - - Class -level in of multi -up DC ators –	ion in h mo PWM third Mult sificat nverte level DC - to E Anal	a inverters. dulated (P I, Bus clar harmonic i i level inver- tion of Mu ers -Flying inverter to DC Conver- ysis of bud	PWM) Inverters mping PWM - Ad injection method –lecters alti level inverters, capacitor multi-le pologies -Introduct erters ters with R and R ck regulators - B	vanced PWM Performance con principle of op vel inverters an tion to advanced L Loads – Mu	techniques mparison. peration and d H-Bridge d Multi leve
Sinusoidal PWM -Space Selective harmonic elim Concept of Multi level features of diode clamp Inverter Topology - Cor inverter topologies. Analysis of step-down converters- Switched m boost regulators – Cuk r	Pul ce Vector ination m Inverters bed multi- mparison of and step- ode regulators.	se widt based ethod - - Class -level in of multi -up DC ators – Isol	ion in h mo PWM third Mult sificat overte level DC - to E Anal ated	a inverters. dulated (P I, Bus clar harmonic i i level inve- tion of Mu ers -Flying inverter to DC Conver- ysis of buc DC-DC Ce	PWM) Inverters mping PWM - Ad injection method – erters ulti level inverters, capacitor multi-le pologies -Introduct erters ters with R and R ck regulators - B	vanced PWM Performance con principle of op vel inverters an tion to advanced L Loads – Mu oost regulators	techniques mparison. peration and d H-Bridg d Multi leve llti quadran – Buck and
Sinusoidal PWM -Space Selective harmonic elim Concept of Multi level features of diode clamp Inverter Topology - Corr inverter topologies. Analysis of step-down converters- Switched m	Pul ce Vector ination m Inverters bed multi- mparison of and step- ode regulators. ion in the wer circui Jtilization	se widt based ethod - - Clase -level in of multi -up DC ators – Isol e switch t and sta	ion in h mo PWM third Mult sificat nverte level DC - to D Anal ated h-mode eady-	a inverters. dulated (P I, Bus clar harmonic i i level inver- tion of Mu ers -Flying inverter to DC convert ysis of buc DC-DC Co de convert state analy	PWM) Inverters mping PWM - Ad injection method – erters ulti level inverters, capacitor multi-le pologies -Introduct erters ters with R and R ck regulators - B onverters ers -Transformer sis - Push-Pull Cor	vanced PWM Performance con principle of op vel inverters an tion to advanced L Loads – Mu oost regulators connection – F nverters – Powe	techniques mparison. peration and nd H-Bridg d Multi leve llti quadran – Buck and Forward and r circuit and
Sinusoidal PWM -Space Selective harmonic elim Concept of Multi level features of diode clamp Inverter Topology - Cor inverter topologies. Analysis of step-down converters- Switched m boost regulators – Cuk r Requirement for isolati flyback converters - Pow steady-state analysis - U	Pul ce Vector ination m Inverters bed multi- mparison of and step- ode regulators. ion in the wer circui Jtilization	se widt based ethod - - Clase -level in of multi -up DC ators – Isol e switch t and sta	ion in h mo PWM third Mult sificat nverte level DC - to D Anal ated h-mode eady-	a inverters. dulated (P I, Bus clar harmonic i i level inver- tion of Mu ers -Flying inverter to DC convert ysis of buc DC-DC Co de convert state analy	PWM) Inverters mping PWM - Ad injection method – erters ulti level inverters, capacitor multi-le pologies -Introduct erters ters with R and R ck regulators - B onverters ers -Transformer sis - Push-Pull Cor	vanced PWM Performance con principle of op vel inverters an tion to advanced L Loads – Mu oost regulators connection – F nverters – Powe	techniques mparison. peration and nd H-Bridg d Multi leve llti quadran – Buck and Forward and r circuit and

- 1. Muhammad H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, 3rd Edition, 2003.
- 2. B. K. Bose, "Modern Power Electronics & AC Drives", Prentice Hall, 2002
- 3. Dr. B.S.Bimbra, "Power Electronics", Khanna Publishers, 3rd edition, 2003
- 4. Vedam Subrahmanyam, "Power Electronics", New Age International, 1996
- 5. M.D. Singh, K.B. Khanchandani, "Power Electronics", Tata McGraw-Hill, 2008

- 1. G.K. Dubey, et.al, "Thristorized Power Controllers", Wiley Eastern Ltd, 2001
- 2. D. Grahame Holmes, Thomas A. Lipo, "Pulse Width Modulation for Power Conversion", John Wiley & Sons, 2003

Web References:

- 1. http://www.sciencedirect.com/science/book/9780120887958
- 2. http://www.freebookcentre.net/Electronics/Power-Electronics-Books.html
- 3. http://nptel.ac.in/downloads/108105066/
- 4. http://uni-site.ir/khuelec/wp-content/uploads/Mohan-Power-Electronics.pdf
- 5. http://www.e-booksdirectory.com/details.php?ebook=11306

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

DIGITAL SIGNAL PROCESSING (DSP)

I Semester : POWER	ELECTE	RONIC	S			Scheme	: 2017
Course Code	Hours/	Week		Credits	Max	kimum Marks	
EE804	L	Т	Р	C	Continuous Internal Assessment	End Exam	TOTAL
Sessional Exam Dur	3	- []	-	3	40 End Eve	60 m Duration: 3	100
Sessional Exam Dur	ation: 2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A	t the end	of the c		the studer	t will be able to		
CO1: Understand the							
CO2: Characterize L'		-	-		*		
CO3: Understand the			<u> </u>			mation methods	S.
CO4: Understand and							
CO5: Understand and						J	
CO6: Design analog					0		
CO7: Design digital f							
				-			
		Discret	e Tin	ne Signals	and Systems		
Z-transform and inverse transform.	Z-transfc	orms, the		-Transform ns and prop		ction, sampling	the Z-
		Discret	e For	ırier Tran	sform (DFT)		
Fourier representation o DFT, Inverse DFT (IDF	-	cy doma	in se	quences, di	iscrete fourier trans	form (DFT), pr	operties of
				ourier Tra			
Introduction, Radix-2 Fl	FT algorit	hms, ap					
				sign of Filt	ters		
Design of FIR filters - D	<u> </u>						
					te-Time Systems		
Structures of FIR system	<u>is - Struct</u>	ures of	IIR s	ystems.			
Torré Doclar							
Text Books : 1. John G. Proakis Prentice Hall, 4 th	¹ edition, 2	2007	-	-			ations",
2. Johnny R Johnso	n, "Introc	luction	to Dig	gital Signa	l Processing", Pren	tice Hall, 1989	
Reference Books :							
 Alan V. Oppenh William D. Stand edition, 1984 					Signal Processing" Signal Processing"		

edition, 1984 3. Andreas Antoniou, "Digital filters", McGraw-Hill, 2nd edition, 2000.

Web References:

- 1. http://nptel.ac.in/courses/117102060/
- 2. https://lecturenotes.in/note/50/digital-signal-processing
- 3. https://onlinecourses.nptel.ac.in/noc16_ec13
- 4. https://www.scribd.com/document/317199607/PDF-of-Digital-Signal-Processing-Ramesh-Babu-2

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

SIMULATION OF POWER ELECTRONIC SYSTEMS LAB (SPESL)

I Semester : POWER	ELECTE	RONIC	S			Scheme	: 2017
Course Code	Hours/	Week		Credits	Max	ximum Marks	
EE805	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	-	-	3	3	50	50	100
End Exam Duration:	3 Hrs	I.	L				I
Course Outcomes : A							
CO1: Acquire know							
CO2: Understand and							MATLAB.
CO3: Develop the m						AB.	
CO4: Design various	s converter	rs with	R and	RL Load u	using PSIM		
				F EXPERI			
1. Develop a simulink	model for	a three	-phas	e induction	motor using synch	ronously rotation	ng reference
frame.							
2. Develop a simulink							
3. Develop a simulink							
source inverter. Stud							
 Develop a simulink phase voltage sour modulation indices. 							
5. Develop a simulatio	n model f	or pulse	e widt	h modulate	d diode clamped th	ree-level invert	ter and
compare the same w		-			±		
6. PSIM simulation of	single pha	ase dual	l conv	erter with	R and R-L loads.		
7. PSIM simulation of	three-pha	se AC v	/oltag	e controlle	r with R and R-L lo	oads.	
8. PSIM simulation of	single pha	ase full	contro	olled rectif	ier with R and R-L	loads	
9. PSIM simulation of	three-pha	se full c	contro	lled rectifie	er with R and R-L	loads	
10. PSIM simulation of	four quad	rant ch	opper	with R and	l R-L loads.		
Reference Books :							
1. cdn.intechopen.co							
2. www.hamzaprod	ucts.com/1	natlab-	manua	al-for-powe	er-electronics.pdf		

M.Tech II Semester

S.No	Subject	Code	Credits	In	cheme struct iods/v	ion	Duration of end Exam (Hours)	Sche	eme of Examin Max. Marks	ation
				L	D/ T	Р		End Exam	Internal Assessment	Total
Ι	Theory									
1.	Solid State DC Drives (SDCD)	EE806	3	3	-	-	3Hrs	60	40	100
2.	Solid State AC Drives (SACD)	EE807	3	3	-	-	3Hrs	60	40	100
3.	HVDC and FACTS (HVDC)	EE808	3	3	-	-	3Hrs	60	40	100
4.	Advanced Simulation of Power Electronic Systems (ASPES)	EE809	3	3	-	-	3Hrs	60	40	100
5.	Elective-III		3	3	-	-	3Hrs	60	40	100
6.	Elective-IV		3	3	-	-	3Hrs	60	40	100
7.	Research Methodology	AU102	-	-	-	-	-	-	-	-
Π	Practical									
8.	Electrical Drives Lab (EDL)	EE810	2	-	-	3	3Hrs	50	50	100
			20	18	-	3		410	290	700

SOLID STATE DC DRIVES (SDCD)

II Semester : POWE			CS			Scheme	: 2017
Course Code	Hours/	Week		Credits		ximum Marks	
EE806	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Du	ration:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A CO1: Select the suita CO2: Understand the CO3: Gain adequate	able drive : e concept o	for the r of Conv	equir erter	ed load cha /Chopper c	aracteristics.		
eeer oun adequate					al DC Drives		•0•
Review of conventiona control, electrical brake of separately excited I motor- field and armatu	ing for bot DC motor	h series with re	s and gener	separately rative brak	excited DC motor	rs, Multi quadra	int operatio
Introduction, types, 1- converters connected t operation, dual convert	o separate er fed DC	ly excit drives, 1 Chor	ed an revers oper (nd series m sible DC dr Controlled	otor, continuous a tives. I dc drives	and discontinuo	us modes c
Introduction, types, Ty motor drives, motoring closed loop control of c	operation lc drives-S	, regene ingle ar	erative nd fou	e operation	and braking operation	ation, multi-qua	
Speed controlled driv hysteresis current contr	e system,	curren	t con	ntrol loop,	pulse width mo	odulated curren	t controlle
					otor drives		
Dynamic simulations of command current gener	-				r drives – Speed f	feedback speed	controller
Text Books : 1. S. B. Dewan, G and Sons, 1987 2. Vedam Subrahr 3. P. C. Sen, "Thy	nanyam, "	Thyristo	or Co	ntrol of Ele	ectric Drives", TM		hn Wiley
Reference Books : 1. G K Dubey, "Po 2. R. Krishnan, "E	ower Semi	conduct	or Co	ontrolled D	rives" Prentice Ha	JI 1989	

Web 1	References:
1.	www.emic-bg.org/files/Electric_Motors_Drives.pdf
2.	http://www.freebookcentre.net/electronics-ebooks-download/DC-Motor-Drive-(PDF-36p).html
3.	https://library.e.abb.com/public/8bf2f10f6872424396a5ccbf77f8435f/Technical%20e-
	book%20ACS580_b.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

SOLID STATE AC DRIVES (SACD)

		RONIC	20		I	Scheme	: 2017
Course Code	Hours	/Week		Credits		ximum Marks	T
EE807	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Dur	ration : 2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A							
CO1: Understand conv							-1-
CO2: Understand state stage and two st				duction mot	or and synchronous	motors using sing	gie
CO3: Apply slip powe				he control o	f induction motor		
CO4: Apply closed lo	•					n motor	
CO5: Understand spec							
		Review	of C	onvention	al AC Drives		
Review of conventiona						ons of Induction	n Motor an
Synchronous Motor.		, -F					
		Speed	contr	ol of Indu	ction Motor		
Speed control of 3-ph	ase Induc	tion M	- 4		1, , 1		
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~			otor i	using stato	or voltage control	method using	AC Voltag
Controllers, Stator freq	uency cor	ntrol me	ethod	using Cyc	cloconverters, state	or V/F control n	nethod usin
Controllers, Stator freq Voltage Source Inverte	uency cor ers (VSI),	ntrol me stator	ethod currei	using Cyc nt control	eloconverters, state method using cur	or V/F control n rent source inve	nethod usin erters (CSI
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d	uency cor ers (VSI), ynamic ar	ntrol me stator nd regen	ethod curren nerativ	using Cyc nt control ve braking	eloconverters, state method using cur of VSI and CSI fee	or V/F control n rent source invo d Induction Mot	nethod usin erters (CSI) or Drives.
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phase	uency cor ers (VSI), lynamic ar se inductio	ntrol me stator nd regen on motor	ethod curren nerativ r using	using Cyc nt control ve braking g Static rot	eloconverters, state method using cur of VSI and CSI fee for resistance contr	or V/F control n rent source invo d Induction Mot	nethod usin erters (CSI) or Drives.
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phas recovery schemes, Stati	uency cor ers (VSI), ynamic ar se inductic c Kramer	ntrol me stator nd regen on motor method	ethod curren nerativ r usin l, and	using Cyc nt control ve braking g Static rot Static Sche	eloconverters, state method using cur of VSI and CSI fee for resistance contr erbius method.	or V/F control n rent source inve d Induction Mot ol method, Slip	nethod usin erters (CSI) or Drives. power
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phase	uency cor ers (VSI), ynamic ar se inductic c Kramer	ntrol me stator nd regen on motor method	ethod curren nerativ r usin l, and	using Cyc nt control ve braking g Static rot Static Sche	eloconverters, state method using cur of VSI and CSI fee for resistance contr erbius method.	or V/F control n rent source inve d Induction Mot ol method, Slip	nethod usin erters (CSI) or Drives. power
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phas recovery schemes, Stati	uency cor ers (VSI), ynamic ar se induction ic Kramer ase induct	ntrol me stator nd regen on motor method ion motor	ethod curren nerativ r usin l, and tor by	using Cyc nt control ve braking g Static rot Static Sche y vector co	eloconverters, state method using cur of VSI and CSI fee for resistance contr erbius method. ontrol methods: B	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o	nethod usin erters (CSI) or Drives. power f Direct an
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phase recovery schemes, Static Speed control of 3-phase	uency cor ers (VSI), ynamic ar se induction ic Kramer ase induct tor contro	ntrol me stator and regen on motor method ion motor al. Speed	ethod curren nerativ r usin l, and tor by <u>l cont</u>	using Cyc nt control ye braking g Static rot Static Sche y vector co rol of indu	eloconverters, state method using cur of VSI and CSI fee for resistance contr erbius method. ontrol methods: B	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o	nethod usin erters (CSI) or Drives. power f Direct an
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phase recovery schemes, Stati Speed control of 3-phase	uency cor ers (VSI), ynamic ar se induction ic Kramer ase induct tor contro	ntrol me stator nd regen on motor method ion motor l. Speed	ethod curren rerativ r usin l, and tor by l cont	using Cyc nt control ve braking g Static rot Static Sche y vector co rol of indu l of Synch	eloconverters, state method using cur of VSI and CSI fea for resistance contr erbius method. ontrol methods: B ction motor by Dir ronous motor	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o rect Torque Cont	nethod usin erters (CSI) or Drives. power f Direct an trol (DTC).
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phas recovery schemes, Stati Speed control of 3-pha Indirect methods of vec	uency cor ers (VSI), lynamic ar se induction to Kramer ase induct tor contro	ntrol me stator nd regen on motor method ion motor l. Speed Speed co trol of	ethod curren nerativ r usin l, and tor by l cont ontro synch	using Cyc nt control ye braking g Static rot Static Sche y vector co rol of induce l of Synch pronous mo	eloconverters, state method using cur of VSI and CSI fee for resistance contre- erbius method. ontrol methods: B ction motor by Dir ronous motor ptors, VSI and CS	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o ect Torque Cont SI fed synchror	nethod usin erters (CSI) or Drives. power f Direct an trol (DTC).
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phas recovery schemes, Stati Speed control of 3-pha Indirect methods of vec Self control and separ margin angle control;	uency cor ers (VSI), ynamic ar se induction ic Kramer ase induct etor contro stely cont Cyclocor	ntrol me stator and regen on motor method ion motor ol. Speed Speed co trol of nverter	ethod curren nerativ r usin l, and tor by d cont ontro synch fed s	using Cyc nt control ye braking g g Static rot Static Sche y vector co rol of induc l of Synch pronous mo synchronou	cloconverters, state method using cur of VSI and CSI fee for resistance contre- erbius method. ontrol methods: B ction motor by Dir ronous motor otors, VSI and CS s motor, speed c	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o ect Torque Cont SI fed synchror ontrol and per	nethod usin erters (CSI) or Drives. power f Direct an trol (DTC).
Controllers, Stator freq Voltage Source Inverter PWM inverter drives, d Speed control of 3-phas recovery schemes, Stati Speed control of 3-pha Indirect methods of vec	uency cor ers (VSI), ynamic ar se induction ic Kramer ase induct etor contro stely cont Cyclocor	ntrol me stator and regen on motor method ion motor l. Speed Speed co trol of nverter ole frequ	ethod curren nerativ r usin l, and tor by l cont ontro synch fed s nency	using Cyc nt control ye braking g Static rot Static Sche y vector co rol of induc l of Synch ronous mo synchronou supply wit	cloconverters, state method using cur of VSI and CSI fea for resistance contr erbius method. ontrol methods: B ction motor by Dir ronous motor otors, VSI and CS is motor, speed c th DC link inverter	or V/F control n rent source inve d Induction Mot ol method, Slip asic concepts o ect Torque Cont SI fed synchror ontrol and per	nethod usin erters (CSI) or Drives. power f Direct an trol (DTC).
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- 3. http://lnodroundtable.com/groups/modern-power-electronics-and-ac-drives-textbook-pdf-epub/

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

HVDC AND FACTS (HVDC)

Course Code		RONIC	LS			Scheme	: 2017
	Hours/	Week	-	Credits	Ma	ximum Marks	-
EE808	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
~	3	-	-	3	40	60	100
Sessional Exam Dur	ation:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A CO1: Understand the						ssion grid	
CO2: Understand the						solon gild.	
CO3: Understand the							
CO4: Analyze the pro						stem and Per U	nit
representation.			5	/1			
CO5: Understand the	design of	f variou	s type	es of FACT	S controllers.		
CO6: Compensate rea						ompensation.	
*	*					_	
			Ba	asic concep	ots		
Choice of converter con	nfiguratio	ons - Ar	nalysi	s of Graet	z circuit – Charac	teristics of 6-p	ulse and 12
pulse converters - Prin							
control – Current and ex							
				faults &		<u> </u>	
Converter faults – protect	ction agai					erter station – su	rge arresters
_	-	nst ovei	r curre	ents & over	r voltages in conve		-
Converter faults – protec – smoothing reactors – I	DC breake	nst ovei ers – Efi	r curre fects (ents & over of proximit	r voltages in conve ty of AC & DC tra		-
– smoothing reactors – I	DC breake Po	nst over ers – Eff wer Flo	r curre fects (w An	ents & over of proximit alysis in A	r voltages in conve ty of AC & DC tra AC/DC Systems	nsmission lines.	-
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- 1. J. Arrillaga, "High Voltage Direct Current Transmission", IET / BSP Books, 2nd edition, 2013
- 2. G.K. Dubey, et.al, "Thyristorized Power Controllers", Wiley Eastern Ltd, 2001

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3. http://www.siemens.co.in/pool/about_us/our_business_segments/hvdc_proven_technology.pdf

4. https://people.qatar.tamu.edu/shehab.ahmed/ecen_459/FACTS.pdf

5. http://www.faadooengineers.com/threads/42779-HVDC-KR-Padiyar

- 6. http://www.faadooengineers.com/threads/11735-Facts-k-r-padiyar
- 7. http://storageelectricity.blogspot.in/2014/09/understanding-facts-by-hingorani.html
- 8. http://research.iaun.ac.ir/pd/bahador.fani/pdfs/UploadFile_6422.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

ADVANCED SIMULATION OF POWER ELECTRONIC SYSTEMS (ASPES)

II Semester : POWER			28			Scheme : 2017			
Course Code	Hours	/Week		Credits	Ma	ximum Marks			
EE809	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL		
	3	-	-	3	40	60	100		
Sessional Exam Dur	ration : 2	Hrs			End Exa	m Duration: 3	Hrs		
Course Outcomes : A									
CO1: Understand the							nines.		
CO2: Understand van						ment.			
CO3: Understand the									
CO4: Understand sys						te space averagin	ng		
circuit averagi	ng and av	reraged	switch	h modeling	•				
				Modeling					
Principles of Modeling									
model - Semiconducto									
Resistance Capacitance									
for power electronic swi	itches cor	nputer f	ormul	lation of eq	uations for power	electronic system	ms		
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- 1. Robert W. Erickson, Dragan Maksimovic, "Fundamentals of Power Electronics", Springer International Edition, 2nd edition, 2001.
- 2. Ned Mohan, Tore M. Undeland, "Power Electronics: Converters, Applications and Design", John Wiley and Sons, 2nd edition, 2009
- 3. ORCAD PSpice Basics: Circuit Analysis Software, User's Guide, ORCAD Corporation.

Web References:

- 1. https://ece.uwaterloo.ca/~pwr_elec/
- 2. https://www.scribd.com/document/317675553/circuit-sim-1-IITB-pdf
- 3. https://www.fer.unizg.hr/_download/repository/Modeling_and_Simulation_of_Power_Electroni c_converters.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

ELECTRICAL DRIVES LAB (EDL)

II Semester : POWER	ELECT	RONIC	CS			Scheme	Scheme : 2017	
Course Code	Hours/	Week		Credits	Max	imum Marks		
EE810	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL	
	-	-	3	3	50	50	100	
End Exam Duration: 3	Hrs							
Course Outcomes : At	t the end	of the c	ourse	the studer	t will be able to			
CO1: Acquire knowled								
CO2: Understand spee	0					. rectifier and c	hopper.	
CO3: Understand spee								
CO4: Understand v/f of							rs.	
				F EXPERI				
1. Verification of SI					*			
2. Verification of SI								
					ve using dSPACE l	kit.		
4. DSP based speed					. 100			
					excited DC motor.			
6. Speed control of 17. Four-quadrant and				-				
8. Static Kramer dri			pper i					
9. Static rotor resista		trol of S	RIM	using chor	mer			
10. Speed control of i						rollers.		
				pilu				
Reference Books :								
1. B. K. Bose, "Mod	lern Pow	er Elec	tronic	s & AC Di	rives", Prentice Hal	1, 2002.		
2. Vedam Subrahma	unyam, ''	Thyristo	or Cor	ntrol of Ele	ectric Drives", TMI	H, 2008		

M.Tech III & IV Semester

Power Electronics

S.No	Subject	Code	Credits Scheme o Instructio periods/we		ion	Duration of end Exam (Hours)	Sche	Scheme of Examination Max. Marks		
				L	D/ T	Р		End Exam	Internal Assessment	Total
1.	Project Dissertation	EE901	12	-	-	-	-	50	50	100

Description	Subject title	Code
Audit Course – I	Technical English	AU101
Audit Course – II	Research Methodology	AU102
	1. Digital Control Systems (DCS)	EE811
Elective I	2. Nonlinear Control Systems (NLCS)	EE812
	3. Modern Control Theory (MCT)	EE813
	1. Neural Networks and Fuzzy Logic (NNFL)	EE814
Elective II	2. Soft Computing Techniques (SCT)	EE815
	3. Microcontrollers and Applications (MCA)	EE816
	1. Power Quality (PQ)	EE817
Elective III	2. EMI and EMC issues (EMI)	EE818
	3. Industrial Applications of Power Electronics	EE819
	(IAPE)	
	1. Renewable Energy Sources (RES)	EE820
Elective IV	2. Power Electronics in Solar and Wind Energy	EE821
	Systems (PESWS)	
	3. Programmable Logic Controllers (PLC)	EE822

List of Electives

TECHNICAL ENGLISH (TE)

I Semester : POWER	ELECTE	RONI C	S			Scheme	: 2017
Course Code	Hours/	Week		Credits	Max	ximum Marks	
AU101	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	-	-	-	-	-	-	-
Sessional Exam Dura	ation :				End Exa	m Duration:	
Course Outcomes : A							
CO1: Write Technical							
CO2: Write Job Appl	ications,	Resume	es and	Statement	s of Purpose.		
				urse Cont	ent		
1. Technical Reports -Fo	ormats an	d Style	S				
a) Feasibility Report							
b) Factual Report							
c) Project Reports							
2. Journal Papers- Forma							
3. Paper Presentation Str							
4. Statement of Purpose					ips		
5. Letter Writing- Job Ap			ime P	reparation			
6. Common Errors in Re	search Pa	apers					
Reference Books :							
1. Sangeeta Sharma & B		hra, Co	mmur	nication Sk	ills for Engineers a	and Scientists,	
PHI Learning Private							
2. M. Ashraf Rizvi, Effe	ctive Tec	hnical (Comm	nunication,	Tata McGraw-Hil	l Publishing	
Company Ltd., 2005.							
3. Thomas S. Kane, The							
4. Joan van Emden, A G							
http://scisweb.ulster.ac	c.uk/~pro	jects/gi	uide-to	o-technical	-writing-1.pdf		

RESEARCH METHODOLOGY (RM)

II Semester : POWER			CS		Sche					
Course Code	Hours	Week	-	Credits	Max	kimum Marks				
					Continuous					
AU102	L	Т	P	С	Internal	End Exam	TOTAL			
					Assessment					
	-	-	-	-	-	-	-			
Sessional Exam Dur	ration :				End Exa	m Duration:				
Course Outcomes : A	At the end	of the c	ourse	the studer	t will be able to					
CO1: Understand ov						m and conduct a	literature			
review of the c			-		_	in and conduct a	i incrature			
CO2: Study the data										
CO3: Understand the							pret the data			
in a research p	-	permes	01 050							
r										
	Meani	ng, Obj	jectiv	e and Mot	ivation in Researc	ch				
Types of Research, Res		U, V					search.			
Features of Good Desig										
Sampling Design, Char										
Design.				-						
	Μ	leasure	ment	and Scali	ng Techniques					
Errors in Measurement	t, Tests of	f Sound	1 Mea	asurement,	Scaling and Scale	e Construction	Technique			
Forecasting Techniques	, Time Se	ries An	alysis	, Interpolat	ion and Extrapolat	ion.				
		Me	thods	s of Data C	ollection					
Primary Data, Question	naire and					Cases and Sche	dules.			
				stical Proc						
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Correlation Vs. Determ		•			-	-				
contention vs. Determ		ypes 01		othesis Te		jiioutions.				
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Statistical Techniques f										
Test, Analysis of Varia						ing meory cr	n Square			
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Text Books :										
1. C.R. Kothari, J	Research	Metho	dolog	v (Method	ls & Techniques), New Age	Internation			
Publishers.			0.		1	., 0				
	Sudha Na	yak, M.	Girija	a, Research	Methodology, S.C	Chand Publisher	s.			
Reference Books :		• /	5							
1. Dr.Chandrakant	Kokare, D	r.Shrik	ant K	okare," Re	search Methodolog	y", Repro Knov	wledgcast			
Limited, 2015	·			,	c	·· · 1	C			
· · ·										
Web References:										
1. http://www.socie	ology.kpi.ı	ıa/wp-c	onten	t/uploads/2	2014/06/Ranjit_Ku	mar-				
Research_Metho	dology A	Sten_ł	w_Ste	en Gindf						

2.	http://www.socscidiss.bham.ac.uk/methodologies.html
3.	https://www.bcps.org/offices/lis/researchcourse/develop_writing_method_quantitative.htm
4.	https://groups.google.com/forum/#!msg/klubs_mba/e24oSszYJPI/APKTFNtmg8EJ
5.	https://www.researchgate.net/publication/270956555_CHAPTER_3
	_RESEARCH_METHODOLOGY_Data_collection_method_and_Research_tools
6.	https://www.slideshare.net/collinsbrobbey/sample-study
7.	http://libguides.usc.edu/writingguide/methodology

DIGITAL CONTROL SYSTEMS (DCS)

Semester : POWER ELECTRONICSCourse CodeHours/Week						Scheme : 2017				
Course Code	Hours/	Week		Credits		ximum Marks				
EE811	L 3	Т	Р	C 3	Continuous Internal Assessment	End Exam	TOTAL			
Sagional Evon Dur	-	-	-	3	40 End End	<u>60</u>	100			
Sessional Exam Dur	ration: 2	Hrs			End Exa	m Duration: 3	Hrs			
<u> </u>	A / 1 1	6.4		(1 (1	· ·11.1 1.1 ·					
Course Outcomes : A					it will be able to					
CO1: Understand the CO2: Understand the			/A co	nversion						
			nia m	othoda						
CO3: Understand the CO4: Understand the	<u> </u>				in analycic					
CO4: Understand dig					ill allarysis					
		ss conti		u ucsigii.						
			Ţ	ntroductio	n					
Block diagram of typica	al digital c	ontrols				control systems	- examples			
of discrete data and digi							examples			
of diserve dute and digi	itur contro	r bysten		-Transfor		uis, 2011.				
of ZOH - relation betwee State space modeling of in variant systems - solu	digital sy tion of tir	stems v	State with sa	Space An ample and	<mark>alysis</mark> hold - state transiti	on equation of d	ligital time			
function from the state i		-	ies, Ei	igen vector matrix.						
function from the state r canonical form, comput	ation of st	ate tran	ies, Ei sition	igen vector matrix. Stability	s and diagonalisat					
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1. Ioan Doré Landau, Gianluca Zito, "Digital Control Systems: Design, Identification and Implementation", Springer Science & Business Media

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- 1. https://link.springer.com/book/10.1007%2F978-1-84628-056-6
- 2. http://www.sciencedirect.com/science/book/9780123943910
- 3. http://faculty.ksu.edu.sa/hedjar/Documents/CEN455/Digital%20Control%20Systems.pdf
- 4. http://www.springer.com/in/book/9781846280559
- 5. http://www.springer.com/in/book/9783642864193
- 6. http://nptel.ac.in/courses/108103008/
 - 7. https://www.coursehero.com/file/13785953/DIGITAL-CONTROL-SYSTEMSpdf/
 - 8. http://een.iust.ac.ir/profs/Esmaeilzadeh/MSc.%20Digital%20Control%20Systems/Digital%20Control%20System_PhilipsNagle.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

NON LINEAR CONTROL SYSTEMS (NLCS)

Semester : POWER ELECTRONICS Course Code Hours/Week						Scheme : 2017				
Course Code	Hours	/Week		Credits		ximum Marks				
EE812	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL			
	3	-	-	3	40	60	100			
Sessional Exam Du	ration : 2	Hrs			End Exa	m Duration: 3	Hrs			
	41 1	6.1		.1 . 1						
Course Outcomes :						1				
CO1: Understandsta	-	±			<u> </u>					
CO2: Understand sta										
CO3: Verify the give	en system	is contr	ollabl	le, observal	ble, detectable, stal	bilizable and red	lucable			
	-		4.	· • •						
					zation Process	:1:1	of nonlin			
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systems, Feedback Line	earization,									
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			theor syste	ems - Stab m.the chap	ility, determinatio ter					
performance analysis o	f piecewis	e linear	theor syste Stal	ems - Stab m.the chap bility Anal	ility, determinatio ter ysis	n - Limit cycles	- Nonlinea			
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http://www.gipsa-lab.grenoble-inp.fr/~nicolas.marchand/teaching/Nonlinear_PSPI.pdf
 http://nptel.ac.in/courses/108106024/

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

MODERN CONTROL THEORY (MCT)

I Semester : POWER			5	Scheme : 2017					
Course Code	Hours/	Week	1	Credits		ximum Marks	T		
EE813	L 3	Т	Р	C	Continuous Internal Assessment 40	End Exam	TOTAL		
Sessional Exam Dur	-	- Urc	-	3		m Duration: 3	100 Urs		
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Course Outcomes : A	At the end	of the c	ourse	the studen	t will be able to				
CO1: Analyze dynam						ation or applyin	σ		
domain transfo		liicui sy		o y bor ing	system model equ	anon or uppryma	5		
CO2: Realize the stru	icture of a	a discret	e time	e system ar	nd model its action	mathematically	<i>.</i>		
CO3: Examine a syst									
CO4: Implement bas			•	•					
CO5: Formulate and							ce		
indices.			-		-	-			
CO6: Apply knowled	lge of con	trol the	ory fo	r practical	implementations i	n engineering ar	nd		
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- 1. Jean Jacques E. Slotine, Weiping Autor Li, "Applied Nonlinear Control", Prentice Hall Inc., 1991
- 2. M. Vidyasagar, "Nonlinear System Analysis", Prentice Hall Inc., 2nd Edition, , 1993

Web References:

- 1. portal.tpu.ru:7777/SHARED/s/SMIKE/Uchebnaya/.../Modern_Control_Engineering.pdf
- $2. www.znu.ac.ir/data/members/pirmohamadi_ali/Control/Brogan(BookZZ.org).pdf$

3. sv.20file.org/up1/951_0.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

NEURAL NETWORKS AND FUZZY LOGIC (NNFL)

Course Code	ELECTI		5			Scheme	: 2017	
	Hours/	Week	I	Credits		ximum Marks		
EE814	L 3	Т	Р	C 3	Continuous Internal Assessment 40	End Exam	TOTAL 100	
Sessional Exam Du	-	- Ung	-	3		m Duration: 3		
Sessional Exam Dur	ration: 2	Hrs			End Exa	m Duration: 5	Hrs	
Course Outcomes : A CO1: Understand the CO2: Understand the CO3: Create Neural	e basic cor e basic cor	ncept of ncept of	biolo artifi	gical neura cial neural	l networks networks			
CO4: Understand the				0	meering.			
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CO5: Create Fuzzy r	nouels for	electric		gincering.				
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Text Books :

- 1. Jacek M. Zurada, "introduction to artificial neural systems", Jaico Publishing House, 6th edition, 2003
- George J. Autor Klir, Tina A Autor Folger, "Fuzzy sets, Uncertainty and Information", PHI, 1988
- 3. Bart Kosko, "Neural Networks and Fuzzy Systems", PHI, 1992
- 4. S. Rajasekaran, G. A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic, Genetic Algorithms: Synthesis and Applications", PHI Publication, 2003
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- 1. Philip D. Wasserman, "Neural Computing, Theory and Practice", Van Nostrand Reinhold Pub., 1989.
- 2. Laurene V. Fausett, "Fundamentals of Neural Networks, Architectures, Algorithms and Applications", PHI, 1994

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- 2. http://uni-obuda.hu/users/fuller.robert/nfs.html
- 3. http://nptel.ac.in/courses/117108048/module8/Lecture26.pdf
- 4. http://www.dkriesel.com/_media/science/neuronalenetze-en-zeta2-1col-dkrieselcom.pdf
- 5. https://page.mi.fu-berlin.de/rojas/neural/neuron.pdf
- 6. http://www.wearealgerians.com/up/uploads/139955152739491.pdf
- 7. https://docs.google.com/file/d/0B5vXY4-Kg5GeMmg4U2N6ZlR4Qm8/edit

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

SOFT COMPUTING TECHNIQUES (SCT)

I Semester : POWER			S			Scheme	e : 2017	
Course Code	Hours	/Week		Credits	Max	ximum Marks		
EE815	L	Т	Р	C	Continuous Internal Assessment	End Exam	TOTAL	
Sessional Exam Dura	$\frac{3}{1}$	- Ung	-	3	40 End Eva	60 m Duration: 3	100	
Sessional Exam Dura	ation: 2	Hrs			End Exa	m Duration: 5	Hrs	
Course Outcomes : A	t the and	of the	01180	the studer	t will be able to			
Course Outcomes . A CO1: Understand how								
CO1: Understand how	-	-			ork System			
CO2: Understand how	U	<i>.</i>				one in electrical		
engineering.	v to desig	gii ule ir	yonu	system for	unierent application			
engineering.								
		Int	rodua	ction to Fu	zzy logic			
Fuzzy sets - Fuzzy set	operation					zy relations O	nerations o	
Fuzzy relations - Prop functions – Fuzzification Defuzzification - Defuzz	on - Me	ethods	of M	embership	Value Assignme	ents - Fuzzy R		
				l Neural N				
forward network - Recur Perceptron networks - B Kohonen self organizing	ack Propa g maps - A	agation ART	netwo	orks - Radi		•		
Basic concepts - Workin different methods - Ge algorithm.								
			Hy	brid syste	ms			
Neural network, fuzzy hybrids - Fuzzy genetic propagation networks - I	hybrids	- Gene	ic alg etic al colled	gorithm hy Igorithm b Genetic A	brids – Neuro fuz ased back propaga lgorithms.			
		1		pplication			0 10	
Neural Networks Appli techniques - Genetic algorithm				-	· •		fuzzificatio	
Text Books :								
1. S. Rajasekaran, C Synthesis and Ap	plication n, S. N. I	is", PHI Deepa, "	Publ Princ	ication, 20 iples of So	· •	-	-	

- 1. D. E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Pearson Education, 2009
- 2. Kalyanmoy Deb, "Optimization for Engineering Design: Algorithm & Examples", PHI Learning Pvt. Ltd., 2nd edition, 2012

Web References:

- 1. www2.cs.uh.edu/~ceick/6367/Soft-Computing.pdf
- 2. https://www.bioinfopublication.org/files/articles/1_1_2_BSC.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

MICROCONTROLLERS AND APPLICATIONS (MCA)

	ELECT		S			Scheme	: 2017
Course Code	Hours/	Week		Credits		ximum Marks	T
EE816	L 3	Т	Р	C 3	Continuous Internal Assessment 40	End Exam	TOTAL
Sessional Exam Du	-	- Ung	-	3		m Duration: 3	
Sessional Exam Dur		nrs			Ellu Exa	III Duration: 5	nrs
Course Outcomes : A	At the end	of the c	ourse	the studen	t will be able to		
CO1: Understand ho						to gain the know	vledge of
different archit							
CO2: Understand ho	w to inter	face a m	nicroc	ontroller to	o different I/O devi	ces.	
CO3: Apply for diffe	erent indus	stries ba	sed o	n the requi	rements.		
				Microcont			
Introduction to Intel 8						0	n MCS-51
8051 Pin Description -							
				<u> </u>	and Instructions		
8051 Addressing Mode						1 0	
Stack Pointer - 8051 A Simulators of 8051	ssembly L	Languag	e Pro	gramming	- Development Sy	stems and 1001	is - Softwa
Simulators of 6031							
					and Serial Comm		
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip	in MCS- XX and	-51 - 89C20X	Time (XX) -	rs and C Architect	ounters - Serial ural Overview of	Communication Atmel 89C51	and Atm
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX	in MCS- XX and S tion of 89	-51 - 89C20X C51 an	Timer (X) - d 89C	rs and C Architect C2051 - Us	ounters - Serial ural Overview of ing Flash memory	Communication Atmel 89C51 devices Atmel	and Atm
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX	in MCS- XX and 3 tion of 89 ons of MC 51 and Atr Pulse gene	-51 - 89C20X C51 an S-51 a nel 89C ration -	Time (X) - d 89C nd At (51 ar - Puls	rs and C Architect C2051 - Us mel 89C51 nd 89C205 se Width M	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Aodulation - Stair	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave	and Atma 89CXX an
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse	in MCS- XX and 3 tion of 89 ons of MC 51 and Att Pulse gene Width Mc Inter	-51 - 89C20X C51 an C551 an nel 89C ration - easurem facing a	Timer (XX) - d 89C nd At (C51 ar (C51 ar)(C51	rs and C Architect C2051 - Us mel 89C51 nd 89C205 se Width M Frequency (ficrocontr	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Application	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene	and Atm 89CXX ar e generation eration- Sin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P	in MCS- XX and 3 tion of 89 ons of MC of and Atr Pulse gene Width Me Inter (LEDs), 1 t Display	-51 - 89C20X C51 and S-51 and mel 89C ration - easurem facing a Push Bu s, LCI	Time: (X) - d 89C (A) (C) (C) (C) (C) (C) (C) (C) (C) (C) (C	rs and C Architect C2051 - Us mel 89C205 and 89C205 are Width M Frequency (ficrocontr as, Relays a terfacing,	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Addulation - Stair Counter oller Applications nd Latch Connect ADC and DAC	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard	and Atm 89CXX ar e generation eration- Sin Interfacin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers	in MCS- XX and a tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu	-51 - 89C20X C51 and S-51 and nel 89C ration - easurem facing a Push Bu s, LCI s, LCI	Time: (XX) - d 89C (A 89C) (CS1 ar (CS1 ar (CS1 ar (CS1)	rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of 1	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard	and Atm 89CXX ar e generation eration- Sin Interfacin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers	in MCS- XX and a tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu	-51 - 89C20X C51 and S-51 and nel 89C ration - easurem facing a Push Bu s, LCI s, LCI	Time: (XX) - d 89C (A 89C) (CS1 ar (CS1 ar (CS1 ar (CS1)	rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of 1	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard	and Atm 89CXX ar e generation eration- Sin Interfacing
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati	in MCS- XX and a tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu	-51 - 89C20X C51 and S-51 and nel 89C ration - easurem facing a Push Bu s, LCI s, LCI	Time: (XX) - d 89C (A 89C) (CS1 ar (CS1 ar (CS1 ar (CS1)	rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of 1	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard	and Atm 89CXX ar e generation eration- Sin Interfacin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati	in MCS- XX and a tion of 89 ons of MC 51 and Atr Pulse gene Width Ma Inter (LEDs), 2 t Display Indu ons, Autor	-51 - 89C20X C51 and C51 and C	Time: (XX) - d 89C (A 4 8 9C) (C 5 1 at (C 5 1	rs and C Architect C2051 - Us mel 89C51 nd 89C205 se Width M Frequency (ficrocontr s, Relays a terfacing, cations of 1 control App	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard Interfacing	and Atm 89CXX ar e generation eration- Sin Interfacin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati Text Books : 1. Ajay V Deshmu	in MCS- XX and 3 tion of 89 ons of MC 51 and Attr Pulse gene Width Mc Inter (LEDs), 1 t Display Indu ons, Autor	-51 - 89C20X C51 and C51 and Mel 89C ration - easurem facing a Push Bu s, LCI Istrial A mation a	Time: (X) - d 89C nd At C51 ar - Puls and N uttons D Int Applic and C Illers-'	rs and C Architect C2051 - Us mel 89C51 nd 89C205 the Width M Frequency (ficrocontr s, Relays a terfacing, cations of C control App Theory and	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Aodulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene ions, Keyboard Interfacing wave MH, 2005	and Atm 89CXX ar e generation eration- Sin Interfacin
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati Text Books : 1. Ajay V Deshmu 2. Kenneth J. Ayal	in MCS- XX and 3 tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu ons, Auto akh, "Micr a, "Micro	-51 - 89C20X C51 and S-51 and reasurem facing a Push Bus s, LCI Istrial A mation a ocontrol	Time: (XX) - d 89C ad 89C ad At C51 ar - Puls ient- H and N uttons D Int Applie and C Illers-' ers'', (rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of C control App Theory and Cengage L	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard funterfacing w MH, 2005 h, 2004	and Atm 89CXX an e generation eration- Sin Interfacin with 89C5
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati Text Books : 1. Ajay V Deshmu	in MCS- XX and 3 tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu ons, Auto akh, "Micr a, "Micro	-51 - 89C20X C51 and S-51 and reasurem facing a Push Bus s, LCI Istrial A mation a ocontrol	Time: (XX) - d 89C ad 89C ad At C51 ar - Puls ient- H and N uttons D Int Applie and C Illers-' ers'', (rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of C control App Theory and Cengage L	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard funterfacing w MH, 2005 h, 2004	and Atm 89CXX an e generation eration- Sin Interfacin with 89C5
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati Text Books : 1. Ajay V Deshmu 2. Kenneth J. Ayal 3. C. R. Sarma, "W	in MCS- XX and 3 tion of 89 ons of MC 51 and Atr 201se gene Width Ma (LEDs), 1 t Display Indu ons, Auto akh, "Micr a, "Micro	-51 - 89C20X C51 and S-51 and reasurem facing a Push Bus s, LCI Istrial A mation a ocontrol	Time: (XX) - d 89C ad 89C ad At C51 ar - Puls ient- H and N uttons D Int Applie and C Illers-' ers'', (rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of C control App Theory and Cengage L	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard funterfacing w MH, 2005 h, 2004	and Atm 89CXX an e generation eration- Sin Interfacin with 89C5
Interrupts, Interrupts Microcontrollers (89C) 89C2051 - Pin Descrip 89C20XX Applications of MCS-5 Rectangular waves - P wave generation- Pulse Light Emitting Diodes Interfacing 7-Segment Microcontrollers Measurement Applicati Text Books : 1. Ajay V Deshmu 2. Kenneth J. Ayal 3. C. R. Sarma, "N Reference Books :	in MCS- XX and 3 tion of 89 ons of MC 51 and Attr Pulse gene Width Mo (LEDs), 1 t Display Indu ons, Autor a, "Micro ficroproce	-51 - 89C20X C51 and S-51 and mel 89C ration - easurem facing a Push Bus s, LCI ss, LCI strial 4 mation a ocontrol essor and	Time: (X) - d 89C ad 89C ad 89C C51 ar - Puls hent- I and N uttons D Int Applia and C llers-' ers'', (d Mic	rs and C Architect C2051 - Us mel 89C51 nd 89C205 we Width M Frequency (ficrocontr s, Relays a terfacing, cations of control App Theory and Cengage La rocontrolle	ounters - Serial ural Overview of ing Flash memory and 89C2051 M 1 Microcontrollers Modulation - Stair Counter oller Applications nd Latch Connect ADC and DAC Microcontrollers olications	Communication Atmel 89C51 devices Atmel icrocontrollers s - Square wave case ramp gene s ions, Keyboard Interfacing w MH, 2005 a, 2004 shing House, 20	and Atm 89CXX an e generatio eration- Sin Interfacin with 89C5

Professional, 2007

Web References:

- 1. http://ee.sharif.edu/~sakhtar3/books/8051%20Microcontrollers%20An%20Applications%20Bas ed%20Introduction.pdf
- 2. https://ti.tuwien.ac.at/ecs/teaching/courses/mclu/theory-material/Microcontroller.pdf
- 3. janaxelson.com/files/microcontroller_idea_book.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

POWER QUALITY (PQ)

II Semester : POWER			CS			Scheme	: 2017
Course Code	Hours	/Week	1	Credits		ximum Marks	ſ
EE817	L 3	Т	Р	C 3	Continuous Internal Assessment 40	End Exam	TOTAL 100
Sessional Exam Dur	_	- Urc	-	3	-	m Duration: 3	
Sessional Exam Dur		nrs			Ellu Exa	in Duration: 5	nrs
Course Outcomes : A	At the end	of the c	nurse	the studen	t will be able to		
CO1: Apply the know						Electrical and l	Electronics
110	0	-			problems encount		
Engineering pra		the solu	ation	or complex	problems encount	tered in the mod	CIII
CO2: Design and cor		eriment	s				
CO3: Design a system	1			ss to meet	desired needs		
CO4: Identify, formu							
	inate und c		Dince				
			I	ntroductio	n		
Introduction of the Pow Harmonics, Over voltag	ges, Spike	es, Volt	age fl	luctuations,	, Transients, Intern	ruption, Overvie	
quality phenomenon - R	emedies	to impro				monitoring	
				g Interrup			
Interruptions-Definition interruptions – Origin interruption duration – Comparison of observat	of interr costs of	uptions interrup	- Li - tion	mits for th – Overviev	he interruptions f	Frequency – Li	nits for the
	ions and	- ciiuoiii	-	t Interrup	tions		
Short interruptions – E magnitude events due to Difference between med and current during fault interruptions.	o re-closir lium and	ng - Vol low vol	of s tage c tage s	hort interru luring the i systems - N	uptions, basic prin nterruption, monit fultiple events, sin	oring of short in gle phase tripping	terruptions ng – Voltage
	Volta	ge sag -	– Cha	racterizat	ion – Single phas	e	
Voltage sag – Definiti calculation of voltage sa Voltage sag duration			-	-			
	Vol	tage sag	g - Ch	aracterizati	on - Three phase		
Three phase faults - Ph	ase angle	jumps	- Ma	gnitude and	d phase angle jum	ps for three pha	ase balanced
sags - Load influence or	n voltage	sags.					
	PQ co	nsidera	tions	in Industr	rial Power System	15	
Voltage sag – Equipmer - Computers consumer						•	
Drives - Adjustable spec	ed DC dri	ves and	its of	peration - N		of DC drives	

immunity - different even and mitigation methods

Wiring and grounding

Reason for grounding - Typical wiring and grounding problems - Solution of wiring and grounding problems.

Text Books :

- 1. Math H. Bollen, "Understanding Power Quality Problems", Wiley, 2000
- Roger C. Dugan, Mark F. McGranaghan, Surya Santoso, H. Wayne Beaty, "Electrical Power System Quality", TMH, 3rd edition, 2012
- 3. Ghosh Arindam et.al, "Power Quality Enhancement using Custom Power Devices", Springer (India) Pvt. Limited, 2009

Reference Books :

- Jos Arrillaga, Neville R. Watson, "Power System Harmonics", John Wiley & Sons, 2nd edition, 2004
- 2. C. Sankaran, "Power quality", CRC Press, 2001

Web References:

- 1. prof.usb.ve/bueno/Libros/power_quality-0849310407.pdf
- 2. www.gcebargur.ac.in/sites/gcebargur.ac.in/files/.../electrical_power_systems_quality.pdf
- 3. www.aeeohio.com/Power%20Quality_CDA_AEE%20102510.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

EMI AND EMC ISSUES (EMI)

II Semester : POWER	R ELECT	RONIC	CS			Scheme	: 2017
Course Code	Hours	Week		Credits	Max	ximum Marks	
EE818	L 3	Т	P -	C 3	Continuous Internal Assessment 40	End Exam	TOTAL 100
Sessional Exam Dur	_	- Hrs	-	5		m Duration: 3	
Course Outcomes : A CO1: Understand fur CO2: Understand ele CO3: Understand shi Sources of EMI, Condu compatibility (EMC) - eliminating interference Cabling – capacitive co transfer impedance, Gru	ndamental ectromagn ielding of icted and i EMC re es.	s of EM etic Spe Power (radiated gulation I inductiv	II/EM ectrum Cables Inter Inter n- typ Vletho ve co	C n and Apples. ntroduction ference - C pical noise od of Hard upling- shi	ications. n Characteristics - De path - use of no lening elding to prevent	etwork theory- magnetic radia	methods of tion - shield
systems- hybrid ground shields. Power supply decouplin near and far fields- shi material - conductive ga	ng - decou elding eff	Balanc upling f	ing, F ilters- ess - a	Filtering an amplifier tabsorption	nd Shielding filtering – high fre and reflection loss	quency filtering s - Shielding w	g shielding –
		Digita	l Ciro	cuit Noise	and Layout		
Frequency versus time sources - digital circuit voltages - unused inputs Elect Static Generation - hun versus EMC, Industrial	ground n s - logic fa rostatic D nan body	oise – p milies. P <mark>ischarg</mark> model -	oower ge, Sta static	distribution andards A discharge	on - noise voltage nd Laboratory Te s - ED protection	objectives mea echniques in equipment d	suring noise esign - ESD
Laboratory techniques - Text Books :	Measure	ment me	ethods	s for field s	trength - EMI.		
 Henry W.Ott, "Nedition, 1989. B. J. Keiser, "Pr L. W. Ricketts, Wiley & Sons, 1 	rinciples o Jack E. Br	f Electro	omagi	netic Comp	patibility", Artech I	House, 3 rd editio	on, 1987.
Reference Books :							

Web References:

- 1. mdi.desy.de/sites2009/site_mdi/content/e37820/e37920/.../MDI_120302.pdf
- 2. www.emcchicago.org/rl.pdf
- 3. dhio.in/wp-content/uploads/2013/01/EMIEMCWOrkshop_Distribution1.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

INDUSTRIAL APPLICATIONS OF POWER ELECTRONICS (IAPE)

II Semester : POWE			20		- -	Scheme	: 2017
Course Code	Hours	/Week	1	Credits		ximum Marks	1
EE819	L	Т	Р	C	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	<u>60</u>	100
Sessional Exam Du	ration : 2	Hrs			End Exa	am Duration: 3	Hrs
Course Outcomes :	At the end	of the c	course	the studen	t will be able to		
CO1: Understand ele				heating ar	nd dielectric heatir	ng	
CO2: Understand w							
CO3: Understand A		using si	ngle p	phase and t	hree phase ac mot	ors and control of	of DC
traction motor							
CO4: Understand th	e power el	ectronic	c com	ponents ap	plications to the in	ndustry	
	1 0 5			istrial Hea			
Advantages and metho			ng, ty	pes and ap	plications of elect	ric heating equip	oment,
induction heating, diele	ectric heati	ng.		_			
triggering and gating of power circuit. Traction motors - requ phase and three phase	circuit, int irement of ac motors	erval st	syster eppin Ele n mot	g circuit, i <mark>ctric Trac</mark> t tors - tracti	ce of operations, nterval time coun tion oning series moto	ter, heat-cool co	ounter, we using sing
triggering and gating of power circuit. Traction motors - requiphase and three phase saving with series paral Solid state converter of dc traction using chopp Introduction, drives an	irement of ac motors llel ontrolled c pers - tracti	f tractio f tractio - linea drives, 2 on usin Drive for text	syster eppin Ele n mot r mot 25kV g poly es for	m, sequence g circuit, i ctric Tracti tors - tracti tors - contr AC traction y phase AC specific aj	tion tion oning series moto ol of DC traction using semi conv motors - types of oplications	or - AC traction motor, controll verter controlled diesel electric tr	using sing ers - enerş DC motor action.
Physical description o triggering and gating o power circuit. Traction motors - requ phase and three phase saving with series para Solid state converter co dc traction using chopp Introduction, drives an mills, coal mines, centr	irement of ac motors llel ontrolled c pers - tracti	f tractio f tractio - linea drives, 2 on usin Drive for text	syster eppin Ele n mot r mot 25kV g poly es for ile m	m, sequence g circuit, i ctric Tracti tors - tracti tors - contraction AC traction phase AC specific ap ills, steel r	tion tion oning series moto ol of DC traction n using semi conv motors - types of oplications olling mills, ceme	or - AC traction motor, controll verter controlled diesel electric tr	using sing ers - energ DC motor action.
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triggering and gating of power circuit. Traction motors - requiphase and three phase saving with series paral Solid state converter of dc traction using chopp Introduction, drives an	irement of ac motors llel ontrolled c bers - tracti d motors ifugal mill ication - s mple batte	erval st f tractio s - linea lrives, 2 on usin Drive for text ls. tatic ex ry charg	syster eppin Ele n mot r mot 25kV g poly es for ile m Othe citatio	m, sequend g circuit, i ctric Tract tors - tracti tors - contr AC traction y phase AC specific aj ills, steel r er Applica on system	tion oning series moto rol of DC traction n using semi conv motors - types of oplications olling mills, ceme tions for alternators -	or - AC traction motor, controlled diesel electric tr ent mills, sugar	using sing ers - energ DC motor action. mills, pap
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- 7. http://thebookee.net/el/electrical-power-utilization-and-traction-theraja
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Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

RENEWABLE ENERGY SOURCES (RES)

Course CodeHours/WeekCreditsMaximum MarksEE820LTPCInternal AssessmentEnd ExamTOTAL Assessment334060100Sessional Exam Duration : 2 HrsEnd Exam Duration : 2 HrsEnd Exam Duration : 2 HrsEnd Exam Duration: 3 HrsCourse Outcomes : At the end of the course the student will be able toCO2: Understand various renewable energy systems and their principle.CO2: Understand advantages and disadvantages of various renewable energy sources.CO3: Understand how to utilize a renewable energy source(s) based upon its availability in a locality.Solar Energy CollectionRole and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation data.Solar Energy CollectionFlat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.Solar Energy CollectionOcean EnergyOuter to solar EnergySources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz limit, WECS: classification, characteristics, and applications.Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Retz limit, WECS: classification, characteristics, and applications. <tr< th=""><th>II Semester : POWER</th><th></th><th></th><th>CS</th><th></th><th></th><th>Scheme</th><th>: 2017</th></tr<>	II Semester : POWER			C S			Scheme	: 2017	
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- 2. G. N. Tiwari, M. K. Ghosal, "Fundamentals of Renewable Energy Sources", Narosa Publishing House, 2007

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- 2. https://www.utanrikisraduneyti.is/media/PDF/Iceland_energy_umbrot_loka2.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

POWER ELECTRONICS IN SOLAR AND WIND ENERGY SYSTEMS (PESWS)

II Semester : POWEI			JS		1	Scheme	: 2017
Course Code	Hours	/Week		Credits			
EE821	L	Т	Р	C	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Du	ration : 2	Hrs			End Exa	am Duration: 3	
Course Outcomes : A	At the end	of the a	nurse	the studer	t will be able to		
CO1: Gain adequate						ergy systems an	d its
measurement.		0.	0	0.	,	85 5	
CO2: Gain adequate						ronics converter	s used in
solar and wi							
CO3: Gain adequate	knowledg	ge regar	ding N	MPPT cont	rol technique.		
		_		ntroductio			
Brief survey on differen					lar, wind, ocean, b	biomass, fuel cell	, Hydroger
energy systems and hyb	orid renew		<u> </u>	systems. s of Solar	D 11 /1		
solar power, physics of	f the sun, ce, instrui	the sola ments fo	ar con or mea	stant, extra suring sola	aterrestrial and ter ar radiation and su	n shine, solar rac	liation, sola
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- 2. D. Rai," Solar Energy Utilization", Khanna Publishers, 1999.
- 3. B. H. Khan "Non-Conventional Energy Sources ", TMH, 2nd edition, 2006
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- 5. James F. Manwell, Jon G. McGowan, Anthony L. Rogers, "Wind Energy Explained: Theory, Design and Application", John Wiley & Sons, 2nd edition, 2010
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- 2. powerelectronics.teipir.gr/Papers/Trends_of_power_electronics_on_RES.PDF
- 3. www.ejournal.aessangli.in/ASEEJournals/ELEC56.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.

PROGRAMMABLE LOGIC CONTROLLERS (PLC)

	<u>K ELECI</u>	RONIC	CS			Scheme	: 2017
Course Code	Hours	/Week		Credits	Ma	ximum Marks	
EE822	L	Т	Р	С	Continuous Internal Assessment	End Exam	TOTAL
	3	-	-	3	40	60	100
Sessional Exam Dur	ration:2	Hrs			End Exa	m Duration: 3	Hrs
Course Outcomes : A						1	•
CO1: Gain adequate							ung.
CO2: Understand ho							
CO3: Gain adequate	knowledg	ge regard	ding v	arious app	lications of PLC if	n real time.	
				PLC Basic			
PLC system, I/O modu formats, construction of			ing, (rams,	CPU proce Devices co	ssor, programming onnected to I/O mo		rogramming
				^l Program			
Input instructions, outp Drill press operation.	uts, opera	ational p	procee	lures, prog	ramming example	s using contacts	s and coils -
			Di	igital Syste	em		
Digital logic gales. Di		IIV III					nlaa Ladda
Diagrams for process c flowchart for spray proc	ontrol: La	adder di	iagran	ns & seque	ence listings, ladde	nversion exam er diagram cons	
Diagrams for process c flowchart for spray proc	ontrol: La cess system	adder di m.	iagran Pl	ns & seque	ence listings, ladde	er diagram cons	truction and
Diagrams for process c	ontrol: La cess system	adder di m.	agran Pl ressin	ns & seque LC Registe g, holding	ence listings, ladde ers registers, Input Re	er diagram cons	truction and
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Reference Books :

1. William Bolton, "Programmable Logic Controllers", Elsevier Publications, 2011.

Web References:

- 1. www.ieec.uned.es/investigacion/Dipseil/PAC/archivos/introtoplcs_SUPER.pdf
- 2. www.iasegypt.net/PLC_Theory%20Book.pdf
- 3. www.festo-didactic.com/ov3/media/customers/1100/093311_web_leseprobe.pdf

Question Paper Pattern:

Internal Assessment: The question paper for internal examination shall consist of **Six** questions and the student has to answer any **Four** questions.