## **B.TECH (ELECTRICAL ENGINEERING) - COURSE SYLLABI**

Course Title		Applied Chamistry
Course Number		AC 111
Course Number		
Credits		
Course Category		
Pre-requisites	2.1.0	Nil
Contact Hours (L-T-P):	3-1-0	3-0-1
Type of Course		Theory
Course Objectives	To impar	t the knowledge of applications of chemical sciences in the field of
	engineerii	ng and technology.
Course	After co	ompletion of the course the students shall be able to understand:
Outcomes	1. Th	e basic knowledge of methods of chemical analysis and the
	ins	trumentation involved
	2. Wa	ater treatment procedures for municipal and industrial uses.
	3. Ab	out solid, liquid and gaseous fuels
	4 Ab	out lubricants types and their applications
	5 Ab	out corresion and techniques to control corresion
	J. AU	out contosion and their applications
	0. A0	out porymers and men applications
Synabus		
	UNIT-	1: METHODS OF CHEMICAL ANALYSIS (10 L)
	Introdu	iction to chemical analysis, Classification, Qualitative and gravimetric
	analysi	s, (quantitative analysis) Principle of gravimetry. The steps involved
	in grav	rimetric analysis, with special emphasis on precipitation, Digestion,
	Favora	ble conditions for precipitation, Von-Wiemarn ratio, Types of
	precipi	tates, Impurities in precipitates and their minimization.Volumetric
	Analys	is, Titration, Titrant, Analyte Basic requirements of titrimetric
	method	l. Primary and Secondary standards, Basic requirements of primary
	standar	d. Types of titrations, Acid-Base Titration (strong acid versus strong
	base,	pH Titration curve) Redox titration (Iodimetry, Iodometry),
	Precipi	tation titration (Silver nitrate versus sodium chloride), Chelometric
	titration	n (Ca2+/Mg2+ versus EDTA). Absorption Spectrophotometry, Beer
	and La	umbert's law (definition and units of terms involved, deviation from
	Beer L	ambert's law, numerical problems), block diagram of single beam UV
	– Visit	ble Spectrophotometer. Definition of chromatography, Stationary and
	mobile	phases, Classification of chromatography on the basis of physical
	mode	and mechanism (adsorption, partition, size exclusion and ion
	exchan	ge), RF Value.
	UNIT-	II: TREATMENT OF WATER FOR MUNICI PAL AND
	INDUS	STRIAL USE (10 L)
	Uses	of water for municipal and industrial nurposes. Sources of water
	Impuri	ties in water Requirements of water for municipal use Municipal
	water	treatment methods. Disin sedimentation Sedimentation with
	water	treatment methods, Flam sedimentation, Sedimentation with
	Coaguia	ation and initiation. Distinection, Requirements of a good distinectant,
	Types	of disinfecting agents (Bleaching powder, Liquid chlorine, Ozone, UV
	radiatio	ons and Chloramine), Break point chlorination, Advantages of break
	point c	chlorination, super chlorination and dechlorination, Requirements of
	water f	or industrial use, Hardness of water, Units of hardness,
	Calcula	ation on hardness, Theories of estimation of hardness by soap and
	EDTA	methods.Boiler defects (Sludge and scale formation, Priming and
	foamin	g), Boiler corrosion and caustic embrittlement (Causes and
	preven	tion). Removal of hardness, Lime-soda process, Zeolite process, Ion-
	exchan	ge process Advantages and limitations of the process, Calculations
	based of	on lime – soda process.
		r

		UN	IT-III: FUELS AND COMBUSTION (10 L)			
		De	finition of fuels, Classification of fuels, Calo	orific value and its		
		det	ermination by bomb calorimeter, Dulong's formula	a. Coal, Coal analysis		
		(Bo	oximate and ultimate analysis), Significance of	constituents of coal		
		Pet	roleum, Classification and important fractions of pe	troleum and their uses		
		(Pe	trol, Diesel, Lubricating oils), Synthetic petrol			
		(Sy	nthesis by polymerization, by cracking by Fisher	r Tropsch process by		
		Bei	rgius process) Gaseous fuels (CNG, LPG), Advanta	ges and disadvantages		
		of	gaseous fuels, Combustion calculations based on sol	id and liquid fuels.		
		UN De	<b>IT-IV: LUBRICANTS AND LUBRICATION</b> (1) finition and classification of lubricants, Fund	<b>0 L)</b> etions of lubricants,		
		Lul (M of and	brication (Types of lubrication and their mechanism ineral oils, Fatty oils, Compounded oils and Silicone greases and conditions of their use, Testing of great conditions of their use. Testing of liquid	ms). Liquid lubricants e fluids) Greases types eases, Solid lubricants		
		lub anc lub Re	ricants (Viscosity and viscosity index, Flash and find setting points, Saponification value, Aniline ricants (Cutting tools, Internal combustion of frigerators)	ire points, cloud, pour point), Selection of engine, Transformer,		
		KC.				
		UN De	IIT- V: CORROSION AND ITS PREVENTION ( finition, Significance (Economic aspect), Classifica	( <b>10 L</b> ) tion of corrosion. Dry		
		cor	rosion, Mechanism of dry corrosion, Types of	f oxide film, Pilling		
		Be	dworth rule. Electrochemical corrosion, mechanis	m of electrochemical		
		cor	rosion, Factors influencing corrosion rate. Electr	ochemical series and		
		Galvanic series Corrosion control methods (proper design, important				
		coatings (galvanizing tinning) Organic Coatings types Paints (Constitue)				
		of	paints, Drying mechanism of oil).	, ramis, (Constituents		
		UN	IT-VI: POLYMERS (10 L)			
		De	inition and classification of polymers (On the basis of origin, synthesis,			
		the	rmal response, physical state, applications,	chemical structure)		
		Pol	ymerization (Addition and condensation), Mechanism of free radical			
		ado	lition polymerization of vinyl chloride, Difference b	etween thermoplastics		
		and DV	C Nulons PTEE) Thermosetting plastics (Preparation, property)	ration properties and		
		1 V	s of bakelite polyesters) Elastomers (Preparation	properties and uses of		
		NR	BUNA rubbers). vulcanization.	properties and uses of		
Books*/Referen	nces	1.	Analytical Chemistry by G.D. Christian, John W	Viley and Sons, New		
			York.			
		2.	Quantitative Analysis by R.A. Day and A.L. Under	wood.		
		3.	A Text Book of Engineering Chemistry by S.S. D	Dara, S. Chand & Co.,		
			New Delhi (India).			
		4.	Engineering Chemistry by B.K. Sharma, Krishna Ltd., Meerut (India).	Prakashan Media (P)		
		5.	Engineering Chemistry by P.C. Jain, Dhanpat Rai New Delhi.	Publishing Company,		
Course			Course Work (Home Assignment & Quizzes	15 Marks		
Assessment/	Sessio	nal	Midsem Examination (1 Hour)	25 Marks		
Evaluation/G			Sessional Total	40 Marks		
rading Policy	Endser	m Exai	nination (3 Hours)	60 Marks		
			Total	100 Marks		

Course Title			Applied Chemistry			
Course number			AC-194			
Credit Value			2			
Course Category			DC			
Pre-requisite	-		Nil			
Contact Hours (	L-T-P)		0-0-3			
Type of Course			Practical			
Course Object	ives	To tr	in the students for the applications of the chemica	l sciences in the field of		
, , , , , , , , , , , , , , , , , , ,		engir	ering and technology.			
Course		After	completion of the course the students shall be able	to understand:		
Outcomes		1. 1	ne basic methods of chemical analysis and the inst	rumentation involved.		
		2. 1	estimate the hardness of water.			
		3. 1	carry out the proximate analysis of coal and grad	le the coal for industrial		
		r	irposes.			
		4. 1	estimate the drop point of grease and its applicat	ions.		
		5 1	o study and explore the nature of the corrosion and	l its control		
		6 4	pout the determination of the molecular weight by	viscometer		
Syllabus			OF EXPERIMENTS:	viscometer.		
Synubus		1 1	etermine total permanent and temporary hardne	ess of water in ppm by		
1. Dett			rsenate method	ss of water in ppin by		
		2 1	etermine the amount of dissolved oxygen in water in ppm units			
		3 1	etermine the cloud point, pour point and setting point of an oil			
5. 10 d			determine the percentage of available chloring	etermine the percentage of available chlorine in the given sample of		
4. 10 C			eaching nowder	in the given sample of		
		5 1	corry out provimete englysis of the given semple	arry out proximate analysis of the given sample of coal		
		5.1	determine the generification value and percent	etermine the saponification value and percentage of fatty oil in the		
		0. 1	you sample of compounded oil	tage of fatty off in the		
			determine the onitine point of a given comple of	on oil		
		/. I 0 7	determine the relative viscosity of on oil by red	all oll.		
		0. 1	du the variation of viscosity with change in terms	aroturo		
			demonstrate and evelore the electrochemic	elature.		
		9. 1	resign To study the electrochemical methods of	ar nature of aqueous		
		10 7	ston. To study the electrochemical methods of corrosion control.			
10. 10 0			paratus	s and relisky Martell's		
appa 11 Dote		а 11 т	paratus.	ith 1 10 phononthroling		
by st		11.1 h	spectrophotometry	iui 1, 10 phenanunonne		
			spectrophotometry.			
Books*/References 1 Lab		1. I	b Manuals provided by the Department.			
Course	-		Viva Voca	60 Marks		
Accessment/	Sessi	ional	VIVA-VULT Cossional Tatal	60 Mortes		
Fyaluation/C	End	Somosta	Examination (2 Hours)	40 Marks		
rading Policy	Enus	semeste	Examination (2 frours) Tatal	100 Montra		
raung roncy			lotal	100 Marks		

<b>Course Title</b>				Mathematics -I		
Course number				AM-111		
Credit Value				04		
Course Category				DC		
Pre-requisite				Nil		
Contact Hours (	L-T-P)			3-1-0		
Type of Course				Theory		
Course Objecti	ives	To le	earn	the fundamental concepts of matrices, different	tial and integral	
		calcu	ılus,	he theory of differential equations, applications.		
Course		After	r cor	npleting this course the students should be able	to:	
Outcomes		1. ap	pply	tools of the theory of matrices to relevant field	s of Engineering.	
		2. ui	nders	stand curve tracing and regions between differe	ent curves.	
		3. ex	xpan	d important mathematical functions in power se	eries and their	
		aŗ	pplic	ations.		
		4. ap	oply	tools of integration to find length, surface area	and volume.	
		5. ex	xpres	ss real life problems into mathematical models	using differential	
		ec	quati	ons and analyse their solutions.	C	
Syllabus		UNI	<b>T-1</b>			
		Rank	c of	a matrix with applications to consistency	of a system of linear	
		equa	tions	s, eigen-values and eigen vectors of a n	natrix, Caley-Hamilton	
theorem.		rem.				
		UNI	<b>T-2</b>			
Asympto		npto	tes and simple curve tracing. successive dif	ferentiation, Leibnitz's		
theorem,		rem,	Taylor and Maclaurin series with remainder terms.			
UNIT-3		<b>T-3</b>				
		Appl	licati	ons of integration to lengths of curves, surface	s and volumes of solids	
		of re	volu	tion.		
		UNI	<b>T-4</b>			
		Solu	tion	of exact differential equations, linear different	tial equations of second	
		and	hig	her order with constant coefficients, hor	nogeneous differential	
		equa	tions	s, simultaneous linear differential equations, a	applications to physical	
		prob	lems			
Books*/Referen	nces	1. C	hanc	Irika Prasad, "A First Course in Mathematics f	or Engineers",	
		Pe	othis	shala Pvt. Ltd., Allahabad.		
2. Chanc		hanc	lrika Prasad, " Mathematics for Engineers", Po	thishala Pvt. Ltd.,		
Allah		llaha	ibad.			
3. Erwin		rwin	Kreyszig, "Advanced Engineering Mathematic	cs", John Wiley &		
Sons,		ons,	INC.			
Course		_	Co	urse Work (Home Assignments)	15 Marks	
Assessment/	Sess	ional	Mi	dsem Examination (1 hour)	25 Marks	
Evaluation/G		~		Sessional Total	40 Marks	
rading Policy	End S	Semeste	r Ex	amination (3 Hours)	60 Marks	
1	1			Total	100 Marks	

Course Title			Mathematics –II		
Course number			AM112		
Credit Value			4		
Course Category	у		DC		
Pre-requisite			Nil		
Contact Hours (	L-T-P)		3-1-0		
Type of Course			Theory		
Course Objecti	ves	To le	earn partial differentiation, multiple integration,	polar forms of conics,	
		vario	us forms of general equation of second de	forms of general equation of second degree and its tracing,	
		appli	cations.		
Course		After	completing this course the students should be able	to:	
Outcomes		1. ur	derstand the theory of functions of several variable	es and its applications.	
		2. ur	derstand double and triple integrals and use it to	o find surface area and	
		vo	lume.		
		3. le	arn various forms of general equation of second deg	gree and its tracing.	
		4. ur	derstand polar forms of conics.		
Syllabus		UNI	<b>Γ-1</b>		
		Parti	al differentiation, Euler's theorem, total differentia	l, small errors, change	
		of va	riables, Jacobians.		
		UNI	Г-2		
		Tayle	or series of functions of two variables, approximate	e calculations, maxima	
and mini		and r	ima of functions of two variables, Lagrange's multipliers.		
		UNI	<b>Г-3</b>	L	
Double :		Dout	le and triple integrals, change of variables, change	of order of	
		integ	ration applications to area and volume		
			$\Gamma \Lambda$		
		UNI C	<b>L-4</b>	inter tration to make	
		Gene	rai equation of second degree, tracing of conics,	, introduction to polar	
		form	of conics.		
Books*/Referen	nces	1. C	nandrika Prasad, "A First Course in Mathen	natics for Engineers",	
		Po	othishala Pvt. Ltd., Allahabad.		
2. Chand		2. C	handrika Prasad, " Mathematics for Engineers"	, Pothishala Pvt. Ltd.,	
Allah					
5. Erwin		3. El	win Kreyszig, "Advanced Engineering Mathema	atics", John Wiley &	
			ons, inc.	u" Dothicholo Dut Itd	
4. Goral		4. U	Jakii Flasad, A text book of coordinate geometi.	y, rounshala rvi. Liu.,	
Course	1	11	Assignments $(2 \text{ to } 3)$	15 Marks	
Assessment/	Secci	ional	Mid Term Examination (I Hour)	25 Marks	
Evaluation/G	0000	Jul	Sessional Total	40 Marks	
rading Policy	End S	Semester	r Examination (3 Hours)	60 Marks	
			Total	100 Marks	

<b>Course Title</b>			Higher Mathematics			
Course number			AM223			
Credit Value			4			
Course Category	У		DC			
Pre-requisite			AM111, AM112			
Contact Hours (	L-T-P)		3-1-0			
Type of Course			Theory			
Course Objecti	ves	To le	arn complex analysis and various numerical metho	ods to solve engineering		
		prob	ems.			
Course		After	completing this course the students should be able	to:		
Outcomes		1. ur	derstand and apply fundamental concepts of comp	plex functions and their		
		re	presentation in Taylor and Laurentz series.			
		2. ur	derstand and apply complex integration.			
		3. ap	ply numerical methods to solve linear, not	alinear equations and		
		in	terpolation techniques in scientific computations	including estimation of		
		er	CORS.			
		4. ca	lculate derivatives and areas when functions are	given in tabular forms		
		ar	d obtain numerical solutions of differential equation	ons.		
Syllabus		UNI	ſ <b>-1</b> :			
		Func	tions of complex variable, analytic functions, Cauc	chy-Reimann equations,		
		comp	lex integration, Cauchy's theorem, Cauchy's integ	ral formula.		
		UNI	ſ-2:			
		Serie	s and contour integration: Taylor series, Laure	ent's series, zeros and		
		singu	lar points, residues and residue theorem, evaluat	ion of real integrals by		
		conto	ur integration.			
UNIT-3:			[- <b>3:</b>			
Numerica			erical solutions of algebraic equations: solut	al solutions of algebraic equations: solution of algebraic and lental equations by Newton-Raphson and general iterative methods		
transcene		trans	dental equations by Newton-Raphson and general iterative methods,			
		solut	of linear simultaneous equations by Gauss-elimination and Gauss- ethods, finite difference operators, Newton's forward and backward			
		seide	i methods, mille difference operators, Newton's	forward and backward		
		Num	erical solution of ordinary differential equations:	Taylor's series method		
		Fule	's and modified Fuler's methods Runge-Kutta	fourth order method		
		solut	on of two point boundary value problems by finite	difference methods		
Books*/Referen	nces	1 C	andrika Prasad " Mathematics for Engineers"	Pothishala Pvt Ltd		
		A	lahabad.	1 oundraw 1 (m. 2000)		
			. K. Venkataraman, " Engineering Mathematics",	Third Year (Part A. B).		
Nation			ational Publishing Co. Madras.			
3. M. K			. K. Jain, S.R.K. Ivenger and R.K."Waimerica	al Methods for		
Scient			ientific and engineering Computation's Nev	v age International		
Public		Pı	blication (P) Ltd.	C		
4. S.S. S		4. S.	S. Sastry, "Introductory Numerical Methods", Pren	tice Hall India Ltd.		
5. Erwin		5. E	win Kreyszig,"Advanced Engineering Mathema	tics", John Wiley &		
Sons,		Se	ons, INC.	-		
Course	A		Assignments (2 to 3)	15 Marks		
Assessment/	Sessi	ional	Mid Term Examination (I Hour)	25 Marks		
Evaluation/G			Sessional Total	40 Marks		
rading Policy	End S	Semeste	• Examination (3 Hours)	60 Marks		
			Total	100 Marks		

Course Title		Applied Physics
Course number		AP-111
Credit Value		4
Course Category		BS
Pre-requisite(s)		None
Contact Hours (L-T-P)		3-1-0
Type of Course		Theory
Course Objectives	To equ	ip the student with a strong understanding of the fundamentals of
	physics	s so as to enable him/her to apply it to his/her field of study.
	This co	burse should enable the student to-
	1. exp	blain the behavior of the physical world around him/her
	2. app	bly the concepts of physics in his/her field of study
	3. rela	ate the concepts of physics to the advancement of technology.
	4. uno	derstand and relate the different phenomena in the world.
	5. app	broach problems, predict their results in advance, and solve them in
	qua	antitative and qualitative manner.
Course	0. gai	n a broader understanding of other sciences.
Course		completion of the course, the student will be able to:
Outcomes	1. lect	interrelate some of them
	$\frac{1}{2} desc$	ribe the link between physics and the technology
	2. dese 3. iden	tify technological applications of some of the aforementioned
	con	cents
	4. desc	ribe how he/she can harness the benefits of some of the
	afor	ementioned concepts to his /her area of specialization.
	5. und	erstand the professional and ethical responsibilities of the subject.
	6. com	municate effectively while speaking, employing graphics and writing.
Syllabus		
·	UNIT	1. MASERS AND LASERS
	Basic j	principle, Einstein coefficients for Induced absorption, Spontaneous
	emissio	on and Induced emission, Ammonia maser and its applications, Ruby
	and He	e-Ne Lasers, Semiconductor laser, Spatial and temporal coherence,
	Charac	teristics of lasers and its applications based on these characteristics
	(such	as in Industry, Science, Medicine, Communications, Surveying,
	Hologr	aphy, Fusion reactors, Isotope separation, etc.). Fibre Optics: Basic
	princip Numor	ie, Fibre construction and dimensions, Light propagation in fibres,
	distorti	on in optical fibres. Transmission losses, Light wave communication
	in optic	control fibres. Fibre optics in medicine and industry
	in optic	an nores, i fore opties in medicine and medisiry.
	UNIT	2. SEMICONDUCTORS
	Elemer	tal and compound semiconductors. Energy bands, Direct and indirect
	semico	nductors, Electrons and holes, Effective mass, Intrinsic material,
	Extrins	ic material, Fermi level, Electron and hole concentration at
	equilib	rium, Temperature dependence of carrier concentrations,
	Compe	nsation and space charge neutrality, Conductivity and mobility, Hall
	effect i	n semiconductors.
	Superc	onductivity: Zero resistivity, Meissner effect, Type I and Type II
	superco	onductors, High temperature superconductors, BCS theory
	(qualita	ative), Josephson effect, SQUIDS.
	TINIT	3 PARTICIES AND WAVES
	UNII . Mecha	o, FARTICLED AND WAVED nism of X- ray production (continuous and characteristic Vroys
	Duane-	Hunt limit) Compton effect Pair production Phase and group
	velociti	ies, Uncertainty principle.

		Qu Co der Ste Ex] effe	antum Mechanics: Introduction to quantum mech nditions necessary for physically acceptable wa asity and probability, Schrödinger equation (Tim ady state or time independent form), Eigenvalu pectation values, Particle in a box (Infinite square ect (qualitative).	nanics, Wave function, vefunction, Probability e dependent form and es and eigenfunctions, potential well), Tunnel	
		UN Sta an me ene rate wo	<b>IT 4. STATISTICAL MECHANICS</b> tistical distributions, Maxwell–Boltzmann statistics ideal gas, Quantum statistics, Specific heats of so tal, Electron- energy distribution. Nuclear Physics ergy of nuclear reactions, Cross section of a nuclear e, Breeder reactors, Fusion reactors, Nuclear detect rking principle), Gas filled detectors, Scintillation of	s, Molecular energies in blids, Free electron in a : Q-value and threshold ar reaction and reaction cors (names and general letectors.	
<b>Books*/References</b>		1. Ben G. Streetman, "Solid State Electronic Devices" 5th edition (2000), Prentice-Hall of India Private Limited New Delhi			
		2. Arthur Beiser, "Concepts of Modern Physics" 6th edition (2003), Mc.			
		Graw Hills Inc. International Edition.			
		3.	3. M.R. Wehr, J.A. Richards Jr. and TW Adair III, "Physics of the Atom" 4th edition (1984), Addison Wesley / Narosa.		
		4. 4. M.R. Srinivasan, "Physics for Engineers" 1st edition (1996), New Age			
	1		International (P) Limited, Publishers.		
Course			Home Assignments	15 Marks	
Assessment/	Sessional		Midsem Examination (1 hour)	25 Marks	
Evaluation/G			Sessional Total	40 Marks	
rading Policy	End Se	emester	r Examination (3 Hours)	60 Marks	
			Total	100 Marks	

Course Title		Physics Lab
Course number		AP-194
Credit Value		2
Course Category		BS
Pre-requisite		None
Contact Hours (L-T-P)		0-0-3
Type of Course		Lab
Course Objectives	This co	urse should enable the student to-
Ŭ	1. buil	d an understanding of the fundamental concepts with the help of
	expe	eriments.
	2. fam	iliarize the student with the various experiments of the physical world
	arou	ind him/her.
	3. appl	y the concepts of physics in his/her field of study.
	4. relation	te the concepts of physics to the advancement of technology.
	5. allo	w the student to gain expertise in design and maintenance of
	expe	eriment setup.
Course	Upon c	ompletion of the course, the student will be able to:
Outcomes	1. reco	gnize and present real life examples of various experiment performed.
	2. desc	ribe the link between physics and the technology.
	3. und	erstand and explain data analysis and identify technological
	appl	ications of the experiments.
	4. desc	bribe how he/she can harness the benefits of some of the experiments
	to h	is /her area of specialization.
	5. und	erstand the professional and ethical responsibilities of the subject.
	6. com	municate effectively while speaking, employing graphics and writing.
Syllabus		JF EXPERIMENTS
	1. 10 rota	tion
	$2 T_{0}$	1011. Iatarmina resistance per unit length of a Carey Foster's Bridge wire.
	2. 100	hence to find the difference between the two nearly equal unknown
	resi	stances
	3 To	determine the modulus of rigidity of the material of a wire n by
	stati	cal (vertical) method.
	4. To e	determine the refractive index. u of the material of a prism for parrot
	gree	n line in the mercury spectrum.
	5. To s	study the variation of semiconductor resistance with temperature and
	hene	ce to find the energy- gap, Eg of the semiconductor.
	6. (a)	To study the V-I and power characteristics of a solar cell and also to
	dete	rmine its fill factor. (b) To study the current versus voltage
	char	acteristics of two light emitting diodes (LED) and hence to determine
	their	r cut in voltages.
	7. To e	determine the diameters of three thin wires with the help of a He-Ne
	Lase	er.
	8. To (	determine the coefficient of thermal conductivity, K of rubber in the
	forn O To	1 OF a tube.
	9. 10 (	15 A) and a voltmeter (ranges 5, 10 and 15 V)
		15 $\Lambda$ ) and a volumeter (langes 5, 10 and 15 V). determine the wavelength $\lambda$ of vallow line of shorter wavelength in
	10. 10 ( the	mercury spectrum with plane transmission grating
	11  To  c	letermine the specific rotation at of cane sugar solution in water using
	11. 100 a hi	martz nolarimeter
	12 To c	calibrate a given thermo-counle with the help of a potentiometer
	13. To	find the operating voltage of a G.M. counter and to determine the
	abso	protion coefficient, u of copper for gamma rays from 137 Cs source
	14. (a).	To draw the graph between various values of capacitance and the

		to determine the value				
			of unknown capacitance by using Lissajous Figures.			
			(b). To draw the graph between various values of inductance and the			
			corresponding frequencies of a given oscillator and to determine the value			
			of unknown inductance by using Lissajous Figures			
		15.	To determine Hall coefficient, RH and majority ca	rrier concentration of a		
			given semiconductor sample.			
Books*/References		1.	Prof. D.S. Srivastava & Dr. Ameer Azam, Laborat	tory Manual of Applied		
			Physics Experiments, AMU, Aligarh			
		2.	Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab			
			Mahal, New Delhi.			
		3.	D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate			
			Classes, Vani Publication House, New Delhi.			
		4.	K. K. Dey, B. N. Dutta, Practical Physics, Kalyani	Publishers, 1981, New		
			Delhi.			
Course			Record book	42 Marks		
Assessment/	Sessional		Viva-Voce	18 Marks		
Evaluation/G			Sessional Total	60 Marks		
rading Policy	End Se	emeste	r Examination (2 Hours)	40 Marks		
			Total	100 Marks		

Course Title		Environmental Studies
Course number		CE-111
Credit Value		4
Course Category		ESA
Pre-requisite		Nil
Contact Hours (L-T-P)		3-1-0
Type of Course		Theory
Course Objectives	1. To un	derstand the basic concept of ecology, atmospheric structure and its
	chemi	stry involved.
	2. To ha	ve a knowledge about the air quality and its standards and how to
	contro	l air pollution.
	3. To ha	ve knowledge about Water Quality: Physical, Chemical and Biological
	param	eters.
	4. To ur	inderstand the Water purification processes in natural systems and
	introd	uction to Water Treatment Technologies.
	$5. \mathbf{To} \mathbf{kr}$	now about the wastewater characteristics and wastewater treatment
	techno	plogies.
C	6. To ha	ve a knowledge about the solid waste management.
Course	Opon suc	ted that student will be able to:
Outcomes	1 Under	stand fundamental physical and biological principles that govern
	1. Ulluci natura	I processes
	2 Demo	nstrate an in-depth understanding of the sub disciplines within
	enviro	nmental studies (i e Biology Chemistry Physics etc.)
	3. Com	nunicate environmental scientific information to both professional and
	lav au	diences.
	4. Demo	nstrate an understanding of current environmental challenges.
	5. Devel	op a basic fundamental background for the higher environmental
	engine	eering courses offered in civil engineering department.
Syllabus	UNIT I:	
	Concepts	of Ecology: Ecosystem, Energy and nutrient flow in ecosystem, Food
	chain, Ei	nvironmental Segments: Atmospheric Structure, classification of air
	pollutant	s, sources of air pollution and their effects on human health and
	property.	Atmospheric chemistry, Photochemical
	Smog, O	zone depletion.
	Air Qual	ity and Standards, Meteorological phenomena and their influence on
	Introduct	inty, Lapse fates, Dispersion of Fondants. All Fondation Control.
		•
	Water O	uality: Physical, Chemical and Biological parameters, Water quality
	standards	Biochemical (BOD) and Chemical Oxygen Demand (COD).
	BOD/CO	D Calculations Environmental Analyses: pH, Alkalinity,
	Conducti	vity, Ammonia, Fluoride, Sulphate, Chloride. Analysis and
	measurer	nent of gaseous pollutants.
	UNIT IV	7:
	Water p	urification processes in natural systems: Dissolved Oxygen (DO),
	Impact of	f wastewater discharge on streams, Oxygen Sag Curve. Introduction to
	Water Ti	eatment Technologies: Sedimentation, coagulation and Flocculation,
	Hardness	Reduction, Filtration and Disinfection.
	UNIT V:	tor Characteristics Introduction to wastewater tractment technologies
	Primory	Treatment: Screening Crit Removal Flow massurement Flow
	equalizat	ion. Secondary Treatment: Microbial growth curve. Suspended and

		Attac			
		UNI	Г VI:		
		Solid	Waste: Classification, Sources and Characteristic	cs. Waste Management:	
		Solid	Waste Generation, Collection, Processing an	nd Disposal Methods.	
		Reso	urce Recovery in Waste Management, Biological a	nd Thermal Conversion	
		Proce	esses.		
Books*/Referen	ices	1. V	enugopala Rao, P., 2006, Principles of Envir	onmental Science and	
		Er	igineering, Prentice-Hall of India Private Limited,	New Delhi.	
		2. M	asters, G.M., 1991, Introduction to Environme	ental Engineering and	
		Sc	ience, Prentice- Hall International, Inc., Englewood	d Cliffs, NJ.	
		3. Pe	3. Peavy, H.S., D.R. Rowe and G. Tchobanoglous, 1985, Environmental		
		Engineering, McGraw-Hill Book Company, New York.			
		4. Henry, J.G. and G.W. Heinke, 1989, Environmental Science and			
		Engineering, Prentice- Hall International, Inc., Englewood Cliffs, NJ.			
		5. Sawyer, C.N. and P.L. McCarty, 1978, Chemistry for Environmental			
		Engineering, 3 <sup>rd</sup> Edition, McGraw-Hill Book Company, New York.			
		6. Tchobanoglous, G., H. Theisen and S. Vigil, 1993, Integrated Solid Waste			
		М	anagement, McGraw-Hill Inc. Singapore.	0	
Course	Sessional		Assignments (2 to 3)	15 Marks	
Assessment/			Mid Term Examination (I Hour)	25 Marks	
Evaluation/G			Sessional Total	40 Marks	
rading Policy	End S	Semester	r Examination (3 Hours)	60 Marks	
			Total	100 Marks	

Course Title			COMPUTER PROGRAMMING LABORA	ATORY	
Course number	Course number		CO-191		
Credit Value			2		
Course Category			ESA		
Pre-requisite			Nil		
Contact Hours (	L-T-P)		0-1-2		
Type of Course			Practical		
Course Objecti	ves	To 1	nake the students familiar with the Programm	ning concepts and to	
		imple	ment the algorithmic approach of problem solving	g in C language to gain	
		work	ng knowledge of C programming.		
Course		Stude	nts will be able to:		
Outcomes		1. U	derstand programming concepts.		
		2. D	velop analytical skills for step by step solution for	algorithms.	
		3. So	lve problems through programming.		
		4. Re	late and extend C programming concepts includ	ing control statements,	
		st	ings, functions and programming techniques t	o solve computational	
		pr	oblems.	_	
Syllabus		Intro	luctory discussion of how a computer execute	s a program. A brief	
		discu	ssion of high level languages, e.g., C, and C++ and	nd low level languages,	
		e.g.,	ssembly language and binary code. An introduction	on to the translation i.e.	
		comp	ilation process.		
		Expe	iments to be conducted in the laboratory consist of	f, but not limited to, the	
		follo	ving:		
		1. Pr	actice of Turbo C as the development environment		
		2. Si	nple introductory algorithms and programs for	getting input, printing	
forma		fo	matted output etc.		
3. Progr		3. Pr	ograms introducing elementary C concepts, like va	riable and names.	
4. Progr		4. Pr	ograms using operators.		
5. Prog		5. Pr	ograms using control structures.		
		6. Pr	ograms for repetitive tasks and iterations.		
7. Progr		7. Pr	ograms on arrays and strings.		
		8. Pr	ograms introducing the use of function calls.		
		9. Pr	ograms introducing basic concept of file handling.		
		10. Pr	ograms for using basic concepts of storage classes.		
Books*/Referen	nces	1. K	mighan, Brian W., and Dennis M. Ritchie.	"The C programming	
		la	uage."Prentice-Hall, Englewood Cliffs, New Jersev (1978).		
2. G		2. G	ttfried "Theory and Problem of Programming with C" Schaum's Outline		
Serie		Se	ries, TMC (Text book).		
3. M. Ir		3. M	Inamullah and S. M. Zakariya. "CO191 Comp	uter Programming Lab	
Cours		C	ourse Content and Practice Schedule", Depa	artment of Computer	
Engir		Er	gineering, A.M.U. (This document can be obtained	ed in PDF format from	
the in			e instructor).		
Course	I		Reports	40 Marks	
Assessment/	Sessi	ional	Viva-Voce	20 Marks	
Evaluation/G			Sessional Total	60 Marks	
rading Policy	End S	Semester	Examination (2 Hours)	40 Marks	
			Total	100 Marks	

Course number				
000100 110111001		EE-111		
Credit Value		4		
Course Category		ESA		
Pre-requisite		Nil		
Contact Hours (L-	·T-P)	3-1-0		
Type of Course		Theory		
Course Objectives	The objective Electronics I theorems and circuits, me motors, trans	we of this course is to set a firm and solid foundation in Electrical & Engineering with strong analytical skills and conceptual understanding of d analysis methods in electrical and magnetic circuits, electronic devices, asuring instruments. The course will familiarize students with various sformers, power generation system.		
Course	After succes	sful completion of this course, the students will be able to:		
Outcomes	<ol> <li>Analyse fundamen</li> <li>Analyse</li> <li>Converse</li> </ol>	electrical and magnetic circuits with moderate complexity applying ntal laws and theorems in steady-state as well as transient operation. AC circuits using phasors.		
	4. Understa	nd various methods of electrical generation		
	5. Identify s devices e 6. Understa	schematic symbols and understand the working principles of electronic .g. Diode, Zener Diode, LED, BJT, JFET and MOSFET etc. nd the working principles of electronic circuits e.g. Rectifiers. Amplifiers		
	and Oper	ational Amplifiers etc.		
	7. understar	ad methods to analyse and characterize these circuits		
Syllabus	PART A			
	UNIT I: Cin Review of thevenin's t circuits, 3-p hysteresis & calculation of	rcuit and Transformers dc circuits and theorems, 1-phase circuits, superposition theorem, heorem and norton's theorem for ac circuits, RLC series and parallel phase balanced ac circuits. Magnetic circuits, magnetization curve, c eddy current effect/losses. Transformer construction, equivalent circuit, of losses and efficiency.		
	UNIT II: In 3-phase ind instrument: Elements of Introduction	<b>troduction to Electrical Machines, Instruments and Power System</b> uction motor and 1-phase induction motors. Basic elements of an MC, MI instruments, dynamometer wattmeter, digital energy meter. f power system, layout of thermal, hydro, nuclear and gas plants. to renewable energy sources and recent trends in generation.		
	PART B			
	UNIT III: I Terminal ch piecewise lin diode; Opera Construction configuratio	Diode and BJT aracteristics of diodes, diodes models; Ideal, constant voltage and near, load line concept, Diode applications; Rectifier, logic gates, Zener ation, characteristics, voltage regulation. Bipolar Junction Transistor; n, operation, configurations, characteristics of common emitter n, DC load analysis.		
	UNIT IV: N	IOSFET and OPAMP		
	Introduction to MOSFET; Depletion MOSFET construction, of Enhancement MOSFET construction, Operation, amplifiers, Operational A equivalent circuit, ideal behavior, open loop and closed loop concept, c virtual short, simple Opamp applications; Unity gain amplifier, invert inverting, integrator, differentiator, subtractor, summer.			
Books/ References	1. Ashfaq H Rai & So 2. R. Boyles	Iusain*: Fundamentals of Electrical Engineering, 3 <sup>rd</sup> Edition, Dhanpat ns. stad & L. Nashelsky*: Electronic Devices and Circuits, Prentice Hall,		

	3. Hughes: Electrical Technology. 7 <sup>th</sup> edition, Addison Wesley.						
	4. A.K. Sawhney: A course in Electrical & Electronics Meas. & Inst., Dhanpat Rai &						
	Sons.						
	5. B.R. Gupta: Electrical Power Systems, Wiley Eastern.						
	6. Mathur, Chadda and Kulshresta: Electronic Devices, Applications and Integrated						
	Circuits	, Umesh Publications.					
Course	Sessional	Assignments (2 to 3)	10 Marks				
Assessment/		Quiz (3 to 4), Best two may be considered	05 Marks				
Evaluation/Gr		Mid Term Examination (I Hour)	25 Marks				
ading Policy		Sessional Total	40 Marks				
	End Semester Examination (3 Hours)60 Marks						
	Total 100 Marks						

Course Title			Electrical Machines-I		
Course number			EE-211N		
Credit Value				4	
Course Category				DC	
Pre-requisite				Nil	
Contact Hours (	L-T-P)			3-1-0	
Type of Course				Theory	
Course Objecti	ojectives To intr			duce the basic concepts of transformers (3-ph	nase and single -phase),
	voltage			regulation and testing of transformers	s, Parallel operation,
Autotra			otrai	nstormers, Phase transformation of transform	ners. To introduce the
basic co			C CO	incepts of induction machines (3-phase and sin	igle -phase), production
or rota			rotat	n generator	s of space narmonics,
Course			he ei	nd of the course the students will be able to:	
Outcomes			ne ei	the knowledge about the machines in the field	1
Outcomes		1. d 2 r	nach	ine based problems can be solved	
		2.1		ast the kind of machine suitable for field work	
			ugge an d	lesign and develop new machines	
		4.0	all u	used Modern tools for control	
		5.0	an u Iesia	in the machines for environmental friendly	
			on l	arn machine for life long	
Syllabus			ан к ГТ-Т	• Transformer-I	
By Habus		Introduction: Efficiency: maximum and all-day: Equivalent circuit of single-			
		phase transformer, voltage regulation. Testing: load test, open circuit and			
		short circuit tests, Sumpner's test.			
		UNIT-II: Transformer-II			
		Construction of three phase transformer and their phase groupings; Parallel			
		operation; Harmonics in transformers; Autotransformers: Introduction,			
		comparison with two winding transformers; Phase transformation: Three-			
		phase to two-phase, single-phase, and six-phase.			
		UN	I <b>T-I</b>	II: Three-Phase Induction Machines-I	1
		winding factors of ac windings; emi equation of ac machine; mmi wave of single and three phase windings: space harmonics: Construction and principle			
		single and three phase windings; space harmonics; Construction and principle of operation of three-phase induction motor; production of rotating magnetic			
		field, equivalent circuit and phasor diagram			
		UNIT-IV: Three-Phase Induction Machines-II			
		Losses and power flow diagram; slip-torque curves; no load and blocked rotor			
		tests; circle diagram; starting methods; effects of space harmonics; cogging.			
		crawling, and noise; induction generator.			
		UNIT-V: Single-Phase Induction Motors			
		Principle of operation of single-phase induction motors; double revolving			
		field and cross field theories; equivalent circuit; classification and starting of			
		sing	le-p	hase induction motors; testing.	
Books*/References		1. *I. J. Nagrath and D. P. Kothari, Electric Machines, Tata McGraw Hill,			
		2004.			
		2. f	5. S. .4 O	Guru and H. R. Hizirogiu, Electric Machiner	y and Transformers, 3
		2 1	iu, U De	Phimbre, Electric Machinery, Khanna Publish	ing House
			. S. Zitza	arald Kingley and Uman Electric Machinery	McGrow Hill Inc
Course	Sessional Q		Mi	d Term Examination (I Hour)	25 Marks
Assessment/				i7	10 Marks
Evaluation/G			As	signments	05 Marks
rading Policy			110	Sessional Total	40 Marks
	End S	Semeste	r Ex	camination (3 Hours)	60 Marks
				Total	100 Marks

Course Title		Electrical Ma	Electrical Machines-II			
Course number		<b>EE-213N</b>				
Credit Value		4				
Course Category	7	DC				
Pre-requisite		Nil				
Contact Hours (I	L-T-P)	3-1-0				
Type of Course		Theory				
Course Objectiv	ves To	introduce the basic	concepts of Synchronous Mac	chines. The salient and		
	non	-salient pole machir	nes, maximum power. Open c	ircuit, short circuit and		
	zero	power factor tests,	Slip test. Alternator load charac	cteristics.		
		introduce the basic	concepts of D.C. machines, fu	inction of commutator,		
	sim	plex lap and wave	windings, armature reaction	, and Special motors:		
	uni	versal motor, permar	ent magnet de machines, hyste	eresis motor, reluctance		
Course		or, and stepper moto	r. the students will be able to			
Course		he end of the course	the students will be able to	4		
Outcomes		Apply the knowledge	about the machines in the field	u.		
	2.1	viachine based probl	ems can be solved			
	3. 1	Suggest the kind of n	hachine suitable for field work.			
	4. 0	an design and devel	op new machines			
	5.0	an used Modern too	ols for control			
	6. 1	Design the machines	for environmental friendly			
	/. (	Can learn machine fo	r life long			
Syllabus		11 1: Synchronous	viacnines-i	theory experimeness		
		construction, armature reaction and two reaction theory, synchronous				
	read	la curve for selient e	nd non solient note machines	maximum nower Open		
		uit short circuit an	d zero power factor tests. Sli	in test Alternator load		
	cha	racteristics	d zero power ractor tests, sh	ip test. Alternator load		
		t II. Synchronous N	/Jachines-II			
	Vol	tage regulation and	its determination by synch	conous impedance and		
	Por	tier triangle methods	Synchronization of three pha	se alternators, effect of		
	gov	governor characteristics on load sharing of alternators, operation on infinite				
	bus	bars, active and read	tive power control.			
	Uni	t III: Synchronous	Machines-III			
	Syn	Synchronous motors: methods of starting, synchronizing power, hunting, V-				
	cur	curves, synchronous condenser, Transient and sub-transient reactances and				
	tim	time constants, Negative and zero sequence impedances.				
	Uni	Unit IV: D. C. Machines				
	Cor	Construction, function of commutator, simplex lap and wave windings, emf				
	and	and torque equations, armature reaction and commutation. D. C. generator				
		characteristics.				
		Unit V: D. C. Machines and Special Machines				
	mot	Unaracteristics of dc motors, testing of dc machines, dc motor starters, Special				
	relu	ctance motor, and st	epper motor.	mes, nysteresis motor,		
Books*/Referen	ices 1 ·	<sup>K</sup> I I Nagrath and F	) P Kothari Electric Machin	es Tata McGraw Hill		
		2004.				
	2	B. S. Guru and H F	. Hiziroglu. Electric Machine	ry and Transformers. 3		
		ed. Oxford University	v Press (Indian Edition).	-,,, -		
	3.1	P. S. Bhimbra. Electr	ic Machinerv. Khanna Publishi	ing House.		
	4.1	E. Openshaw Tavlo	pr.Performance and Design	of A. C. Commutator		
		Motors, A. H. Wheel	er, New Delhi.			
Course	I.	Mid Term Examina	ation (I Hour)	25 Marks		
Assessment/	Sessional	Quiz		10 Marks		
Evaluation/G		Assignments		05 Marks		

rading Policy		Sessional To	tal 40 Marks
	End Semester	r Examination (3 Hours)	60 Marks
		То	tal 100 Marks

Course Title	Power System Engineering
Course number	EE-231N
Credit Value	4
Course Category	DC
Pre-requisite	Nil
Contact Hours (L-T-P)	3-1-0
Type of Course	Theory
Course Objectives	To give an overview of power system and its various components and their importance. Calculation of line parameters, evaluation of line performance, mechanical aspects of overhead transmission line, underground cables, their constructional features and current rating. Sub-stations, its earthing various equipments used in them and their function.
Course Outcomes	After completing the course, the students should be able to know about the overhead and underground types of transmission systems, different mathematical models to represent different types of transmission lines and evaluate their performance. They should also be able to design an overhead transmission line including mechanical aspects. They will also know about different types of sub-stations, sub-station earthing and different components used in it and their objective.
Syllabus	<b>UNIT I:</b> Electrical Characteristics of O.H. Lines: Types of conductors for O.H. power transmission. Calculation of Line parameters; inductance and capacitance for single and double circuit lines, bundle conductors. Concept of GMD and GMR, Effect of earth on line capacitanc <b>UNIT II:</b> Performance of O.H. Transmission Lines: Representation of short, medium and long transmission lines; nominal-T, nominal- $\pi$ and equivalent- $\pi$ , Characteristic impedance, Z0 and SIL, ABCD parameters, Voltage regulation and efficiency, Compensation of line, Corona and radio interference. <b>UNIT II:</b> Insulators and Mechanical Design of O.H. Lines: Types of insulators; pin, disc and strain type. Voltage distribution and equalization; Arcing horns, Types of line supports, Air clearance. Sag calculations, effect of wind and ice loading. Ground clearance, Vibration of conductors and dampers. <b>UNIT IV:</b> Underground Cables: Construction of single core and three core cables, electrostatic stresses and grading of cables, thermal rating of cables, testing of cables, HVDC cables, cable failure. <b>UNIT V:</b> Substation: Classification, components and layout of substation (33 / 11 Kv). Package substations. Introduction to Gas insulated substations, Substation grounding and grounding methods.
Books*/Referencs	<ol> <li>*Nagrath and Kothari Power System Engg. 3<sup>rd</sup> edition (TMH)</li> <li>Cotton and Barbar Transmission and Distribution of Electrical Energy, (BI Publications).</li> <li>Ashfaq Husain Electrical Power System; 4<sup>th</sup> edition (CBS).</li> <li>WD Stevenson Elements of Power System Analysis (McGraw Hill).</li> <li>CL WadhwaElectrical Power Systems (Wiley Eastern).</li> </ol>

Course		Assignments (2)	15 Marks
Assessment/	Sessional	Mid Term Examination (1Hour)	25 Marks
Evaluation/G		Sessional Total	40 Marks
rading Policy	End Semeste	r Examination (3 Hours)	60 Marks
		Total	100 Marks

Course Title	Course Title			Electrical Measurements		
Course number	Course number			EE-251N		
Credit Value	Credit Value			4		
Course Category	Course Category			DC		
Pre-requisite				Nil		
Contact Hours (L-T-P)				3-1-0		
Type of Course	'ype of Course			Theory		
Course Objecti	ives	To introduce the concepts of measurement standards, measurement errors.				
		opera	ation	of electrical and electronic measuring instru	ments and their testing	
		and c	calibr	ation, measurement of electrical quantities and	l circuit parameters.	
Course		At th	he end	l of the course the students will be able to		
Outcomes		1. U	Inders	tand the measurement standards and analyse t	he measurement errors.	
		2. A	Apply	the knowledge about the instruments to use th	em more effectively.	
		3. Si	lugges	t the kind of instruments and instrumentation	on schemes suitable for	
		ty	ypical	measurements.		
Syllabus		Unit	t I			
		Mea	asurer	nent Standards and Errors: Classification	of standards, standards	
		Of E	EMF,	Resistance, Inductance, Capacitance. Inaction of	curacies in R, L, C	
		Comp	rootori	istics of instruments & massurement system	Massurement systems.	
		and t	thoir s	analysis	. Measurement errors	
		I Init	4 <b>II</b>	inarysis.		
		Eleci	etrom	echanical Instruments: Review	of PMMC. ML	
		Elect	trodvi	namometer. Thermal, and Electrostatic instru	ments. Errors and their	
		reme	edies	in the Electromechanical instruments. Worl	king principles of Hall	
		effec	ct Am	meter and Wattmeter. Measurement of power	in three phase systems.	
		Meas	surem	nent and adjustments in the single phase Induc	tion type Energy meter.	
		Dyna	amic l	behavior of D' Arsonval Galvanometer.		
	Unit III					
Bridges:			lges:	Bridges for measurement of low, medium,	and high Resistances.	
Measure			surem	ent of Inductance and Capacitance with th	e help of AC bridges.	
Multime			timete	er, Ratiometer and Megger. Principle of AC potentiometers, Testing		
of Wattn			Vattme	eter and Energy Meter using phantom method	of loading.	
Magne			gnetic	and Power System Measurements: Determ	ination of B-H curve of	
mag		netic	specimen. Measurement of Iron losses and	their separation using		
		Doct	Lioya Fisher Square. Measurement of high voltage using Sphere Gap and Pactified Charging Current methods. Symphre gapsa. Principle construction			
Kectific and too			testina	ng of Current Transformer and Potential Transformer		
		I Init	t V	g of current fransformer and fotential fransf	ormer	
		Elect	e troni	c Instruments: Average reading, RMS re	ading and True RMS	
		readi	ing v	voltmeters. Electronic potentiometer, Instr	rumentation Amplifier.	
		Harn	monic	ic analysis of waveforms. Review of basic CRO circuit (Block		
		Diag	gram).	Probes, Oscilloscope control. Measurement	of voltage, frequency,	
		and p	phase	using a CRO.		
Books*/Referen	Books*/References 1. *(		Goldi	ng & Widis Electrical Measurement & Measu	ring Instruments,	
		Pitman				
2. *H 3. A. Dh		2. *I	H. S.	Kalsi Electronic Instrumentation, TMH		
		3. A	A. K. S	Sawhney Electric & Electronic Measurement &	¿ Instrumentation,	
		Dhanpa	at Rai			
	4. Da		David 1	Bell Electronic Instrumentation & Measureme	nt, PHI	
Course			Ass	ignments (2 to 3)	10 Marks	
Assessment/	Sessi	onal	Qui	z (3 to 4), Best two may be considered	05 Marks	
Evaluation/G	20001		Mid	I Term Examination (I Hour)	25 Marks	
rading Policy				Sessional Total	40 Marks	
	End S	emeste	er Exa	mination (5 Hours)	OU Marks	
	1			Total	IUU IVIARKS	

Course Title		Circuit Theory
Course number		EE-276
Credit Value		4
Course Category		DC
Pre-requisite		Nil
Contact Hours (L-T-F	<b>)</b>	3-1-0
Type of Course		Theory
<b>Course Objectives</b>	To intro	duce the basic concepts of AC/DC Theorems, Transient and
	Steady S	State Response of R-L-C Circuits, Two port network parameters,
	Network	functions and time response, basics of graph theory and
	formulat	tion of network equations, state variable techniques and
0	introduc	tion to electric filters.
Course	At the en	and of the course the students will be able to $A C/DC$ the second and
Outcomes	1. Solve	R-L-C network problems using various AC/DC theorems and
	2 coloui	liansient response,
	2. Calcul	are parameters of various two port power of communication
	3 deter	nine driving point and transfer functions of various networks
	their	poles and zeros and also their time response:
	4. formu	late multi-bus power network equations using Graph Theory;
	5. formu	late state space equations representing a system and design
	basic	type of electric filters.
Syllabus	UNIT I	Transient Response and Network Theorems
	Transier	t response of R-L, R-C, R-L-C circuits to sinusoidal input,
	Maximu	m power transfer theorem, compensation theorem, reciprocity
	theorem	, Millman and Tellengen's theorem.
		I: Two Port Network and I A M
	Various	two port circuit parameters, relationship between different 2
	network	s transmission parameters in terms of $\Omega C$ & SC parameters
	network	s, transmission parameters in terms of OC & SC parameters.
	UNIT I	II: Network Functions
	Natural	frequencies, complex frequencies, Network functions, driving
	point ar	nd transfer functions, poles and zeros of network function,
	physical	interpretation of poles and zeros, time domain response from
	pole zer	p plot.
	UNIT I	V: Graph Theory
	Definitio	on of various terms used in graph theory, Formulation of various
	network	matrices and relationship between them, Formulation of
	network	equations on the basis of loop, mesh, tree branch voltage and
	node pai	r voltage.
	LINIT V	· State Veriable Analysis and Filters
	Sate sna	ce representation formulation of state equations Solution of
	state en	ation. Introduction of electric filters. Constant K and m derived
	filters L	pw pass and high pass.
Books*/References	1. Chou	dhry D. Roy: Network and Systems, New Age International
	2003.	
	2. Ashfa	q Husain: Networks and Systems, Khanna Publishers, Delhi,

		2008.					
		3. Shankar and Shyam Mohan: Circuits and Network Analysis and					
		Synthesis, Tata Mc Graw Hill, New Delhi, 2006					
		4. K	4. Kuo M.F: Network Analysis and Synthesis.				
		5. A	5. Aatre V.K: Network Theory and Filter Design				
Course			Assignments (2 to 3)	10 Marks			
Assessment/	Seco	anal	Quiz (3 to 4), Best two may be considered	05 Marks			
Evaluation/	Sessiona	onai	Mid Term Examination (I Hour)	25 Marks			
Grading			Sessional Total	40 Marks			
Policy	End	Semester Examination (3 Hours) 60 Marks					
			Total	100 Marks			

Course Title		Electrical Engineering Materials
Course number		EE-277
Credit Value		4
Course Category		DC
Pre-requisite		<b>Basic Electrical Engineering, Applied Mathematics &amp; Applied</b> <b>Physics</b>
Contact Hours (L-T-P)		3-1-0
Type of Course		Theory
Course Objectives	The obje electrical insulating	ective of the course is to introduce the concepts, atomic structure, properties and applications of conducting, superconducting, g, dielectric and magnetic materials.
Course Outcomes	At the en 1. Apply more of 2. Becom field a 3. Under 4. Sugge constr 5. Fulfill Electr	d of the course the students will be able to the knowledge about the Electrical Engineering Materials to use them effectively. In familiar with the dielectric behavior in static as well as varying and polarization mechanisms. Testand the modern trends in electrical insulation. Test different electrical engineering materials suitable for the function of electrical appliances and electrical machines. In the demand of the industry about the analysis and construction of fical Engineering Materials.
Syllabus	UNIT 1 Conduct the Rela Emissio Thermoo Conduct UNIT 2 Dielectr Polariza Dielectr Relaxati Dependa UNIT 3 Dielectr Liquid a of Insu Volume Electrici UNIT 4 Magnet Moment and Ferr Soft an Factors Ferrima	<ul> <li>tivity of Materials: Free Electron Theory of Metals; Ohm's Law and axation Time of Electrons; Factors affecting Resistivity of Metals; n of Electrons from Metals; Thermal Conductivity of Metals; electric Effects; Superconductivity; Band Theory of Solids; tion in Liquids.</li> <li>ric Properties of Materials-1: The Static Dielectric Constant; tion and Dielectric Constant; Polarization Mechanisms; Behavior of ics in Alternating Fields; Complex Dielectric Constant; Dipolar ton; Dielectric Losses-Loss Tangent; Temperature and Frequency ence of Dielectrics; Dielectric Strength; Temperature Classification lating Materials; Properties of Insulators-Insulation Resistance; Electrical Resistivity; Surface Electrical Resistivity; Ferroity; Piezoelectricity.</li> <li>ic Properties of Materials: Magnetization; Atomic Magnetic ts; Classification of Magnetic Materials; Diamagnetic, Paramagnetic romagnetic Materials; Losses in Magnetic Materials; Affecting Permeability and Hysteresis Loss; Anti-Ferromagnetism; gnetism; Magnetic Resonance.</li> </ul>
	UNIT 5 Materia Insulatin Material	als and their Applications: Properties of Various Conducting, ng and Magnetic Materials and their Applications; Superconducting ls and their Applications; Special Purpose Materials; Thermocouple

		Mat	erials; Contact Materials; Electrode Materials; M	laterials for Electronic			
		Con	ponents				
		1. J. Dekker, "Electric Engineering Materials", Prentice Hall					
	Books*/References		2. L. Solymer and D. Walsh, "Electric Properties of Materials", Oxford				
Books*/Refere			University Press, 2004				
		3. S.	3. S. P. Seth, "A course in Electrical Engineering Materials", Dhanpat Rai				
		Publication					
Course			Assignments (2 to 3)	10 Marks			
Assessment/	Soco	onal	Quiz (3 to 4), Best two may be considered	05 Marks			
Evaluation/	56881	onai	Mid Term Examination (I Hour)	25 Marks			
Grading		Sessional Total 40 Marks					
Policy	End S	Semester Examination (3 Hours) 60 Marks					
		Total 100 Marks					

Course Title		MATLAB for Engineers				
Course number		EE-278				
Credit Value		4				
Course Category		ESA				
Pre-requisite		Nil				
Contact Hours (L-T-P)		2-2-0				
Type of Course	1	Theory				
Course Objectives	To aim	at providing programming skills from b	asic level onwards using			
	MATLA	B software and its usage for data a	equisition, data analysis,			
	graphical visualization, numerical analysis, algorithm development, signal					
Garage	processin	ig and many other applications.				
Course	1. At the	end of the course the students will be able				
Outcomes	2. Illustr	ate the direct connection between the	e theory and real-world			
	applic	ations encountered in the typical eng	ineering and technology			
	2 Devel	uns.	up problem and use this			
	J. Devel	op then own program to solve then of	wir problem and use this			
	A Devel	on simulink model of the given system				
Syllabus		<b>Basics</b>				
Synabus	MATLA	B environment Variables Basic data ty	pes Relational and Logic			
	operators	, Conditional statements, Input and Outpu	t, Loops and branching.			
		, i i i i i i i i i i i i i i i i i i i	<i>o</i>			
	UNIT II: Matrices					
	Creating and Manipulating matrices, Matrix maths and Matrix functions,					
	Colon operator, Linspace, Cross product, Dot product, Logical functions,					
	Logical indexing, 3-dimensional arrays, Cell arrays, Structures, Plotting: 2- D and 3 D plots: Basic plots, subplots, Histograms, Par graphs, Dis charts					
	D'and 5-D piots. Dasic piots, subpiots, filstogranis, dai graphis, rie charts.					
	UNIT III: M-file scripts					
	Creating, saving and running an M-file, Creating and running of a function,					
	Function definition line, H1 and help text lines, Function body, Sub-					
	functions	, Nested functions, File I/O handling, M-f	ile debugging.			
	UNIT IV: Simulink					
	Introduction, Block diagram, Functions, Creating and working with models, Defining and managing signals, Running a simulation, analyzing the results.					
	UNIT V: Applications					
	UNIT V: Applications Root finding Data analysis Statistical functions, Dolynomials, Cymus fitting					
	Interpolation, Ordinary differential equations, Integration and differentiation, Signal processing applications, Circuit analysis applications, Control system					
	applications.					
	**					
Books*/References	1. *D Hanselman and B Littlefield, Mastering Matlab 7, Pearson					
	Education.					
	2. A Gilat, Matlab: An Introduction with Applications, John Wiley and					
	Sons, 2004.					
	3. Y Kirani Singh and B BChaudhari, Matlab Programming, Prentice Hall of India, 2007					
	4. Steve	cations 2 <sup>nd</sup> edition Orchard Publication 2	nnik with Engineering			
Course Assessment/	Арри	Assignments (2)	5 Marks each			
Evaluation/Grading Policy		Ouiz (2). Best may be considered	05 Marks			
	Sessional	Mid Term Examination (I Hour)	25 Marks			
		Sessional Total	40 Marks			
	End Semes	ster Examination (3 Hours)	60 Marks			
		Total	100 Marks			

Course Title		Signals and Systems	Signals and Systems		
Course number		EE-282N			
Credit Value		4			
Course Category		ESA			
Pre-requisite		Nil			
Contact Hours (	L-T-P)	3-1-0			
Type of Course		Theory			
Course Objecti	ves The c	ourse is aimed at introducing the fundamental cor	cepts and techniques in		
	signa	s and systems. The students are to be familiarized	with techniques suitable		
	for a	alyzing and synthesizing both continuous-time and	discrete time systems.		
Course	By th	e end of the course, students should be able to	use signal transforms,		
Outcomes	syste	n convolution and describe linear operations on the	se.		
Syllabus	UNI	' I: Introduction to signals and systems			
	Class	fication of signals, Basic operation on signal	s, Elementary signals,		
	Repre	sentation and Classification of continuous and	discrete time systems,		
	Prope	rties of systems, System Model: Input-Output De	scription, Sampling and		
	recov	ery of signals			
	UNI	11: Time-domain analysis of systems	Description Constraint		
	Syste	in Response to Internal Conditions: Zero-Inj	but Response, System		
	Resp	rtige for LTL systems. Convolution State varial	pulse response and its		
	syste	ne	he description for LTT		
	syste.	115			
UNIT III		'III: Fourier representation for signals			
Fourier		eries Representation – Trigonometric Fourier Series, Exponential			
Fourier S		er Series. Fourier Transform and its properties. Tr	ansform of some useful		
functions		ons.			
UNIT IV		IV: System analysis using Laplace transform			
U		eral and Bilateral Laplace Transform, Properties	of Laplace Transform,		
	Inver	Inversion of Laplace Transform, Solving Differential Equations with Initial			
	Cond	tions, Transform analysis of LTI systems.			
	UNI	V: System analysis using Z-transform			
	Unila	eral and Bilateral Z- Transform and its	Properties, Region of		
	Conv	ergence, Inversion of Z-Transform, Transform Ana	nce, Inversion of Z-Transform, Transform Analysis of LTI systems.		
Books*/Referen	nces 1. *S	ykin and B. V. Veen, Signals and Systems, John Wiley and Sons.			
2. A. V.		Oppenheim and A. S. Wilsky, Signals and Systems, Prentice Hall of			
India		lia.			
3. B P La 4. R. E. 2 Contin		P Lathi, Signal Processing and Linear Systems, Ox	ford University Press.		
		E. Ziemer, W. H. Tranter and D. R. Fannim, Signa	ls and Systems:		
		ntinuous and Discrete, IV edition, Prentice-Hall.	1		
Course		Assignments	5-10 Marks		
Assessment/	Sessional	Quiz	5-10 Marks		
Evaluation/G		Mid Term Examination (I Hour)	25 Marks		
rading Policy		Sessional Total	40 Marks		
	End Semeste	r Examination (3 Hours)	60 Marks		
		Total	100 Marks		

Course number         EF-28SN           Credit Value         4           Course Category         DC           Pre-requisite         Applied Mathematics and Basic Physics           Contact Hours (L-T-P)         3-1-0           Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's capations, static electric and magnetic fields and methods of solving for the quantifies associated with these fields, fine varying fields and displacement current, propagation of electromagnetic fields and field theory.           Outcomes         After completing the course, the students should be able:           0utcomes         1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic poisons' equations for electric potential.           3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.           4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields problems.           5. To apply numerical methods for the estimation of electromagnetic field uptory.           Syllabus         UNT1-1: Electrostate Fields           Syllabus         Course and discaptication; Electric field intensity; Gauss's Law and its application; Scalar and Vector magnetic fields Amper's circuital law and its application; Scalar and Vector magnetic field.	Course Title				Electromagnetic Field Theory		
Credit Value         4           Course Category         DC           Pre-requisite         Applied Mathematics and Basic Physics           Contract Hours (L-T-P)         3-1-0           Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's equations, static electric and magnetic fields and methods of solving for the quantities associated with these fields, time varying fields and displacement current, propagation of electromagnetic field theory.           Course         After completing the course, the students should be able:           Outcomes         1.7 o differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.           2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions quasi-static electromagnetic fields, propagation of electromagnetic massis and electromagnetic fields, propagation of electromagnetic field mass and equations, quasi-static electromagnetic fields, propagation of electromagnetic field quantitics.           3. To calculate capacitances, inductances and to apply the theory of electromagnetic field quantitics.         5. To apply numerical methods for the estimation of electromagnetic field quantitics.           5. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         5. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.           Syllabus         UNT1-	Course number				EE-285N		
Course Category         DC           Pre-requisite         Applied Mathematics and Basic Physics           Course Course         Theory           State Hours (L-T-P)         3.1.0           Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's equations, static electric and magnetic fields and methods of solving for the quantifies associated with these fields, time varying fields and displacement current, propagation of electromagnetic fields and displacement current, propagation of electromagnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.           Outcomes         After completing the course, the students should be able:           1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.           2. To describe static electric potential.           3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for dector potential.           4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic field quantities.           5. To apply numerical methods for the estimation of electromagnetic field quantities.           6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.           Syllabus         UNT1-I: Electrostatic Fields           Ampere's circuital law and tis applicatio	Credit Value				4		
Pre-requisite         Applied Mathematics and Basic Physics           Contact HOURS (L-T:P)         3:1-0           Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's equations static electric and magnetic fields and methods of solving for the quantities associated with these fields, time varying fields and displacement current, propagation of electromagnetic waves and their applications in practical problems.           Course         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomes         After completing the course, the students should be able:           0.tcomasities         After completing the cours	Course Category	/			DC		
Contact Hours (L-T-P)         3-1-0           Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's equations, static electric and magnetic fields and methods of solving for the quartines associated with these fields, time varying fields and displacement current, propagation of electromagnetic waves and their applications in practical problems.           Course         After completing the course, the students should be able:           0utcomes         After completing the course, the students should be able:           1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potential.           3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for alectric potential.           4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields mores & effects and to apply the theory of electromagnetic waves in practical problems.           5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations, quasi-static espace, conductors and differentics - Polarization, Boundary conditions; Poisson's aud Laplace's equation, quartacitation, Boundary conditions; Poisson's aud Laplace's equation, quartacitation, Boundary conditions; Poisson's aud Laplace's equation, quartacitation, Boundary conditions; Poisson's aud Laplace's equation, quartacitation; Boundary conditions; Poisson's aud Laplace's equation, force and torque; Inductance; Energy	Pre-requisite				Applied Mathematics and Basic Physics		
Type of Course         Theory           Course Objectives         To introduce the concepts of different coordinate systems, Maxwell's equations, static electric and magnetic fields and methods of solving for the quantities associated with these fields, time varying fields and displacement current, propagation of electromagnetic waves and their applications in practical problems.           Course Outcomes         After completing the course, the students should be able:           Outcomes         1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.           3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.           4. To describe time varying fields, smocrated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic magnetic waves in different media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.           5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electros and heir transformation; Electric Field Intensity; Gauss's Law and its application; Electric potential; Hargerostatic Fields           Syllabus         UNTT-I: Electrostatic Fields         Coordinate systems and their transformation; Electric field in free space, conductors and dielectrics - Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           UNTT-I: Hargerostatic F	Contact Hours (	L-T-P)			3-1-0		
Course Objectives         To introduce the concepts of different coordinate systems. Maxwell's equations, static electric and magnetic fields and methods of solving for the quantities associated with these fields, time varying fields and displacement current, propagation of electromagnetic waves and their applications in practical problems.           Course         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         To different types of coordinate systems and use them for solving the problems of electromagnetic field theory.           2. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic field quantities.           5. To apply numerical methods for the estimation of electromagnetic field quantities, space, conductors and diselectric: potential; Electric Field Intensity; Gauss's Law and its application; Electric potential; Electric field in free space, orductors and diselectrics = Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           Syllabus         UNIT-I: Electromagnetic Fields<	Type of Course				Theory		
equations, static electric and magnetic fields and methods of solving for the practical problems.         Course Outcomes       After completing the course, the students should be able:         Outcomes       1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.         2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for cleatric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic relet waves in practical problems.         5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electronagnetic field theory.         Syllabus       UNT1-I: Electrostatic Fields         Coordinate systems and their transformation; Electric Field Intensity; Gauss's Law and its application; Electric potential; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.         UNT1-II: Time Varying Fields         Faraday's Law; W; Transformer and motional EMF; Displacement current; Maxwell's equation of uniform plane waves in Free Space, Dielectrics and Conductors; Stin effect; Ponting's theorem and Power flow; Reflection of waves; Transmission lines.         UNT1-II: Time Varying Fields         Faraday's Law; Transformer a	Course Objecti	ves To intro			duce the concepts of different coordinate	e systems, Maxwell`s	
Quantities associated with these fields, time varying fields and displacement in practical problems.           Course Outcomes         After completing the course, the students should be able:           Outcomes         After completing the course, the students should be able:           Outcomes         1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.           2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.           3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electro-gotential.           4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic field problems.           5. To apply numerical methods for the estimation of electromagnetic field quantities.           6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.           Syllabus         UNT1-1: Electrostatic Fields           Coordinate systems and their transformation; Electric Field Intensity; Gauss's Law and its application; Electric potential; Electro magnetic potential; Magnetic flux density - Magnetizator; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           UNT1-1: Electrostatic Fields           Ampere's circuital law and its applications; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           UNT1-1: Imagnetostatie Fields <tr< th=""><th></th><th colspan="3">equation</th><th>, static electric and magnetic fields and meth</th><th>nods of solving for the</th></tr<>		equation			, static electric and magnetic fields and meth	nods of solving for the	
Course Outcomes       After completing the course, the students should be able:         1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.         2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.         5. To apply numerical methods for the estimation of electromagnetic field quantities.       6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNIT-I: Electrostatic Fields Coordinate systems and their transformation; Electric Field Intensity; Gauss's Law and its application; Electric potential; Electric field in free space, conductors and dielectrics – Polarization; Boundary conditions; Poison's and Laplace's equations; Capacitance; Energy density.         UNIT-I: Hagnetostatic Fields Ampere's circuital law and its application; Boundary conditions; Lorentz-force equation, Force and torque; Inductance; Energy density.         UNIT-II: Time Varying Fields Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static Electromagnetic Fields.         UNIT-IV: Propagation of Electromagnetic field quantitics. </th <th></th> <th colspan="3">quantitie</th> <th>associated with these fields, time varying f</th> <th>ields and displacement</th>		quantitie			associated with these fields, time varying f	ields and displacement	
Course         After completing the course, the students should be able:           Outcomes         1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.           2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic for the static electromagnetic fields, their behavior, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.           5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.           Syllabus         UNT-1: Electrostatic Fields           Coordinate systems and their transformation; Electric field in free space, conductors and dielectrics – Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           UNT-1: Iterrostatic Fields         Ampere's circuital law and its applications; Scalar and Vector magnetic potential; Electric field in free space, conductors and dielectrics – Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.           UNT-1: Iterrostatic Fields         Ampere's circuital law and its applications; Scalar and Vector magnetic fields; Magnetic flux density – Magnetization; Boundary conditions; Lorentz-force equation, Force and torque; Inductance; Energy density.           UNT-1: It: meassing fields         Faraday's Law; Transformer and motional EMF; Displa			curre	ent,	propagation of electromagnetic waves and	their applications in	
Course       After completing the course, the students should be able:         Outcomes       1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.       3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.         5. To apply numerical methods for the estimation of electromagnetic field quantifies.       6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNT1: Electrostatic Fields       Coordinate systems and their transformation; Electric Field Intensity; Gauss's Law and its application; Electric potential; Electric field in free space, conductors and dielectrics – Polarization; Boundary conditions; Poisson's and Laplace's equation force and torque; Inductance; Energy density.         UNT1:I: Time Varying Fields       Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static Electromagnetic Fields.         UNT1:II: Time Varying Fields       Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static	~		pract	ical	problems.		
Outcomes       1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory.         2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in fifterent media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.         5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNT1-1: Electrostatic Fields         Coordinate systems and their transformation; Electric field in free space, conductors and dielectrics – Polarizatio; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.         UNIT-1: Magnetostatic Fields         Ampere's circuital law and its application; Boundary conditions; Poisson's and Laplace's equation; Capacitance; Energy density.         UNIT-1: Time Varying Fields         Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static Electromagnetic Fields.         UNIT-1:V: Propagation of Electromagnetic Maves         UNIT-1:V: Propagation of Electromagnetic field; Appli	Course		Afte	er co	mpleting the course, the students should be able	e:	
Solving the problems of electromagnetic field theory.         2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic field quantities.         5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNIT-1: Electrostatic Fields         Coordinate systems and their transformation; Electric field In free space, conductors and dielectrics – Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.         UNIT-11: Magnetostatic Fields         Ampere's circuital law and its applications; Scalar and Vector magnetic Fields.         Lorentz-force equation, Force and torque; Inductance; Energy density.         UNIT-11: Time Varying Fields         Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         UNIT-1V: Propagation of Electromagnetic fields; Applications of Electromagnetic Fields.	Outcomes		1. 1	fo d	ifferentiate different types of coordinate syst	ems and use them for	
2. To describe static electric and magnetic fields, their behavior in different media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic waves in practical problems.         5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNTT-1: Electrostatic Fields         Coordinate systems and their transformation; Electric Field Intensity; Gauss's Law and its application; Capacitance; Energy density.         UNTT-1: Magnetostatic Fields         Ampere's circuital law and its application; Scalar and Vector magnetic potentials; Magnetic flux density – Magnetization; Boundary conditions, Lorentz-force equation, Force and torque; Inductance; Energy density.         UNIT-11: Time Varying Fields         Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetic field quantities.         Maxes; Numerical Methods			s	olvii	ig the problems of electromagnetic field theory	/. 	
media, associated laws, boundary conditions and electromagnetic potentials.         3. To calculate capacitances, inductances and to solve the Laplace and Poisson's equations for electric potential.         4. To describe time varying fields, associated laws and equations, quasi-static electromagnetic fields, propagation of electromagnetic waves in different media, their sources & effects and to apply the theory of electromagnetic field quantities.         5. To apply numerical methods for the estimation of electromagnetic field quantities.         6. To use integral and point form of Maxwell's equations for solving the problems of electromagnetic field theory.         Syllabus       UNIT-I: Electrostatic Fields         Coordinate systems and their transformation; Electric field Intensity; Gauss's Law and its application; Electric potential; Electric field in free space, conductors and dielectrics – Polarization; Boundary conditions; Poisson's and Laplace's equations; Capacitance; Energy density.         UNIT-II: Magnetostatic Fields       Ampere's circuital law and its application; Boundary conditions, Lorentz-force equation, Force and torque; Inductance; Energy density.         UNIT-II: Time Varying Fields       Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static Electromagnetic Fields.         UNIT-IV: Propagation of Electromagnetic Waves       Propagation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Numerical Methods for estimation of Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electro			2. 1	fo de	escribe static electric and magnetic fields, the	ir behavior in different	
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Faraday's Law; Transformer and motional EMF; Displacement current; Maxwell's equation in integral and point form; quasi-static Electromagnetic Fields.         UNIT-IV: Propagation of Electromagnetic Waves Propagation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         UNIT-V: Electromagnetic Waves and Applications Sources and effect of electromagnetic fields; Applications of Electromagnetic waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course Assessment/ Evaluation/G rading Policy       Assignments (2 to 3)       10 Marks         Quiz (3 to 4), Best two may be considered Mid Term Examination (I Hour)       05 Marks         End Semester Examination (3 Hours)       60 Marks			UN	T-II	II: Time Varying Fields		
Maxwell's equation in integral and point form; quasi-static Electromagnetic         Fields.         UNIT-IV: Propagation of Electromagnetic Waves         Propagation of uniform plane waves in Free Space, Dielectrics and         Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of         waves; Transmission lines.         UNIT-V: Electromagnetic Waves and Applications         Sources and effect of electromagnetic fields; Applications of Electromagnetic         waves; Numerical Methods for estimation of Electromagnetics field quantities.         1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Assessment/ Evaluation/G rading Policy         Sessional         End Semester Examination (3 Hours)         60 Marks			Fara	ıday'	s Law; Transformer and motional EMF;	Displacement current;	
Fields.         UNIT-IV: Propagation of Electromagnetic Waves         Propagation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         UNIT-V: Electromagnetic Waves and Applications         Sources and effect of electromagnetic fields; Applications of Electromagnetic waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; OxFord University Press.         Course       Assessment/         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks			Max	well	's equation in integral and point form; quasi	-static Electromagnetic	
Image: Course Assessment/ Evaluation/G rading Policy       VNIT-IV: Propagation of Electromagnetic Waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         Image: Course Assessment/ Evaluation/G rading Policy       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics; Ord University Press.         Image: Course Assessment/ Evaluation/G rading Policy       Sessional         Quiz (3 to 4), Best two may be considered field of the maximization (I Hour)       25 Marks         Image: Propagation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.       Image: Propagation of University Press.         Image: Propagation of electromagnetic fields; Applications of Electromagnetics; Oxford University Press.       1. *W. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Image: Propagation of the examination (I Hour)       25 Marks         Image: Propagation of the examination (3 Hours)       60 Marks			Fiel	ds.			
Propagation of uniform plane waves in Free Space, Dielectrics and Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         UNIT-V: Electromagnetic Waves and Applications         Sources and effect of electromagnetic fields; Applications of Electromagnetic waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/Referetere       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics; Oxford University Press.         Course       Assessment/ Evaluation/G rading Policy       Assignments (2 to 3)       10 Marks         Sessional       Quiz (3 to 4), Best two may be considered Mid Term Examination (I Hour)       05 Marks         End Semester Examination (3 Hours)       60 Marks			UN	T-I	V: Propagation of Electromagnetic Waves		
Conductors; Skin effect; Pyonting's theorem and Power flow; Reflection of waves; Transmission lines.         UNIT-V: Electromagnetic Waves and Applications         Sources and effect of electromagnetic fields; Applications of Electromagnetic waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course       Assignments (2 to 3)       10 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks			Prop	pagat	tion of uniform plane waves in Free Space, Dielectrics and		
waves; Transmission lines.       UNIT-V: Electromagnetic Waves and Applications         Sources and effect of electromagnetic fields; Applications of Electromagnetic waves; Numerical Methods for estimation of Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course       Assessment/         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks			Con	duct	tors; Skin effect; Pyonting's theorem and Power flow; Reflection of		
Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course       Assessment/         Evaluation/G       Quiz (3 to 4), Best two may be considered       05 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks         Image: Policy       Image: Policy       100 Marks				es; I	Transmission lines.		
Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetic field quantities.         Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         Course       Assessment/         Assessment/       Evaluation/G         rading Policy       Sessional         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks				1 <b>1 - V</b>	: Electromagnetic Waves and Applications		
Books*/References       1. *W. H. Hayt & J.A Buck, Engineering Electromagnetics 7 <sup>th</sup> Edition, McGraw Hill.         2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course       Assessment/         Assessment/       Evaluation/G         rading Policy       Sessional         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks         Image: Note the information of Electromagnetics       60 Marks	Sources wavee			rccs	and effect of electromagnetic fields; Applications of Electromagnetic		
Jooks / References       1.       w. H. Hayt & J.A Buck, Engineering Electromagnetics / Edition, McGraw Hill.         McGraw Hill.       2.       M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Assessment/       Assignments (2 to 3)       10 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks         Total       100 Marks	Books*/References 1 *W		×W/	H Havt & IA Buck Engineering Electr	compagnetics 7 <sup>th</sup> Edition		
2. M. N. O. Sadiku, Elements of Electromagnetics; Oxford University Press.         Course         Assessment/         Evaluation/G         rading Policy         End Semester Examination (3 Hours)         Course         Image: Sessional Course         Assignments (2 to 3)         Quiz (3 to 4), Best two may be considered         O5 Marks         Mid Term Examination (I Hour)         25 Marks         End Semester Examination (3 Hours)         60 Marks         Total         100 Marks		1000	1. ·	₩. AcG	raw Hill	omagnetics / Eutitoli,	
Course       Assignments (2 to 3)       10 Marks         Assessment/       Sessional       Assignments (2 to 3)       10 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks         Total         100 Marks			2	M N	O Sadiku Elements of Electromagnetics: Ov	ford University Press	
Assessment/ Evaluation/G rading Policy     Sessional     Quiz (3 to 4), Best two may be considered     05 Marks       Mid Term Examination (I Hour)     25 Marks       End Semester Examination (3 Hours)     60 Marks       Total     100 Marks	Course		<u>~</u> . r	Δ.	signments (2 to 3)	10 Marks	
Evaluation/G rading Policy     Sessional     Control to 17, Decrementation (I Hour)     Of Marks       End Semester Examination (3 Hours)     60 Marks       Total     100 Marks	Assessment/			01	iz (3 to 4). Best two may be considered	05 Marks	
rading Policy     Interform Endmotion (1 Hour)     20 Marks       End Semester Examination (3 Hours)     60 Marks       Total     100 Marks	Evaluation/G	Sessi	Sessional Qu		d Term Examination (I Hour)	25 Marks	
End Semester Examination (3 Hours)     60 Marks       Total     100 Marks	rading Policy			1,11	Sessional Total	40 Marks	
Total 100 Marks	<i>j</i>	End S	Semeste	r Ex	amination (3 Hours)	60 Marks	
					Total	100 Marks	

Course Title		Electrical Machines Lab-1			
Course number		EE-295			
Credit Value		2			
Course Category	y	DC			
Pre-requisite		EE-111 Basic Electrical & Electronics Engineering	;;		
		EE-211N Electrical Machine-I & II			
Contact Hours (	L-T-P)	0-1-2			
Type of Course		Practical			
Course Objecti	ves For the	enhancement of theoretical knowledge and to give the practical			
	expos	ure of transformer and induction machines.	of transformer and induction machines.		
Course	1. Ha	ve knowledge of various parts of a transformer and indu	ction machine.		
Outcomes	2. De	velop knowledge helpful for higher studies.			
	3. Ab	ility to conduct different test on single phase transforme	rs.		
	4. Ab	ility to found performance parameters of a transformer.			
	5. Ab	ility to Perform test on induction motor.			
	6. Ab	ility to find different characteristics of induction machin	es.		
Syllabus	List o	f Experiments			
1. To per		perform open-circuit and short-circuit test on a single pl	form open-circuit and short-circuit test on a single phase transformer.		
2. Determ		termination of voltage regulation and efficiency of a sing	gle phase		
transfo		nsformer by load test.			
3. To per		perform phasing out of three-phase transformer winding	gs.		
4. To per		perform the load-test of a three-phase Induction Motor.			
	5. To	perform parallel operation of a single phase transformer			
6. To find		find out the characteristics of wound rotor induction mo	tor.		
	7. To	form Sumpner's test on a single phase transformer.			
	8. De	nination of parameters of a single phase induction motor.			
Books*/	1. A.I	izgerald et al, Electrical Machinery, Tata McGraw-Hill, New Delhi.			
References	2. D.I	othari & I.J. Nagrath, Electrical Machinery, Tata McGraw-Hill, New			
Delhi.		lhi.			
3. M. H. 1		H. Rashid, Power Electronics, PHI Learning, 3 <sup>rd</sup> ed, New	Rashid, Power Electronics, PHI Learning, 3 <sup>rd</sup> ed, New Delhi.		
4. M. S. J		amil Asghar, Power Electronics, PHI Learning, New Delhi.			
	5. <u>htt</u>	<u>p://www.alldatasheet.com</u> (for power electronic devices/	thyristors).		
Course		Evaluation of each lab reports,	60 Marks		
Assessment/E valuation/Gra	Sessional	Viva-voce held every week on each lab report			
ding Policy		Sessional Total	60 Marks		
ang i onej	End Semester	nd Semester Examination (2 Hours)			
		Total	100 Marks		

<b>Course Title</b>				Power Electronics		
Course number				EE-301		
Credit Value				4		
Course Category				OE		
Pre-requisite				EE111		
Contact Hours (	L-T-P)			3-1-0		
Type of Course				Theory		
Course Objecti	ves	To int	rodu	ce the basic concepts of power electronics, typ	es of converters, their	
	character			stics, turn-on of SCR, gate characteristics, AC-	DC Converters, DC -	
		DC C	onve	rters, AC-AC and DC-AC Converters.		
Course		At the	e end	of the course the students will be able to		
Outcomes		1. Ar	ticul	ate the basics of power electronic devices		
		2. Ex	press	s the design and control of rectifiers, inverters.		
		3. De	sign	n of power electronic converters in power control applications		
		4. Ab	oility	to express characteristics of SCR, BJT, MOSF	ET and IGBT.	
		5. Ab	oility	to express communication methods.		
		6. Ab	oility	design AC voltage controller and Cyclo-Conve	erter.	
		7. Ab	oility	to design Chopper circuits.		
		8. Ab	oility	to design Inverter circuit.		
Syllabus		UNIT	' I: P	ower Semiconductor Devices		
		Appli	catio	ns of power electronics; types of converter	s, ideal switch; power	
		diodes	s, SC	CR, Triac and their characteristics, di/dt, dv/dt	limitations and snubber	
		circui	ts, ot	her power semiconductor devices and their cha	aracteristics.	
		UNIT	` <b>II</b> :	: Gate Drive Circuits		
		Metho	ods c	of turn-on of SCR, gate characteristics, simple R, RC and UJT trigger		
		circui	ts, di	ariver and isolation circuits, cosine and ramp control circuits, simple		
digital tri			l trig	ger circuit, commutation of SCR		
				AC-DC converters	wafarma for 1 nh mid	
Principle point an			pie o	bridge converters full and semi-converters	veloring for 1-pit line-	
		ac-dc converter with R and RL loads performance evaluation of phase				
		controlled converters, introduction to three phase converters: semi and full				
		converter topologies, dual-converters.				
		UNIT IV: DC - DC Converters				
		Basic	Basic principle of d.c. choppers: TRC and CLC methods; switching regulators:			
		buck a	and boost converters, basic principles of SMPS and UPS, Introduction to			
		resona	ant converters.			
		UNIT	' V:	AC-AC and DC-AC Converters		
		Introd	luctio	ction to AC voltage regulators, integral cycle control and phase control,		
		cyclo-	-conv	onverters. Series, parallel and bridge inverter circuits, PWM inverters:		
		types	of co	control and harmonic reduction.		
Books*/Referen	nces	1. *M	1.H.	I. Rashid Power Electronics; PHI, Learning.		
2. *G.H		.K.C	K.Dubey, S.R.Doradla, A.Joshi and R.M.K.Sinha, Thyristorised Power			
		Co	Controllers; New Age International, New Delhi.			
3		3. M.H. Rashid (Ch. Editor) Power Electronics Hand Book, Acedemic Press,				
		Ca	California.			
		4. Jai P Agarwal Power Electronics Systems, Pearson.				
5. M. S		S.J.	amil Asghar Power Electronics, PHI Learning.			
Course			As	signments	10 Marks	
Assessment/	Sess	Sessional			05 Marks	
Evaluation/G rading Policy				d Term Examination (1 Hour)	25 Marks	
		C 4		Sessional Total	40 Marks	
	End	Semeste	r Ex	amination (3 Hours)	OU Marks	
	1			Total	IUU MARKS	

<b>Course Title</b>			Power Electronics–I		
Course number			EE-321N		
Credit Value			4		
Course Category			DC		
Pre-requisite			Nil		
Contact Hours (	L-T-P)		3-1-0		
Type of Course			Theory		
Course Objecti	ves	To ii	oduce the concepts of Power Electronic Devices, different types of		
		conve	erters, triggering circuits and their control schem	nes, fourier analysis of	
		powe	r electronic converters.		
Course		At th	end of the course the students will be able to:		
Outcomes		1. de	sign different types of power electronic converters	gn different types of power electronic converters in industry.	
		2. ap	ply various converter control strategies.		
		3. an	alyze different converter schemes as per the require	ed application.	
		4. ex	plore recent advancement and technologies in pow	er electronics.	
Syllabus		UNI	<b>FI: Thyristor and their Characteristic</b>		
		Appl	ications of power electronics; types of converters,	ideal switch, latching	
		and r	on-latching switches, Characteristic of power dio	des, SCR, Diac, Triac,	
		GTO	, ratings of SCR, di/dtand dv/dt limitations, snubbe	r circuits.	
		UNI	F II: Triggering Circuit		
Methods			Is of turning ON, gate characteristics, simple R, RC, UJT and IC based		
		trigge	ng circuits, Driver and isolation circuits for thyristors.		
UNIT I			<b>III: Single phase ac-dc controlled converters</b>		
Principle		Princ	iple of ac phase control, circuit configurations, w	vaveforms for 1-phase	
mid-poin		mid-j	boint and bridge converters, full and semi co	nverters, use of free	
wheeling		whee	ling diode, analysis of single phase ac-dc converted	t with K and KL loads,	
perform			<b>FIV:</b> Three phase of de controlled converters,	THD, pr, ripple factor.	
		Intro	duction full converters with R and RL loads Rect	ification and inversion	
		oners	tions effect of free wheeling diode semi converter	rs	
			$\Gamma$ V: Miscellaneous converters and control schem	nes	
		Swite	ching angle control schemes: cosine, ramp, digita	l: dual-converters and	
		cvclo	-converters, matrix converters.	-,	
Books*/Referen	nces	1. *(	G.K.Dubey, et al. Thyristorised Power Controllers:	New Age International.	
		N	ew Delhi.	,	
	2. *M F		H. Rashid. Power Electronics: PHI Learning, New Delhi.		
3. V.Su		3. V.	Subramanyam, Power Electronics, New Age Intern	ubramanyam Power Electronics New Age International New Delhi	
4. Jai P		4. Ja	i P Agarwal, Power Electronics Systems, Addison	P Agarwal Power Electronics Systems Addison Wesely	
5. V. R.		5. V.	R. Moorthy, Power Electronics, Oxford University	y 2007 Press.	
6. M. S			. S. JamilAsghar, Power Electronics, PHI Learning	,	
Course			Assignments (2 to 3)	10 Marks	
Assessment/	ssessment/ valuation/G Sessional M		Quiz (3 to 4), Best two may be considered	05 Marks	
Evaluation/G			Mid Term Examination (I Hour)	25 Marks	
rading Policy			Sessional Total	40 Marks	
	End Se	emester	r Examination (3 Hours)	60 Marks	
			Total	100 Marks	

Course Title			Power Electronics-II			
Course number			EE- 322N			
Credit Value			4			
Course Category			DC			
Pre-requisite				Nil		
Contact Hours (	L-T-P)			3-1-0		
Type of Course				Theory		
Course Objecti	Course Objectives To introd			luce the Power Electronic Devices, their gate	drive circuits, design of	
commuta			muta	tion circuits, different types of dc-dc conver	rters, ac regulators and	
		their	anal	ysis, their control schemes and various types o	f inverter schemes.	
Course	Course At the en			d of the course the students will be able to		
Outcomes		1. U	se di	ifferent power semiconductor devices for particular applications along		
		th	neir g	gate drive circuits.		
		2. A	pply	the principles of integral cycle and ac-phase c	ontrol schemes.	
		3. D	esig	n PWM based converter control schemes.		
		4. D	esig	n dc-dc converters and apply them effe	ectively for industrial	
		ap	pplic	ations.		
		5. In	nple	ment power electronic circuits with minimal ha	armonics.	
Syllabus		UNI	ΤI	: Power Semiconductor devices and t	heir characteristics:	
		Char	acter	ristics of Power BJT, MOSFET, IGBT, IGC	T and static induction	
		devid	ces a	nd their relative merits, Gate drive circuit for M	AOSFET/IGBT	
			тц	II. DC to DC Converters		
			duct	tion to linear and switching converters, buck, boost, buck-boost, Cuk		
		conv	erter	ers flyback converter: their analysis and design SMPS		
		T II	. AC Degulators	SIMI S.		
		1 11	I: AC Regulators			
Pri		Princ	cipie	of integral cycle and ac phase control, analy	sis of single phase ac	
		regulator with K, L and KL load, introduction to threephase ac regulators:				
		various star and delta configurations.				
		UNIT IV: Thyristor based inverters				
		Forced commutation of SCR, series and parallel inverter, analysis of single				
		phase bridge inverter, modified Mc Murray inverter.				
		UNI	UNIT V: PWM inverters			
		Diffe	erent	PWM techniques, Introduction to PWM tran	sistor based inverters,	
		Harn	nonio	onic control, voltage control of single phase inverters, three phase		
inverters		rters	s: 180 degree and 120 degree conduction schemes.			
Books*/Deferences 1 *C V		GK	Dubay at al. Thyristorised Power Controllers:	New Age International		
DOOKS / Kelerences 1. *G.K		lew I	Delbi	New Age international,		
		1H	W Denn. H. Rashid Power Electronics: DHI Learning New Delhi			
		3 *1	Ned Mohan et al. Power Electronics, John Wiley and Sons			
		1 H	Rashid Power Electronics Handbook Acaden	nic Press, California		
		5 M	1. 11. 1 S	IamilAsghar Power Electronics PHI Learning		
Course A		Δ.	signments (2 to 3)	10 Marks		
Assessment/	G Sessional		01	iz (3 to 4) Best two may be considered	05 Marks	
Evaluation/G			Mi	d Term Examination (I Hour)	25 Marks	
rading Policy			1411	Sessional Total	40 Marks	
j	End S	Semeste	r Ev	ramination (3 Hours)	60 Marks	
			- <b>-</b> A	Total	100 Marks	
L				Total		
Course Title			New and Renewable Energy Sources			
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Course number			EE-325			
Credit Value			4			
Course Category	у		OE			
Pre-requisite			Basic Electrical and Electronics Engineer	ing		
Contact Hours (	L-T-P)		3-1-0	8		
Type of Course			Theory			
Course Objecti	ves	To i	troduce fundamentals of various renewable of	energy source and their		
		techr	ologies used to harness usable energy from	ies used to harness usable energy from solar, wind, ocean and		
		Bion	ass energy sources.			
Course		At th	end of the course the students will be able to			
Outcomes		1. Id	ntify renewable energy sources.			
		2. U	derstand the mechanism of solar, wind and ocea	n energy sources.		
		3. D	monstrate the understanding of various technol	ogies involved in power		
		ge	neration from renewable energy sources.			
		4. U	derstand the methods to handle the biomass in a	productive way.		
Syllabus		UNI	-1: Introduction	· ·		
		Ener	y resources and their classification, oil crisis of	late 20 <sup>th</sup> century and its		
		impa	ts on energy planning, consumption trend of J	rimary energy sources,		
		world	energy future, energy audit and energy conserva	tion, energy storage.		
		UNI	-2: Solar Energy Conversion			
		Sola	resources, passage through atmosphere,	esources, passage through atmosphere, solar thermal energy		
		conv	rsion: solar energy collectors, solar thermal	on: solar energy collectors, solar thermal power plant, solar PV		
conversi		conv	on: solar PV cell, V-I characteristics, MPPT, Solar PV power plant			
and appl		and a	oplications.			
UNIT-3		UNI	-3: Biomass Energy Conversion			
Usable .		Usab	e forms of Bio Mass, Biomass energy resc	urces, biomass energy		
conversi		conv	rsion technologies, ethanol blended petrol and	d diesel, biogas plants.		
Ene		Ener	y farming.			
		UNI	-4: Wind Energy Conversion	lift and dupp former		
		W IIIC	Power: Energy estimation, Power extraction	, fift and drag forces,		
		nonz	rsion and control schemes, onvironmental espect	turonne, white energy		
			-5. Other Alternate Energy Sources/Technologic	o. mine		
		Geot	ermal Energy' geothermal fields types geothe	rmal energy generation		
		syste	ocean tidal energy systems fuel cell basic operation and			
		class	ication, principle of MHD generation, output	occall itidal energy systems, rule cell. basic operation and		
		envir	onmental aspects.			
Books*/References 1 *B H		1. *I	H. Khan, Non conventional Energy Resources.	2 <sup>nd</sup> edition, 2009.		
		2. G	D. Rai, Non Conventional Sources of Energy, (K	hanna Publishers).		
3 I W		3. J.	V. Twidell & A.D. Weir. Renewable Energy Re	sources. (ELBS / E. &		
F.N.S		F.	J. Spon., London).			
4. Godf		4. G	dfrev Boyle, Renewable Energy, Oxford, 2 <sup>nd</sup> edi	tion 2010.		
Course	Course		Assignments (2)	15 Marks		
Assessment/	Sessional		Mid Term Examination (I Hour)	25 Marks		
Evaluation/G			Sessional Tota	40 Marks		
rading Policy	End S	Semeste	Examination (3 Hours)	60 Marks		
			Tota	100 Marks		

Course Title	Electrical Power Generation and Utilization
Course number	EE-331
Credit Value	4
Course Category	DC
Pre-requisite	Nil
Contact Hours (L-T-P)	3-1-0
Type of Course	Theory
Course Objectives	To introduce the fundamentals of illumination engineering. Various types of
	batteries and their field of applications. Railway electrification, various types of
	services and their characteristics. Various types of conventional power plants and their suitability criterion, site selection, maintenance and operation
Course	At the and of the course the students will be able to
Outcomes	At the end of the course the students will be able to
Outcomes	1. Have the knowledge of various types of conventional power plants and then working different equipments and instruments used for trouble free energies
	and maintenance, and factors to be considered for proper site selection
	2 Know about various types of lamps their working principle construction field
	of application
	3 Design the lighting system for various applications
	4 Various types of storage batteries and their field of applications
	5 Electro-plating and its applications and composition of electroplating baths
	6 Different types of traction systems particularly electric traction system types
	of services and their characteristics overhead line equipments and
	maintenance of line.
Svllabus	UNIT I: Thermal Power Plants:
	Coal fired Plants: Site selection, various components, parts and their operation,
	Steam and fuel cycles, Pollution control, Modern clean coal Technologies.
	Nuclear Power Plants: Site Selection, Principal of Fission, Main components of
	nuclear reactor, Fast Breeder and other reactors, Fuel extraction, enrichment and
	fabrication, Basic control of reactors, Environmental aspects.
	UNIT II: Hydro and Gas Power Plants:
	<i>Hydro Plants</i> : Site selection, Classification of Hydro plants, Main components
	and their functions, Classification of turbines, Pumped storage plants,
	Environmental aspects.
	Gas Turbine plant. Principle of operation, Open& closed cycle plants, Combined
	UNIT III. Cogeneration and Cantive Power Plants
	Scope & Benefits Coveneration Plants Coveneration Technologies Scope &
	Benefits of Captive Plants (CPP) Types of CPP Concept of Distributed
	Generation.
	UNIT IV: Electric Traction:
	Speed time curves, Tractive efforts and specific energy consumptions, Track
	electrification & traction substations, Current collectors, Negative boosters and
	control of traction motors.
	UNIT V: Illumination and Electrolytic Effects:
	Illumination: Definitions, Laws of illuminations, Principle of operation &
	construction of various lamps, Various aspects of illumination design, design
	Electrolytic Effects Types of Detteries their components Charsing b
	maintenance Tubular batteries Electroplating and its applications
Books*/Pafarances	1 *P. P. Cupto, Conception of Electrical Energy (Europia Dub, House)
DUUKS / Kelei ences	2. S. N. Singh, Electric Dower Concretion, Transmission & Distribution (DII)
	2. S.N.Shigh, Electric Power Generation, Transmission & Distribution (PHI).
	5. M.V.Desnpande, Elements of Electrical Power Station Design (wheeler Pub.
	nouse).
	4. "H.Flatab, Alt & Science of Othization of Electrical Energy (Dilanpat Kai &

	5. C.L.Wa	dhwa, Generation,	Transmission	& Dis	stribution	of	Electrical
	Energy(	(Wiley Eastern Pub).					
	6. N.V.Su	ryanarayana, Utilizati	ion of Electric Po	ower (W	iley Easte	rn Pu	ıb.).
Course Assessment/		Assignments (2)			15 Mark	s	
<b>Evaluation/Grading</b>	Sessional	Mid Term Examina	tion (I Hour)		25 Mark	s	
Policy			Sessiona	l Total	40 Mark	KS	
	End Semeste	er Examination (3 H	lours)		60 Mark	s	
				Total	100 Mar	·ks	

Course Title			Power System Protection		
Course number			EE-333N		
Credit Value			4		
Course Category			DC		
Pre-requisite			Basics of Electrical, Electrical Machines & P	ower System	
			Engineering		
Contact Hours (	L-T-P)		3-1-0		
Type of Course			Theory		
Course Objecti	ves	To in	oduce the basic concepts of different protection schemes, Relays, Circuit		
breake		break	s together with the basics of Arc Interruption Theory and Power System		
		Trans	sients.		
Course		At th	e end of the course the students will be able to:		
Outcomes		1. Le	earn the fundamental concept of different types of p	protective relays.	
		2. Aj	pply fundamental concepts of various protection sc	hemes.	
		3. U	se different types of circuit breakers according	to their principle of	
		op	peration, characteristics, ratings and their duties.		
		4. Be	ecome familiar with arc properties, their formation	and extinction.	
		5. Be	ecome familiar with Power System Transients, L	ightning arrestors, BIL	
		an	d insulation coordination.		
Syllabus		UNI	Γ I: Protective Relay		
		Basic	e principles, construction and characteristics of	electromagnetic relays;	
		over	current relay, differential relays, distance relay. El	ements of static relays,	
		μP ba	ed relays.		
UNIT		UNI	II: Protection Scheme		
		Prote	ction of generators, transformers, bus bars, transm	ission line and motors.	
		Com	puter aided protection		
UNIT		UNI	I III: Arc Interruption Theory		
Forma		Form	ation and extinction of arcs, arc properties, Re	-striking and recovery	
		volta	ge. Different methods and control devices for arc	e extinction, Resistance	
		SWITC	ning. E W. Cinerit Breekers		
			I IV: CIFCUIT Breakers	CP dution ratings and	
		tostin	All blast and $SF_6$ clicuit bleakers, vacuum switches	In shart and Sr <sub>6</sub> encourt steakers, vacuum swhenes, CD duties, fatings and	
			g. F V: Power System Transients		
		Over	voltages in transmission lines lightning and switching surges		
		Trans	smission reflection and refraction of surges Gro	und wires Snark gans	
		Light	ing arrestors BIL and insulation coordination		
Books*/Referen	nces	1.*	avindranath and Chander PS Protection & Switchgear Wiley Eastern		
		2 C	<b>R</b> Mason Art and Science of Protection Relaying	Wiley Eastern	
		3 B	Ram and Vishwakarma Power System Protection	& Switchgear TMH	
4. T.S.		<u>3</u> . В. 4 т	S M Rao Power System Protection: S	tatic Relay with	
Mic		M	icroprocessor Applications, 2 <sup>nd</sup> Edition.	une Reiug with	
5. Pata		5. Pa	taithankar and Bhide Fundamentals of Power Syst	em Protection PHI	
Course		0110	Assignments (2 to 3)	10 Marks	
Assessment/	Sessional		Ouiz (3 to 4), Best two may be considered	05 Marks	
Evaluation/G			Mid Term Examination (1 Hour)	25 Marks	
rading Policy			Sessional Total	40 Marks	
	End S	Semester	Examination (3 Hours)	60 Marks	
			Total	100 Marks	

Course Title			Power System Analysis	
Course number			EE-335N	
Credit Value			4	
Course Category	y		DC	
Pre-requisite			Nil	
Contact Hours (I	L-T-P)		3-1-0	
Type of Course	<u> </u>		Theory	
Course Objectiv	ves	To	introduce the concepts of Load flow analysis, bus impedance/admittance	
		mat	rix, load flow problem formulation and solution techniques, fault analysis,	
		stea	dy state and transient stability analysis, load frequency and voltage control	
		and	different type of distribution systems.	
Course		At the end of the course the students will be able to:		
Outcomes		1. s	olve load flow problems using per unit values systems.	
		2. d	evelop power system network models.	
		3. f	ormulate and solve load flow problems using various techniques as per the	
		r	equirements of complexity, computational time and accuracy.	
		4. c	alculate power losses in power system and develop economical power	
		S	ystem operation scheme.	
		5. d	ifferentiate various types of fault and calculate the associated fault values	
		f	or symmetrical and unsymmetrical faults.	
		6. p	erform stability analysis and decide stability criteria as per a given	
		p	roblem.	
		7. d	ifferentiate various distribution systems.	
Syllabus UNIT I			(T I	
Load F		Loa	ow Analysis: Per unit system of calculation, Formation of network	
model		moc	$Y_{BUS}$ by inspection and by singular transformation, Formulation of	
load fl		load	flow problem; type of buses, Solution techniques – Gauss-Seidel and	
		Nev	/ton –Raphson. Representation of voltage controlled buses and	
		tran	stormers. Decoupled and fast-decoupled load flow.	
		UN		
		Eco	nomic Operation of Power Systems: Study of economic dispatch problem	
		in a	thermal power station, consideration of transmission losses in economic	
dispa		disp	alch, simplified method of loss-formula calculation, solution of	
		volt	anation equation, unit communent, introduction to load frequency and	
Equit A		Eau	t Analysis: Types of fault calculation of fault current and voltages for	
		svm	metrical short circuit. Symmetrical components. Sequence impedance and	
		netv	vorks of power system elements unsymmetrical short circuits and series	
		faul	t Current limiting reactors	
		UN	IT IV	
		Stat	ility Analysis: Introduction to steady state and transient stability of power	
		syst	ems, swing equation, equal area criteria, solution of swing equation,	
		met	hods of improving stability, Introduction to voltage stability.	
UNI		UN	IT V	
Distrib		Dist	ribution Systems: Different types of distribution systems. Distributors fed	
from o		fron	n one end and both ends, ring mains, unbalanced loading, Rural	
electrif		elec	trification.	
Books*/References 1. *N		1. *	Nagrath and Kothari, Power System Analysis, 3 <sup>rd</sup> edition (TMH).	
2.		2. E	BR Gupta, Power System Analysis and Design.	
3 Grai		3 (	Trainger and Stevenson Power System Analysis (McGraw Hill)	
		л. Л. т.	Jadi Saadat Dowar System Analysis (TMU)	
Comme		4. 1	Assignments (2 to 2)	
Lourse	Sessio	nal	Assignments (2 to 3) 10 Marks	
maacaaniciiu/	1		$\nabla u_{12} \langle J \rangle \langle 0 \rangle + J$ , Desi two may be considered UJ Walks	

<b>Evaluation/G</b>		Mid Term Examination (I Hour)	25 Marks
rading Policy		Sessional Total	40 Marks
	End Semester	60 Marks	
		Total	100 Marks

Course Title			Dynamic System Analysis			
Course number			EE-341N			
Credit Value			4			
Course Category			DC			
Pre-requisite			Circuit Theory & Signal and Systems			
Contact Hours (	L-T-P)		3-1-0			
Type of Course		1	Theory			
Course Objecti	ives	The	objective of the course is to introduce the conce	pts in the analysis and		
		desig	in of control systems.			
		At th	e end of the course the students will be able to	1.0 / /		
		1. A	pply the knowledge about the Automatic Contro	System to use them		
			ofference of the industry shout the one	e effectively.		
		2. Fu	mini the demands of the industry about the analy	ysis and control of the		
Course			manne systems.	stability analysis of the		
Outcomes	5	5. D	inamic systems	stability analysis of the		
			ifferentiate different types of controllers and de	sign them for specific		
		4. D	inferentiate different types of controllers and de	sign meni ioi specific		
		5 D	esign Lag Lead Lag-Lead Compensator using Bo	de Plot and Root Locus		
		J. D	chniques and suggest the relative stabilities of diffe	rent dynamic systems		
		UNI	Γ I: Control Concepts and Mathematical Modeli	ing		
		System Concepts, Effect of Feedback, System Modeling, Transfer Function,				
		Modeling of Different Types of Physical Systems. Analogy between the				
		Elements of Different Types of Systems. State Variable Representation.				
		Relationship between State Model and Transfer Function.				
		UNIT II: System Representation and Control Components				
		Block Diagram Algebra. Signal Flow Graph and Mason's Gain Formula. State				
		Diagram and Simulation. Introduction to Simulink. Working Principle and				
		Cont	rol Applications of Synchros, Tachogenerator, Se	ervomotor and Stepper		
		Motor.				
		UNIT III: Time Response Analysis				
Syllabus		Time response of First Order and Second Order Systems. Steady State Error				
		and Error Coefficients. State Transition Matrix and Solution of State				
		Equations. Concepts of Stability–Routh-Hurwitz Criterion of Stability. Root				
		Locus rechnique.				
		UNIT IV: Frequency Response Analysis Correlation between Time and Frequency Personse Frequency Personse of				
		Second Order System, Bode Plots Polar Plots Nichols Chart and Nyouist				
		Stability criterion – Gain Margin and Phase Margin.				
		UNIT V: Control System Design				
		Cascade and Feedback Compensation – Design of Lag. Lead. Lag-Lead				
		Compensator Using Bode Plot and Root Locus. Introduction to P. PI and PID				
		Controllers and their Tuning.				
Dooks*/Doference		1. N	orman S. Nise, "Control Systems Engineering", Wi	ley Eastern, 2007.		
BOOKS*/Refere	ences	2. K	. Ogata, "Modern Control Engineering", Prentice H	Iall of India 2003.		
		3. B	C. Kuo, "Automatic Control Systems", Prentice Ha	Ill of India, 2002.		
			Assignments (2 to 3)	10 Marks		
Course	Saar	lonal	Quiz (3 to 4), Best two may be considered	05 Marks		
Assessment/	Sess	onal	Mid Term Examination (I Hour)	25 Marks		
Evaluation/G			Sessional Total	40 Marks		
rading Policy	End S	Semeste	r Examination (3 Hours)	60 Marks		
	Total 100 Marks			100 Marks		

Course number     EE-352N       Credit Value     4
Credit Value 4
Cleant value 4
Course Category DC
Pre-requisite Basic Electrical and Electronics Engineering
Contact Hours (L-T-P) <b>3-1-0</b>
Type of Course   Theory
Course Objectives To introduce the concepts of digital measurement, data managemen
transducers and their applications in the measurement of physica
quantities and understanding of latest instrumentation and measurement
technologies.
<b>Course</b> After completing the course, the students should be able:
Outcomes 1. To implement the methods of digital instrumentation, dat
transmission and acquisition.
2. To use electrical transducers according to specific applications an
requirements.
3. To apply different methodologies for the measurement of variou
nhysical quantities (pressure temperature flow etc)
1 To appreciate new instrumentation technologies (Wide Are
4. To appreciate new institution technologies (while Are
Interstrement Systems, Global Positioning System, Nand
Instrumentation, MEMS, Smart Sensors etc) and recent development
in these technologies.
SyllabusUNIT I: Digital Instruments and Measurement
Comparative Analysis of Digital Instruments and Analog Instruments
Digital Voltmeter, Digital Multimeter, Digital Measurement of
Frequency, Time Period, Power and Energy.
UNIT II: Data Transmission and Acquisition
Telemetry Principles and Applications Applog and Digital Dat
Acquisition Systems Data Logger and DSO
INIT III. Transducer-I
Advantages of Electrical Transducers, Classification, Characteristic
Selection of Transducers. Potentiometer, Strain Gauge, Resistance
Thermometer, Thermistor, Thermocouples, LVDT, Capacitive
Piezoelectric, Hall Effect and Opto-electronic Transducers, Gyroscope.
UNIT IV: Transducer-II
Measurement of Temperature, Force, Pressure, Motion, Vibration, Flow
and Liquid Level, Ultrasonic Transducers, Solid State Sensors, Fibe
Optic Sensors, Digital Transducers.
UNIT V: Recent developments
Intelligent Instrumentation, Nano-Instrumentation, Robotic
Instrumentation, Introduction to Virtual Instrumentation, MEMS base
Sensors, Smart Sensors, GPS, Wide Area Measurement, Smart Meter.
<b>Books*/References</b> 1. *D.V.S Murty, "Transducers and Instrumentation", PHI.
2. *T. S. Rathore, "Digital Measurement Techniques", Naros
Publishing House.
3. Morris, "Principle of Measurement and Instrumentation", PHI.
4. H. K. P Neubert, "Instrument Transducers", Oxford University Press
5. Rangan Mani and Sarma, "Electrical Instrumentation", TMH.

Course	Sessional	Assignments (2 to 3)	06 Marks
Assessment/		Quiz (3 to 4), Best two may be considered	09 Marks
<b>Evaluation</b> /		Mid Term Examination (I Hour)	25 Marks
Grading		Sessional Total	40 Marks
Policy	End Semester Examination (3 Hours)		60 Marks
		Total	100 Marks

Course Title	High Voltage Engineering
Course number	EE-361
Credit Value	4
Course Category	DC
Pre-requisite	Electromagnetic field theory, Basics of Electrical Machines & Power System Engg.
Contact Hours (L-T-P)	3-1-0
Type of Course	Theory
Course Objectives	To introduce the basic concepts of high voltage engineering including
	mechanism of electrical breakdown in gases, liquids and solids, high voltage ac/dc and impulse generation and measurement, measurement of partial discharges and loss tangent, high voltage testing and condition monitoring of power equipments.
Course	At the end of the course the students will be able to:
Outcomes	1. learn the fundamental concept of electric breakdown in liquids, gases, and solids.
	2. understand fundamental concepts of high voltage AC, DC, and impulse generation.
	3. learn the techniques employed in high voltage measurements.
	4. become familiar with non-destructive test techniques in high voltage engineering.
	5. become familiar with testing and condition monitoring of power equipments.
Syllabus	UNIT I: Breakdown Mechanisms in Dielectrics:
	Gases – Townsend's theory, Streamer theory, breakdown in electronegative gases, Paschen's Law. Liquids - pure & commercial liquids, Suspended Particle mechanism, Cavitation & Bubble mechanism, Stressed Liquid Volume mech. Solids: Intrinsic breakdown, Streamer breakdown, Electromechanical breakdown, Thermal breakdown, Electrochemical breakdown, Tracking & Treeing. UNIT II: Generation of High Voltages
	Alternating Voltages: Testing transformers, resonant transformers, generation of high frequency voltages; DC Voltages: simple rectifier circuits, cascaded circuits- Cockcroft-Walton circuit, Electrostatic generators- Van-de-Graff generator; Impulse Voltages: Single stage and multistage impulse generator circuits: Marx generator, Tripping and control of impulse generators.
	<ul> <li>UNIT III: Measurement of High Voltages</li> <li>High Voltage Measurement techniques; Peak Voltage Measurement by spark gaps- Sphere gaps, Uniform field electrode gaps, rod gaps; Generating voltmeters; Electrostatic voltmeters; Chubb-Fortescue Method; potential dividers; impulse voltage measurements.</li> <li>UNIT IV</li> </ul>
	Non Destructive Testing of Materials & Electrical Apparatus: Measurement of d.c. Resistivity, Measurement of Dielectric Constant and Loss Factor, Partial Discharges -definition, types of partial discharges and its occurrence; recurrence and magnitude of discharges - quantities related to the magnitude of discharges UNIT V: High Voltage Testing of Electrical Apparatus Testing of Insulators and Bushings, Testing of Isolators and Circuit Breakers, Testing of Cables, Testing of Transformers, Testing of Surge Diverters Condition Manitaria
Dooka*/Doferences	1 *E Kuffal WS Zoonal and L Kuffal
BOOKS*/References	<ol> <li>*E. Kuttel, , W.S. Zaengl, and J. Kuttel</li> <li>High Voltage Engineering Fundamentals, Elsevier India Pvt. Ltd, 2005</li> <li>*M.S. Naidu and V. Kamaraju</li> </ol>

		. High Voltage Engineering, Tata McGraw-Hill Pu	blishing Company Ltd.,	
		5. Mazen Abdel-Salam, Hussein Anis, Ahdab El-Morshedy and Roshdy Radwon		
	6	<ul> <li>High Voltage Engineering Theory and Practice- S</li> <li>and Expanded Marcel Dekker Inc. New York 2</li> </ul>	econd Edition- Revised	
Course		Assignments (2 to 3)	10 Marks	
Assessment/	G • 1	Quiz (3 to 4), Best two may be considered	05 Marks	
Evaluation/G	Sessional	Mid Term Examination (1 Hour)	25 Marks	
rading Policy		Sessional Total	40 Marks	
End Sem		r Examination (3 Hours)	60 Marks	
		Total	100 Marks	

Course Title		Seminar			
Course number		EE-380	EE-380		
Credit Value		2			
Course Category		DC			
Pre-requisite		Nil			
Contact Hours (L-T-	P)	0-2-0			
Type of Course		Theory			
<b>Course Objectives</b>	1. Eng	age graduate students in a discussion with sp	eakers and faculty on		
	curr	ent topics.			
	2. Hav	e graduate students gain experience in giving ora	al presentations on their		
	rese	arch of interest.			
	3. Dev	elop expression, communication skills and confid	ence.		
Course	At the e	end of the course the students will be able to:	of the course the students will be able to:		
Outcomes 1. Think		independently and creatively and also express their thoughts			
	fear	fearlessly.			
	2. Rea	2. Read and grasp the in depth meaning of technical and non-technical			
	liter	literature.			
	3. Con	3. Communicate effectively			
	4. Sho	4. Show the understanding of impact of engineering solutions on the society			
	and	nd will also be aware of contemporary issues.			
	5. Dev	evelop confidence for self education and ability to engage in lifelong			
	lear	ning.			
<b>Books/References</b>	1. Cur	rent topics from web based resources.			
	2. IEE	E transactions for recent research papers.			
Course		Two presentations one based on current topic			
Assessment/		(student choice) and another based on technical	30 marks each		
Evaluation/G	ssional	paper on their research of interest.			
rading Policy		Sessional Total	60 Marks		
En	d Semester	Examination	40 Marks		
		Total	100 Marks		

Course Title		Circuit and Measurement Lab				
Course number		EE-395				
Credit Value		1.5				
Course Category	у	DC				
Pre-requisite		EE-111 Basic Electrical & Electronics Engineering;				
		EE-276 Circuit Theory; EE-251N Electrical Measuremen	t			
Contact Hours (	L-T-P)	0-0-3				
Type of Course		Practical				
Course Objecti	ves Fo	r the enhancement of theoretical knowledge and to	give the practical			
	ex	posure of different electricalcircuits, transducers, ac bri	idges, instruments			
	an	d measurement procedures.	-			
Course	At	fter completing the course, the students should be able to l	know performance			
Outcomes	of	various electricalcircuits, transducers, ac bridg	ges, instruments,			
	m	easurement procedures using them and their practical	aspects including			
	ac	curacy and calibration of these instruments.				
Syllabus	Li	st of Experiments				
	1.	For a given circuit, verify experimentally: (a) Thevenin's Theorem and				
		(b) Superposition Theorem.				
	2.	To perform experiments for resonance of series RLC circuit and parallel				
		RLC circuit, and to plot resonance curves.				
	3.	For a given circuit: (a) Determine $z$ and $h$ parameters of two-port network				
		and (b) Study the frequency characteristics of a passive low pass filter.				
	4.	To determine the 'a', 'c' and 'G' constants of a D'Arsonval type				
		galvanometer.				
	5.	To determine the resistance of ferry alloy by Kelvin's double bridge				
		method.				
	6.	Γο determine inductance and resistance of a coil by Anderson bridge				
		method at different frequencies.				
	7.	Calibration for Wattmeter by D.C. potentiometer using Phantom method				
		of loading.				
	8.	Study of characteristics of thermal and optical transduc	ers: (a) To study			
		the resistance-temperature characteristics of the thermistor and (b) To				
		study the resistance-insolation characteristics of a light dependent resistor				
	1	(LDR).				
Books*/Referen	nces 1.	V. Dell'oro, Electrical Engineering Fundamentals, PE	II Learning, New			
		Delhi.				
	2.	A.K. Sawhney, A course of Electrical and Electronic	Measurement and			
0		Instrumentation, Dhanpat Rai & Co (Pvt.) Ltd., Delhi, 19	99.			
Lourse			ou Marks			
Assessment/E	Sessional	Viva-voce held every week on each lab report				
ding Policy		Sessional Total	60 Marks			
ung i oncy	End Semes	ter Examination (2 Hours)	40 Marks			
		Total	100 Marks			

Course Title		ELECTRICAL MACHINE LAB - II			
Course number		EE-396			
Credit Value		2			
Course Category		DC			
Pre-requisite		Nil			
Contact Hours (L	-T-P)	0-1-2			
Type of Course	1	Laboratory course			
Course	The objec	tive of this laboratory course is to make the stude	ent understand the		
Objectives	constructio	on, operation and control of various electrical machines	s by performing the		
~	experimen	ts.			
Course	At the end	of the course the students will be able to			
Outcomes	1. Understand the constructional details of various machines.				
	2. Have on-hand experience of running the machines.				
	3. Compare the obtained characteristics with the theoretical one.				
	4. Understand various method of speed control of motors.				
	5. Obtain the voltage regulation of alternators.				
	6. Convert three-phase system to single, two and six phase systems.				
Syllabus	List of experiments:				
	1. Speed of	control of dc shunt and compound motors.			
	2. Determ	ination of various characteristic of a dc series motor.			
	3. Speed of	control of a separately excited dc motor by Ward - Leon	nard method.		
	4. Speed of	control of 3-phase induction motor by rotor resistance n	nethod.		
	5. Synchro	onization of an alternator to infinite busbar.			
	6. Slip tes	t of an alternator and determination of voltage regulation	on.		
	7. Determ	ination of voltage regulation by Potier's triangle metho	d.		
	8. Phase c	onversion - From three phase to single, double and six	phase systems.		
Books/	1. Nagrath	1 & Kothari; Electrical Machines; Tata-McGraw Hill, N	New Delhi.		
References	2. B.S. Gi	ru & H.R. Hiziroglu; Electrical Machine and Transform	ners, Oxford		
	Univers	sity Press.			
Course		Laboratory Records	40 Marks		
Assessment/	Sessional	Viva-voce	20 Marks		
ading Policy		Sessional Total	60 Marks		
a and i oney	End Semeste	er Examination (3 Hours)	40 Marks		
		Total	100 Marks		

Course Title		Power Electronics Lab				
Course number			EE-397			
Credit Value			1.5	1.5		
Course Categor	у		DC			
Pre-requisite			Power Electronics			
Contact Hours (	L-T-P)		0-0-3			
Type of Course			Theory			
Course Objecti	ives	То	familiarize the different types of characteristics	of various types Power		
Elect			ctronic Devices and realize various power ele	ctronic converters and		
		tri	gering circuits for specific applications.			
Course		At	the end of the course the students will be able to:			
Outcomes		1.	Interpret different characteristics of an SCR.			
		2.	Implement the phase controlled switching using D	IAC and TRIAC.		
		3.	To realize different type of triggering circuits for p	particular application.		
4. To			To use UJT as a relaxation oscillator and for trigge	use UJT as a relaxation oscillator and for triggering circuits.		
5. To			To implement different types of converters for v	implement different types of converters for various applications like		
			speed control of DC motor.			
Syllabus List o			t of Experiments			
		1.	tatic Characteristics of SCR			
		2.	RIAC and AC phase control			
		3.	JT based relaxation oscillator and trigger circuit.			
		4.	, RC trigger circuits and speed control of Universal motor.			
		5.	controlled AC-DC Converter.			
		6.	onostable based trigger circuits.			
		7.	eed control of DC motor by a phase controlled converter.			
		8.	MOSFET based flyback DC-DC converter.	DSFET based flyback DC-DC converter.		
Books*/Refere	nces	1.	*G.K.Dubey, et al. Thyristorised Power Controller	rs: New Age		
			International, New Delhi.	<i>6</i> <sup>-</sup>		
		2.	*M.H. Rashid, Power Electronics; PHI Learning, I	New Delhi.		
3. V.			V.Subramanyam. Power Electronics. New Age Int	ernational. New Delhi.		
4. Jai			Jai P Agarwal, Power Electronics Systems, Addiso	on Weselv.		
Course			Experiment Reports	40 Marks		
Assessment/	Sessio	onal	Viva-Voce	20 Marks		
Evaluation/G			Sessional Total	60 Marks		
rading Policy	End S	emeste	Examination (3 Hours)	40 Marks		
Total 100 Marks						

<b>Course Title</b>			Power System and High Voltage Lab				
Course number			EE-398				
Credit Value			1.5				
Course Categor	у		DC	DC			
Pre-requisite			Electrical Power Systems	Electrical Power Systems			
Contact Hours (	(L-T-P)		0-0-3				
Type of Course			Theory				
Course Object	ives	То	introduce the working of various power system of	components and testing			
		and	l calibration of high voltage components.				
Course		At	the end of the course the students will be able to:				
Outcomes		1.	Equalize the voltage distribution across the disc	insulators.			
		2.	Simulate and calculate the transmission line	parameters for various			
			network configurations and study the effects of	various line loading and			
			line lengths on power system parameters.				
		3.	Determine the flash over voltages for different ty	pes of insulators.			
		4.	Calibrate a given voltmeter on low voltage side	of high voltage testing			
			transformers.				
		5.	To analyze Power Quality for different loading c	onditions.			
		6.	Study of steady-state stability limit of a transmission line.				
7. A			Analyze various distribution networks.				
Syllabus List o			st of Experiments	of Experiments			
1. 5			Study the construction of disc insulators and	Study the construction of disc insulators and determination of the			
			voltage distribution across an artificial string of disc insulators				
		2.	Study the construction of an artificial transmission line and determine				
			ABCD constants with and without series compensation.				
		3.	Determine ABCD, H, Z and image parameters of medium line for both				
			T and $\pi$ network/ Digital simulation of transmission line.				
		4.	Determine dry one minute withstand and dry fla	Determine dry one minute withstand and dry flash-over 50Hz voltages			
			for an 11 kV pin insulator.	C			
		5.	Calibration of a given voltmeter connected o	Calibration of a given voltmeter connected on low voltage side of			
			testing transformer in terms of high voltage sid	de, with help of sphere			
			gap.				
		6.	Power Quality Assessment				
		7.	Study of steady-state stability limit of a transmis	sion line.			
		8.	Study and analysis of (i) Radial distribution r	network (ii) Ring main			
			distribution network.	listribution network.			
Books*/Refere	nces	1.	*Nagrath and Kothari, Power System Analysis, 3	B <sup>rd</sup> edition (TMH).			
2 в		2	BR Gupta Power System Analysis and Design				
3 6			Grainger and Stevenson Power System Analysis	Six Oupla, I Ower System Analysis and Design.			
		J.	United and Stevenson, Tower System Analysis				
~		4.	Hadi Saadat, Power System Analysis, (TMH).	40.24			
Course			Experiment Reports	40 Marks			
Assessment/	Sessior	nal	Viva-Voce	20 Marks			
Evaluation/G			Sessional Total	60 Marks			
rading Policy	End Ser	mester	Examination (3 Hours)	40 Marks			
			Total	100 Marks			

Course Title		ELECTRIC DRIVES				
Course Number		EE 413N				
Credit Value		4				
Course Category		DC				
Pre-requisite		EE211N, EE213, EE321N, EE322N, <del>EE341N</del>				
Contact Hours (L-	T-P)	3-1-0				
Type of Course	,	Theory				
Course	To introduce	the basic concepts of dc electric drives and ac electric drives				
Objectives	and their	closed-loop operation including microprocessor based				
Ŭ	arrangements	, , , , , , , , , , , , , , , , , , ,				
Course	At the end of	the course the students will be able to				
Outcomes	1. Apply the	knowledge of drives and use them effectively.				
	2. Suggest th	ne particular type of AC/DC drive system for an application.				
Syllabus	UNIT I: Typ	bes of Drives and Loads				
	Introduction	and classification of electric drives, comparision with other				
	types of driv	ves. Characteristics of different types of mechanical loads,				
	stability of r	notor-load systems. Fluctuating loads and load equalization.				
	Thermal load	ding of motors, estimation of motor rating for continuous,				
	intermittent a	and short-time duty loads.				
	UNIT II: DO	C Drives I				
	Characteristi	cs of dc motors and PM dc motor. Conventional methods of				
	speed control	l: rheostatic, field and armature control. Electric braking of dc				
	drives: Rege	enerative braking, plugging and Dynamic braking. Phase				
	control of	fully controlled dc drives, continuous and discontinuous				
	conduction n	nodes of operation.				
	UNIT III: D	C Drives II				
	Chopper con	trolled drives. Comparison of phase and chopper controlled				
	drives. Revie	w of feedback control, Closed loop configurations in electric				
	drives: curre	nt limit control, torque control, speed control of multi-motor				
	drives and p	position control. Closed loop control of phase and chopper				
	controlled dc	arives. Microprocessor controlled electric drives.				
	UNITIV: A	.C. Drives I				
	induction m	ator drives. Deconcertive Diverging on and de dynamic				
	hraking Ma	thede of speed control of induction motors, stater voltage				
	control vari	able frequency control pole changing and pole amplitude				
	modulation	able frequency control, pole changing and pole amplitude				
	INIT V· A	<sup>C</sup> Drives II				
	Speed control	ol of wound rotor induction motor: rotor resistance control				
	(conventiona	and static) slip power recovery schemes Closed loop				
	control of in	nduction motor drives: VSI control, static rotor resistance				
	control. stati	c Scherbius and Kramer drives, current regulated VSI drives.				
	Introduction	to vector control.				
Books*/	1. G. K. D.	ubey*, "Fundamentals of Electric Drives", second edition.				
References	Narosa Pu	ıb. House, New Delhi.				
	2. G. K. Duł	bey, "Power Semiconductor Controlled Drives", Prentice Hall.				
	3. R. Krishn	an, "Electric Motor Drives: Modeling, Analysis and Control",				
	Prentice H	Iall of India.				
	4. Joseph V	ithayathil, "Power Electronics, Principles and Applications",				
	McGraw-	Hill, Inc.				

	5. P. C. Ser	5. P. C. Sen, "Thyristorised Power Controller", John Wiley & Sons.					
Course Assessment/ Evaluation/ Grading Policy		Assignments (2 to 3)	10 Marks				
	Sectional	Quiz (3 to 4), Best two may be considered	05 Marks				
	Sessional	Mid Term Examination (1 Hour)	25 Marks				
		Sessional Total	40 Marks				
2 01103	End Semester Examination (3 Hours)60 Marks						
		Total	100 Marks				

Course Title		Power Semiconductor Controllers			
Course number		EE-422			
Credit Value		4			
Course Category		DE			
Pre-requisite		Nil			
Contact Hours (L-T-P)		3-1-0			
Type of Course		Theory			
Course Objectives	To give	the practical exposure and the real world applications of different			
	power e	lectronic controllers.			
Course	After co	mpleting the course, the students should be able to know the practical			
Outcomes	aspect o	f different types of power electronic converters, their relative merits			
	and der	nerits, the current state-of-the-art technological development and			
	applicat	ion of these converters.			
Syllobus		Dowor Supplies			
Synabus	Introduc	tion ac nower supplies: nower quality power supply protection			
	nower	conditioners uninterruptible power supplies: do power supplies:			
	compari	son of linear and switched-mode power supplies, de to de converters			
	with ele	ctrical isolation: forward push-pull and bridge converter SMPS			
	UNIT-I	I: Resonant Converters			
	Switche	d-mode inductive current switching, significance of ZVS and ZCS.			
	classific	ation of resonant converters, series and parallel load resonant			
	converte	ers, class-E converters, ZCS/ZVS resonant switch converters and their			
	switch	configurations, resonant dc link converters and their circuit			
	configu	rations.			
	UNIŤ-I	II: Analysis and simulation of Power Electronic Circuits			
	Analysis	s of simple power electronic circuits with RL, RC and RLC type loads			
	and dc /	<sup>1</sup> sinusoidal sources; performance of transformers for high frequency			
	applicat	ons, computer simulation of power electronic devices and systems.			
	UNIT-I	V: Recent Power Semiconductor Devices			
	Recent a	advances in power devices and their relative merits, power modules,			
	protectio	on of devices and converters, heat management.			
	UNIT-V	: Applications of Different Controllers			
	Three-pl	hase ac regulators, multiple converters, application of different			
	converte	ers in solar and wind energy systems as well as in dispersed			
	generati	on, current trends in power electronics.			
Books*/References	1. M.	H. Rashid (Editor), Power Electronics Handbook, Academic Press,			
	Ca	lifornia.			
	2. N.	Mohan, T.M. Undeland and W.P. Robins, Power Electronics, John			
	Wi	ley, Singapore, 3 <sup>ra</sup> ed.			
	3. M.	H. Rashid, Power Electronics, PHI Learning, 3 <sup>rd</sup> ed, New Delhi.			
	4. G.I	K. Dubey et al, ThyristorisedPower Controllers, New Age			
	Int	ernational, New Delhi.			
	5. P.T	T. Krein, Elements of Power Electronics, Oxford University Press.			
	6. M.	S. Jamil Asghar, Power Electronics, PHI Learning, New Delhi.			
	<u>Referei</u>	nce Materials			
	1. B. Pu	K. Bose, Modern Power Electronics (collection of papers), Jaico blications, New Delhi.			
	2. Eff Inc	Fects of Harmonic Disturbances on Electrical Equipment, Electrical lia, July 2005, pp. 48-54.			
	3. Po	wer Quality Issues and Impacts, Proceedings of PICON-2011. 2011.			
	pp.	85-93.			
	4. <u>htt</u>	p://www.semiconductors.co.uk(D W Palmer)			
	5. Po	wer Electronics Europe, Issue#7, 2008, International Rectifiers			
	(ht	tp://www.irf.com)			

		6.	http://schemit-walter.fbe.fh-darmstadt.de/cgi-bin/smps-e.pl?ue-min=48		
		7.	http://www.IEEEXplore.org /Xplore/home.jsp		
8.			http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=5456233		
9. http://www.vispra.com/solar_hybrid_ups.phd					
Course Assessment/E valuation/Gra			Assignments (2 to 3)	10 Marks	
		sional	Quiz (3 to 4), Best two may be considered	05 Marks	
		Mid Term Examination (1 Hour)		25 Marks	
ding Policy			Sessional Total	40 Marks	
	<b>End Semester Examination (3 Hours)</b>			60 Marks	
	Total 100 Marks				

## **COURSE DESCRIPTION FORM**

Course Title		Power System Deregulation						
Course number		EE-431						
Credit Value		4						
Course Categor	У	DE						
Pre-requisite		Nil						
Contact Hours (	L-T-P)	3-1-0						
Type of Course		Theory						
Course	The objective	s of the course are to make the student understand the concept of						
Objectives	reliability, er	ergy policy, demand side management, power exchange, trading						
	arrangements	and different pricing structure.						
Course	At the end of	he course the students will be able to						
Outcomes	<ul><li>a) Use various models for electrical supply such as central pool model, independent</li></ul>							
	model etc.							
	<ul><li>b) Use benefits of deregulation for efficient energy management.</li></ul>							
	c) Convers	e with the concept of power exchanges for trading arrangement.						
	d) Convers	e with different pricing methods for various conditions						
Syllabus		e whit different prening methods for various conditions.						
Synabus	Unit I:							
	General: Ele	ctricity demand operation and reliability, energy policy and cost,						
	competitive	market for generation, role of the existing power industry,						
	renewable g	eneration technologies, distributed generation, traditional central						
	utility model, independent system operator (ISO), retail electric providers.							
	Unit II:							
	Electricity	Market and Management: Wholesale electricity markets.						
	characteristics	bidding market clearing and pricing. ISO models, market power						
	evaluation, de	characteristics, bidding market clearing and pricing, ISO models, market power evaluation, demand side management, distribution planning.						
	<b>.</b> , <b></b>	r a G						
	Unit III: Dowon Doole	Data of the transmission provider multilatoral transaction model power						
	Power Pool:	Kole of the transmission provider, multilateral transaction model, power						
	exchange and	ISO- functions and responsibilities, classification of ISO types, trading						
	arrangements,	power pool, pool and bilateral contracts, multilateral traders.						
	Unit IV:							
	Electricity P	<b>icing-I:</b> Transmission pricing in open access system, rolled in pricing						
	methods, mar	ginal pricing methods, zonal pricing, embedded cost recovery, open						
	transmission	system operation and congestion management in open access						
	transmission s	ystems in normal operation.						
	Unit V•							
	Flectricity F	<b>Pricing-II</b> . Predicting electricity costs electricity cost derivation						
	electricity pric	ing of inter provincial power market transmission policy						
	cleenerry price	ing of inter provincial power market, transmission poney.						
Books/	1. L.L. Loi*:	Power System Restructuring and Deregulation-Trading, Performance						
References	and Inform	nation Technology, John Wiley & Sons.						
	2. C.S. Frd, 0	C.C Michael, D.T Richard and E.B. Roger: Spot Pricing of Electricity,						
	Kluwer A	cademic Publishers						
	3. I. Marija.	G. Francisco and F. Lester: Power System Restructuring: Engineering						
	and Econd	mics, Kluwer Academic Publishers						

Course	Sessional	Assignments (2 to 3)	10 Marks
Assessment/		Quiz (3 to 4), Best two may be considered	05 Marks
Evaluation/G		Mid Term Examination (I Hour)	25 Marks
rading Policy		Sessional Total	40 Marks
99	End Semest	er Examination (3 Hours)	60 Marks
		Total	100 Marks

PEOs								
I.	II.	III.	IV.	<b>V.</b>	VI.	VII.	VIII.	
X	X		X		X			

POs										
(a)	(b)	(c)	( <b>d</b> )	(e)	( <b>f</b> )	(g)	(h)	(i)	(j)	( <b>k</b> )
X	X	X	X	X			X		X	X

COs											
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
X	X			X					X	X	X

## **COURSE DESCRIPTION FORM**

Course Title Digital Simulation of Power Systems	Digital Simulation of Power Systems				
Course number <b>EE-432</b>					
Credit Value 4					
Course Category DE					
Pre-requisite Nil					
Contact Hours (L-T-P) <b>3-1-0</b>					
Type of Course Theory					
<b>Course</b> The objectives of the course are to make the student understand the operation	n and control				
<b>Objectives</b> of a modern power system, to introduce various problems encountered operation of the system and their mitigation. Students will learn how to ana	d in proper alyze a large				
interconnected power system through digital simulation.					
Correse At the end of the course the students will be able to					
<b>Course</b> At the end of the course the students will be able to					
b) Analyze the system for different short circuit conditions					
c) Address the problem of frequency and voltage control under y	varving load				
conditions of the system.	arying load				
d) Optimize the generation scheduling in a hydro-thermal mix including system losses and maintaining the desired operating conditions.	the effect of				
e) Analyze large data, in an interconnected power system, obtained through	ugh SCADA				
and utilize them for state estimation, contingency analysis and security	assessment.				
Syllabus Unit I:					
<b>Network Matrices:</b> Graph-theoretic approach for the formation of	of network				
matrices – $Y_{BUS}$ , $Y_{BR}$ and $Z_{LOOP}$ ; $Z_{BUS}$ building algorithms, Simulation examp	ole.				
Unit II.					
Short Circuit Studies: Representation of 3-phase networks. Short circuit st	tudies using				
3-phase $Z_{\text{BUS}}$ matrix. Fault impedance and admittance matrices for variou	us types of				
faults. Simulation example.					
Unit III:					
<b>Power System Control:</b> Automatic generation control (AGC). Volta	age control				
methods. Reactive power compensation, static VAR systems, FACTS devices	s.				
Unit IV:					
<b>Optimal System Operation:</b> Unit commitment. Optimal power flow solution	n Operation: Unit commitment. Optimal power flow solution, Hydro-				
Thermal load scheduling; short range and long range. Determination of Los	cheduling; short range and long range. Determination of Loss-Formula.				
Simulation example.					
Unit V:					
<b>Computer Control and Automation:</b> Database for control: SCADA, State	estimation.				
Contingency analysis and power system security assessment. Modern ener	ergy control				
centres.					
Books/ 1. Hadi Sadat*: Power System Analysis; (McGraw Hill)					
<b>References</b> 2. Nagrath and Kothari: Power System Analysis; 4 <sup>th</sup> edition (TMH)					
3. Grainger and Stevenson: Power System Analysis; (McGraw Hill)					
4. El-Abiad and Stagg: Computer Methods in Power System Analysis; (McC	GrawHill)				
5. Wood and Wollenberg: Power Generation Operation and Control; Wiley,	, NY				
	1				
Course   Assignments (2 to 3)   10 Ma	arks				
Course Assessment/Assignments (2 to 3)10 MaQuiz (3 to 4), Best two may be considered05 Ma	arks				
Course Assessment/ Evaluation/Assignments (2 to 3)10 MaQuiz (3 to 4), Best two may be considered05 MaMid Term Examination (I Hour)25 Ma	arks arks arks				
Course Assessment/ Evaluation/ GradingAssignments (2 to 3)10 MaSessionalQuiz (3 to 4), Best two may be considered05 MaMid Term Examination (I Hour)25 MaSessional Total40 Ma	arks arks arks arks				

Course Title Power Station Practice	Power Station Practice					
Course number <b>EE-435</b>	EE-435					
Credit Value 4						
Course Category DE						
Pre-requisite Power System Analysis						
Contact Hours (L-T-P) 3-1-0						
Type of Course Theory						
<b>Course Objectives</b> The course has been designed to fulfill the requirement of power i	ndustry.					
The course aims to provide basic fundamentals of economics involv	ourse aims to provide basic fundamentals of economics involved with					
power generation and Various techniques used optimization of gen	generation and Various techniques used optimization of generation					
cost.						
Course At the end of the course the students will be able to						
Outcomes 1. Understand the economics of power generation.						
2.						
3. Apply design of various new technologies to optimize the eco	nomical					
relations.						
4. Formulate and solve coordination problem of power system plants						
Syllabus UNIT-1: Economics of Generation						
Types of loads, demand factor, group diversity factor and peak d	liversity					
factor, load curve, load duration curve, load factor, capacity fac	tor and					
utilization factor, base load and peak load stations, operating and s	ation factor, base load and peak load stations, operating and spinning					
reserves, load forecasting, capital cost of power plants, depreciation	res, load forecasting, capital cost of power plants, depreciation, annual					
fixed and operating charges.	and operating charges.					
UNIT- 2: Tariff and Power Factor Improvement	- 2: Tariff and Power Factor Improvement					
General tariff form and different types of tariffs, Tariff option fo	ral tariff form and different types of tariffs, Tariff option for DSM.					
Causes and effect of low power factor, necessity of improvement and	es and effect of low power factor, necessity of improvement and use of					
power factor improvement devices.	r factor improvement devices.					
UNIT-3: Coordinated Operation of Power Plants	-3: Coordinated Operation of Power Plants					
Advantages of Coordinated operation of different types of power	ntages of Coordinated operation of different types of power plants,					
hydrothermal scheduling: short term and long term. Coordination of	hydrothermal scheduling: short term and long term. Coordination of various					
types of power plant.	types of power plant.					
UNIT-4: Electrical Equipments in Power Plants	. 1					
Governors for hydro and thermal generators, excitation systems; exci	vernors for hydro and thermal generators, excitation systems; exciters and					
automatic voltage regulators (AVR), bus bar arrangements.	natic voltage regulators (AVR), bus bar arrangements.					
UNIT-5: EHV Substation	used in					
ELIV substations, tasting and maintenance of ELIV substations, aqui	it of EHV substation, brief description of various equipments used in					
Gas insulated substations (GIS)	substations, testing and maintenance of ETTV substations equipments.					
Books*/References 1 * B D Gunta Concration of Electrical Energy (Eurosia Du	bliching					
House)	onsning					
2 MV Deshpande Elements of Electrical Power Station Design (	nouse). M.V. Dashnanda, Elements of Electrical Darway Station Design (Wheeler					
2. W. V. Desipande, Elements of Electrical Tower Station Design, (	M. v. Desnpande, Elements of Electrical Power Station Design, (Wheeler Dyblicking House)					
3 S. Rao, Electrical Substation Engineering and Practice (Khanna)						
1 S. N. Singh Electric Power Generation Transmission and Dist	5. S. Kao, Electrical Substation-Engineering and Practice, (Knanna).					
(PHI)	illuuloli					
Course Assignments (2) 15 Marks						
Assessment/ Sessional Mid Term Examination (I Hour) 25 Marks						
Evaluation/G						
rading Policy End Semester Examination (3 Hours) 60 Marks						
B - C - Line Semester Linemannanton (S Hours) - 00 Warks						

Course Title		Control Systems			
Course number		EE-442N			
Credit Value		4			
Course Category		DC			
Pre-requisite		Signals and Systems (EE-282N), Dynamic System Analysis (EE-			
_		341N)			
Contact Hours (L	-T-P)	3-1-0			
Type of Course		Theory			
Course Objective	es To int	roduce the state variable representation of continuous and discrete			
~	data co model digital placen	ontrol systems, stability analysis and time response analysis using state the concepts of controllability and observability, basic concepts of control systems, their stability analysis, use of state feedback for pole nent design, basic concepts and stability analysis of non linear systems.			
Course	At the	end of the course the students will be able to			
Outcomes	1. Dev	velop state models for different class of systems			
	2. Det	termine the system response using state model and test stability,			
	con	trollability and observability			
	3. Devin t	velop pulse transfer function for discrete data systems and test stability both z-domain and s-domain			
	4. Det	ermine suitable state feedback required for pole placement			
	5. Des	sign a suitable observer for a given system			
	6. An	alvze non linear systems using describing function and phase plane			
	tecl	nniques			
	7. An	alvze system stability using Lyapunov's function			
Syllabus	UNIT	I: State Variable Techniques			
	Systen	n representation in State variable form; Controllability and			
	Observ	vability; Characteristic equation and state variable			
	represe	entation of transfer function; Phase variables, Physical variables and			
	differe	nt Canonical form of representation, State diagram, System analysis			
	using s	state variables (with and without input).			
	UNIT	' II: Discrete Data System-I			
	Introdu	action, Sampling theorem, Spectrum analysis of sampling process, Si			
	gnal re	econstruction, Pulse transformation, z- transform analysis of sampled			
	data sy	vstem, Block diagram reduction.			
		III: Discrete Data System-II			
	State	variable representation of digital control system, State transition			
	contro	llers Stability of digital control system			
		IV. State Feedback Technique (continuous and discrete data)			
	system	s)			
	Contin	uous system pole placement technique. Gain matrix by Ackerman's			
	formul	a, Design example. Discrete data system Pole placement design by			
	state	feedback of digital systems. Pole placement by incomplete state			
	feedba	ck or output feedback Design of digital control systems with state			
	feedba	ck.			
	UNIT	V: Non Linear Systems- their Analysis and Stability			
	Non-li	near systems, Non-linear state equation, Phase plane and describing			
	functio	on techniques of analysis, Lyapunov's stability criteria, Methods of action of Lyapunov's function.			
Books*/Reference	ces 1. * N	agrath and Gopal Control System Engineering. TMH			
	2. K.	Ogata, Modern Control Engineering. PHI			
	3 R (	C. Kuo, Digital Control System Oxford University Press			
	4 M	Gonal State variable analysis of digital control systems TMH			
	5 M	Rihan Advanced Control Systems Axioe			
Course	Sessional As	signments-Skill Assessment Exercise 07 Marks			

Assessment/		Review Exercise (4)	08 Marks
Evaluation/G		Mid Term Examination (I Hour)	25 Marks
rading Policy		Sessional Total	40 Marks
	End Semester	r Examination (3 Hours)	60 Marks
		Total	100 Marks

Course Title			Process Instrumentation and Control	Process Instrumentation and Control			
Course number			EE-453	EE-453			
Credit Value			4				
Course Category	y		DE				
Pre-requisite			Nil				
Contact Hours (	L-T-P	)	3-1-0				
Type of Course			Theory				
Course Objectives Aim of			of this course is to provide the students the fun	damentals of industrial			
		proc	ess and the devices used for instrumentation.				
Course		At the	he end of the course the students will be able to	nd of the course the students will be able to			
Outcomes		1. I	dentify the various steps involved in an industrial p	rocess.			
		2. 8	elect and apply a particular actuator and contra	roller for an industrial			
		p	rocess.				
		3. U	Jse various measurement equipments for an effective	ve control of a process.			
Syllabus		UNI	TI: Basics of Process Control:				
		Fune	damentals of process control, Elements of process	s control loop, process			
		char	acteristics: process lead, process lag, control lag,	distance-velocity lag,			
		tran	sfer lag, Self Regulation. cascade control, feed fo	rward control.: Modes			
		of c	ontrol action: two position, floating, proportional	, proportional-integral,			
		prop	ortional integral and derivative.	ional integral and derivative.			
		UNI	T II: Actuators and Controllers	II: Actuators and Controllers			
		Elec	c, Pneumatic and Hydraulic actuators, control valve, Electrical,				
		Elec	nic, Pneumatic and Hydraulic controllers.				
		UNI	III: Measurement of Process Variables				
		Mea	rement of flow: magnetic, ultrasonic methods. Measurement of				
		pres	e, liquid level, humidity, viscosity and moisture in granular				
			ues.				
			I IV: Control and Display Techniques	ontrollor norformonoo			
		1 un	rig of controller. Quarter Amplitude Criterion, C	Pagation ourse (onen			
			(i) Ziagler Nichols (closed loop) Frequency resp	nea method Displays			
		nara	meters Scanning data logging Computer super	visory control Direct			
		digit	al control	visory control, Direct			
			T V. Programmable Logic Controllers				
		Intro	ction to PLC. Architecture, types of Input and output modules. Fixed				
		and	dular PLC. Specifications. Ladder logic diagram using standard				
		svm	bols. PLC programming for process applicat	s. PLC programming for process applications. Introduction to			
		distr	ibuted control system (DCS).	,			
Books*/Referen	ices	1. *	C.D. Johnson, Process Control Instrumentation Te	chnology (PHI).			
		2. [	D. Patranabis, Principles of Industrial Instrumer	ntation (Tata McGraw			
			Hill).	(			
3. Kris			Krishna Kant, Computer Based Industrial Control (I	PHI).			
Course			Assignments (2 to 3)	10 Marks			
Assessment/	<b>C</b>	sional	Quiz (3 to 4), Best two may be considered	05 Marks			
<b>Evaluation/G</b>	Ses	sional	Mid Term Examination (I Hour)	25 Marks			
rading Policy			Sessional Total	40 Marks			
	End	Semeste	r Examination (3 Hours)	60 Marks			
			Total	100 Marks			

Course Title			High Voltage Testing Techniques					
Course number			EE-463					
Credit Value			4					
Course Categor	у		DE					
Pre-requisite			Electromagnetic field theory, Basics of Ele	ctrical Machines &				
			Power System Engg., High Voltage Engg.					
Contact Hours (L-T-P)			3-1-0					
Type of Course			Theory					
Course Objecti	ives	To	introduce objectives of high voltage testing/pro-	ocedures and standards,				
		sta	tical evaluation of measured results, high voltage testing techniques for					
electri			cal equipment, non-destructive insulation test techniques and finally					
		de	ign, planning and layout of High Voltage laborato	ry.				
Course		At	the end of the course the students will be able to:					
Outcomes		1.	Learn the fundamental concept of high voltage	testing/procedures and				
		-	standards.					
		2.	Understand how to evaluate/interpret statisticall	y the measured results.				
			Learn the techniques employed in high voltage	ge testing of electrical				
		2	equipments such as cable, transformers etc.					
		3.	Become familiar with non-destructive test tech	niques in high voltage				
			engineering.	<b>—</b> • • • • • •				
		4.	Learn how to design modern High Voltage la	ooratory; Test facilities				
		T	provided in H.V laboratory.					
Syllabus			UNIT I: Introduction					
		U	Objectives of high voltage testing, classification of testing methods- self					
		and standards						
		UNIT II. Statistical Evaluation of Measured Results						
		Determination of probability values. Distribution function of a measured						
			quantity, confidence limits of the mean values of disruptive discharges -					
		·U	Up and Down' method for determining the 50% disruptive discharge					
		vo	voltage.					
		U	UNIT III: Testing Techniques for Electrical Equipment					
		Τe	Testing of insulators, bushings, isolators, circuit breakers, transformers,					
		su	surge diverters and cables- testing methodology and interpretation of test					
		re	results.					
		UI	UNIT IV: Non-Destructive Insulation Test Techniques					
		Lo	Loss in dielectrics; Measurement of conduction current at Direct Voltages;					
		M	Measurement of Dissipation Factor at Alternating Voltages; Partial					
		Di	Discharge measurement: basic partial discharge (PD) circuit, PD quantities,					
		PD instruments and measurements.						
			UNIT V: Design of High Voltage Lab					
		Di	Dimensions of High Voltage Laboratory equipment - fencing, earthing and					
		SII Hi	nielding; circuits for high voltage experiments; Construction Elements for					
Pooks*/Deferences 1 *		1	*C D. Johnson, Process Control Instrumentation 7	Cachnology (DUI)				
DOOKS 7 References		1.	1. "C.D. Jonnson, Process Control Instrumentation Technology (PHI).					
		۷.	Hill)	ination (Tata McOlaw				
		3	Krishna Kant, Computer Rased Industrial Control	(PHI)				
Course		5.	Assignments (2 to 3)	10 Marks				
Assessment/			Ouiz (3 to 4). Best two may be considered	05 Marks				
Evaluation/G	Sessi	onal	Mid Term Examination (I Hour)	25 Marks				
rading Policy			Sessional Total	40 Marks				
	End S	emeste	Examination (3 Hours)	60 Marks				
			Total	100 Marks				

Course Title		Microprocessor Systems and Applications					
Course number		EE-473					
Credit Value		4					
Course Category		DC					
Pre-requisite		Nil					
Contact Hours (L-T-P)		3-1-0					
Type of Course		Theory					
<b>Course Objectives</b>	То	know the one microprocessor family thoroughly a	nd to prepare strong base,				
	i.e.	architecture, addressing modes, instruction form	nat, data transfer devices,				
	dif	ferent interrupts, types of controllers, type	s of instructions, and				
	pro	ogramming.					
Course	A	t the end of the course the students will be able to					
Outcomes	1.	Know about the basics of microprocessor					
	2.	different instructions and programming of microp	rocessor				
	3.	Different methods of data transfer between micro	oprocessor and peripheral				
		devices.					
	4.	Different types of controllers and peripheral device	ces used to transfer data				
Syllabus	U	NIT I: Introduction to microprocessors					
	G	General architecture and brief description of elements, instruction execution,					
	in	instruction format, and instruction set, addressing modes, programming					
	sy	system, higher lever languages.					
	U	T II: Input Output Techniques and data transfer					
	D	ta transfers, interrupts, 8259 programmable interrupt controller, memory					
	in	interfacing, DMA					
	U	UNIT III: Programmable peripheral Interface					
	In	Interfacing and programming of programmable peripheral chips, 8254, 8255,					
	82	8259, ADC / DAC interfacing.					
	T	UNIT IV: 8086 Microprocessor					
	80	8086 architecture instruction set addressingmodes constructing machine					
	c	odes Assembly language programming					
	T	NIT V. Descenting applications of 9094					
		sampler directives provide instructions 8086 i	ntorrupts system design				
		sing 8086	interrupts, system design				
Books*/References	1	P S Gaonkar Microprocessor Architecture	programming and				
Books / References 1.		Application with 8085	, programming and				
2		*Douglas V Hall Microprocessor and Interfacing	(TMH)				
Course	2.	Assignments (2 to 3)	10 Marks				
Assessment/		Ouiz (2 to 3) Best two may be considered	05 Marks				
Evaluation/G Session	nal	Mid Term Examination (I Hour)	25 Marks				
rading Policy		Sectional Total	40 Marks				
Find Son	nester	Examination (3 Hours)	60 Marks				
	nestel	Total	100 Montra				

Course Title		Microprocessor Lab					
Course number		EE-492					
Credit Value		1.5					
Course Category	У	DC					
Pre-requisite		Microprocessor Systems and Applications					
Contact Hours (	L-T-P)	0-0-3					
Type of Course		Lab					
Course	How to ope	rate microprocessor, to write programme, to know	w different instructions, convert				
Objectives	them into n	achine language.					
Course	At the end	of the course the students will be able to					
Outcomes	1. Know	about the basics of programming of micropro	cessor systems and use them				
	effecti	vely in the industry					
	2. Add, s	ubtract, multiply and division of signed and uns	igned number and store at the				
	approp	riate memory locations					
	3. Arrang	e the given numbers in ascending or descending o	rder and different mathematical				
	operati	ons, move a block of data from one memory locati	on to another location.				
	4. Apply	the knowledge of programming of microprocesso	r in protection scheme and also				
	1n driv	es systems					
Syllabus	List of Ex	periments					
	1. (a) Stu	dy of operation manual of the single board M	according to the second				
	various	erations through keyboard.					
	(D) 10 2001H	1 two 8-bit unsigned numbers available at memory locations 2000H and					
	200111	subtract two 16 bit unsigned numbers stored at	pectively. Store the result at memory location 200211				
	2. (a) 10 2402H	Store the result at memory location 2404H	memory locations 240011 and				
	(b) To	add two 8 bit BCD numbers stored at memory	v locations 2401H and 2402H				
	respect	ively. Store the result at memory location 2403H.	focutions 2 form and 2 form				
	3. (a) To	subtract two 16 bit BCD numbers stored at memory	ory location 5000H and 5002H				
	respect	ively. Store the result at memory location 5004H o	inwards.				
	(b) To	move a block of data from memory location 30	000H to 3010H to the location				
	3005H	to 3015H.	3015Н.				
	4. To de	ermine the largest of the given numbers store	nine the largest of the given numbers stored at memory location 5000H				
	onward	tore the result at 6000H.					
	5. (a) To	tiply two 8 bit unsigned numbers stored at 2000H and 2001H respectively by					
	succes	addition method. Store the result at 2002H onwards.					
	(b) To	tiply two 8 bit unsigned binary number stored at memory location 3000H and					
	3001H	respectively by rotate and shift method. Store the i	pectively by rotate and shift method. Store the result at 3002H onwards.				
	6. To per	form division on 8 bit unsigned number stored a	n division on 8 bit unsigned number stored at memory location 2000H and				
	2001H	by successive subtraction method. Store the quoti	ent at memory location 2002H				
		lander 2003H.	ider 2003H.				
	7. 10 per	by Poteta and Shift method. Store the quotient a	t memory location 3000H and				
	remain	der 3003H	a memory location 500211 and				
	8 To obt	ain the expression $y = 1 \pm x \pm x^2 \pm x^3 \pm \dots$ wh	here $r$ is stored at the memory				
	locatio	F404H Use subroutine for the multiplication $f$	Store the result at the memory				
	locatio	1 E404H	store the result at the memory				
	9. To con	pute factorial of a number less than 6.					
	10. To arra	nge the given number in ascending/ descending of	rder stored at memory location				
	E500H	stored at memory rocation					
Course		Viva	20 Marks				
Assessment/	Sessional	Evaluation of report	40 Marks				
Evaluation/G	End Semester	Examination (3 Hours)	40 Marks				
rading Policy		Total	100 Marks				
L	1	I otul					

Course Title			Power System Protection Lab					
Course number			EE-493					
Credit Value			1.5					
Course Categor	у		DC					
Pre-requisite			Power System and Power System Protectio	n				
Contact Hours (	L-T-P)		0-0-3					
Type of Course			Theory					
Course Objecti	ives	To	ntroduce various power system protection schem	es for the protection of				
		pow	ver system equipments.					
Course		At t	he end of the course the students will be able to:					
Outcomes		1.1	mplement various power system protection sc	chemes for alternators,				
		t	ransformers etc.					
		2. U	Jse Buchholz relay for the protection of transform	ier.				
		3. 1	Jse different type of relays and MCBs as per requ	irement.				
		4. 7	Test different type of relays and circuit breakers.					
Syllabus		LIS	T OF EXPERIMENTS					
		1.	Characteristics of two input amplitude comparate	or.				
		2. Study the performance of solid state time delay relay						
		3	Study of differential protection scheme for three-phase alternator.					
		2. 4	tudy of constructional and operation of directional earth fault relay					
		5	Riased differential protection transformer					
		5.	o study the operation of Buchholz relay					
		0. 7	To study the operation of Buchholz felay.	est an overcurrent directional relay (inverse) using ME2000 universal				
		7.	system.					
		8.	Characteristics of Type B and Type C Miniature Circuit Breakers					
			(MCB).					
Books*/Referen	nces	1.	* Ravindranath and Chander, P.S. Protection & S	Switchgear, Wiley				
			Eastern.					
		2. C.R. Mason, Art and Science of Protection Relaying, Wiley Eastern						
			3. B. Ram and Vishwakarma, Power System Protection & Switchgear					
			TMH.					
4.		4.	T.S.M. Rao, Power System Protection:	Static Relay with				
N			Microprocessor Applications, 2 <sup>nd</sup> Edition.	·····				
5. P			Pataithankar and Bhide. Fundamentals of Pow	ver System Protection.				
			PHI.	<b>,</b>				
Course			Experiment Reports	40 Marks				
Assessment/	Sessio	nal	Viva-Voce	20 Marks				
Evaluation/G		F	Sessional Total	60 Marks				
rading Policy	End Se	emester	Examination (3 Hours)	40 Marks				
			Total	100 Marks				

Course Title				Control Lab				
Course number				EE-495				
Credit Value				1.5				
Course Categor	у			DC				
Pre-requisite				Dynamic System Analysis				
Contact Hours (L-T-P)				0-0-3				
Type of Course				Theory				
Course Objecti	ives	То	o int	roduce the basics of control systems, control	rol schemes, time and			
freque			equei	ncy response of first order and second order	system, sketch of Bode			
		plo	ot, R	oot locus, Nyquist plot using Matlab.				
Course		At	t the	end of the course the students will be able to:				
Outcomes		1.	App	bly the basic knowledge about Synchros, Se	ervomotor and Stepper			
			mot	or in industry for controlling the practical syste	ems.			
		2.	Util	ize the state space analysis of different physica	al realizable system and			
			sug	gest the stability criterion.				
		3.	Ske	tch Bode plot, Nyquist plot, Root locus with	the help of Matlab and			
			sug	gest the relative stability.				
		4.	App	bly the knowledge of different mechanism in	solar PV system in real			
			wor	ld scenario.				
Syllabus		LI	IST (	OF EXPERIMENTS				
		1.	. To	'o determine the characteristics of a Synchro.				
			2. To determine the frequency response of a second order system.					
	3.		. To	To determine the characteristics of AC servomotor.				
		4.	. То	To determine the steps per revolution and step angle of a stepper motor.				
		5.	. То	To determine the time response of linear time invariant systems.				
		6.	. To	Γο study the effect of digital controller parameters on a given simulated				
			sy	/stem.				
		7. (i) For a given transfer function determine the state model.						
		(ii) For a given state model determine the transfer function.						
		(iii) Check controllability and observability of the state model.						
		8. For a given transfer function obtain						
		(i) Root locus						
		(ii) Bode Plot						
		(iii) Nyquist plot						
		9.	9. To study the power balance in standalone solar PV system					
		1(	0. To	o study the loss of power generation due to mismatch of solar PV				
			Pa	anels.				
Books*/References 1. *		* N	agrath and Gopal Control System Engineering	, TMH				
		2. K. Ogata, Modern Control Engineering, PHI						
3. В		В. (	C. Kuo, Digital Control System, Oxford Unive	rsity Press				
		4.	4. M. Gopal, State variable analysis of digital control systems, TMH					
5. M.		М.	Rihan, Advanced Control Systems, Axioe	1				
Course			Ex	periment Reports	40 Marks			
Assessment/	Session	nal	Viv	va-Voce	20 Marks			
Evaluation/G				Sessional Total	60 Marks			
rading Policy	End Se	mester	r Ex	amination (3 Hours)	40 Marks			
				Total	100 Marks			

Course Title				InstrumentationLab				
Course number				EE-496				
Credit Value				1.5				
Course Category				DC				
Pre-requisite				<b>Electrical Instrumentation</b>				
Contact Hours (	L-T-P)			0-0-3				
Type of Course				Theory				
Course Objecti	ives	То	int	roduce various measurement methods using	electrical transducers,			
		cal	ibra	tion and characteristics of transducers, measured	urement of iron losses,			
		det	erm	ination of BH curve of magnetic material and t	esting of CT.			
Course		At	the	end of the course the students will be able to:				
Outcomes		1.	Me	asure the capacitance by different bridge metho	ods.			
		2.	Rea	lize the characteristics of different types of ele	ctrical transducers.			
		3.	Det	ermine the B-H curve and separate iron losses	in magnetic materials.			
		4.	Use	e electrical transducers to measure physical qua	ntities.			
		5.	Tes	at a given current transformer for finding different types of errors.				
Syllabus		Lis	st of	Experiments				
1. 1			Me	Measurement of capacitance by Schering Bridge.				
2.			Inp	Input characteristics of LVDT (Linear Variable Differential Transformer)				
		3.	Cal	alibration of given thermocouple Pyrometer.				
		4.	Tes	esting of CT by Petch Elliot method.				
		5.	Me	leasurement of Strain using Strain Gauge.				
		6.	5. Determination of B-H Curve of Magnetic Material by a Ballastic					
			Galvanometer.					
		7.	Sep	Separation of Iron losses in Magnetic Sheet by Lloyd Fisher Square				
			Me	thod.				
		8.	Cha	aracteristics of Optical Transducers.				
Books*/Refere	nces	1.	*G	olding & Widis, Electrical Measurement & Measuring Instruments,				
			Pitı	nan.	-			
2. A.			A.	K. Sawhney, Electric & Electronic Measurement & Instrumentation,				
Dh			Dha	anpat Rai.				
3. *H			*H.	S. Kalsi, Electronic Instrumentation, TMH.				
4. Da			Dav	vid Bell, Electronic Instrumentation & Measure	ement, PHI.			
Course	E		Ex	periment Reports	40 Marks			
Assessment/	Sessio	onal	Vi	va-Voce	20 Marks			
Evaluation/G				Sessional Total	60 Marks			
rading Policy	End S	emester	·Ex	camination (3 Hours)	40 Marks			
				Total	100 Marks			

Course Title	P	roject			
Course number <b>EE</b> -		E-499A			
Credit Value 3					
Course Category DC		C			
Pre-requisite Nil		lil			
Contact Hours (L-T-P) 0-3		-3-0			
Type of Course Pro		ject			
Course	To provi	ovide team work opportunity for solving the recent problems associated with			
Objectives	the dive	diverse field of electrical engineering and associated areas by software			
	developm	development and hardware design/implementation.			
Course	At the en	At the end of the course the students will be able to			
Outcomes	1. Apply	1. Apply the knowledge about the electrical engineering and associated fields more			
	effecti	effectively in solving electrical engineering problems.			
	2. Work	. Work in a team with capability of leadership.			
	3. Mana	. Manage and complete the project in a given time schedule.			
List of	Attached				
Projects					
Books/References		Electrical Engineering			
Course Assessment/ Evaluation/Grading Policy		Sessional (Continuous Evaluation)	30 Marks		
		Total	100 Marks		

Course Title		Project					
Course number		EE-499B					
Credit Value		3					
Course Category		DC					
Pre-requisite		Nil					
Contact Hours (L-T-P)		0-3-0					
Type of Course		Project					
Course	To pro	To provide team work opportunity for solving the recent problems associated with					
Objectives	the diverse field of electrical engineering and associated areas by software						
	development and hardware design/implementation.						
Course	1. At the end of the course the students will be able to						
Outcomes	2. Apply the knowledge about the electrical engineering and associated fields more						
	effe	effectively in solving electrical engineering problems.					
	3. Wo	3. Work in a team with capability of leadership.					
	4. Ma	4. Manage and complete the project in a given time schedule.					
List of	Attached						
Projects							
Books /	Electrical Engineering						
References							
Course	Sessio	essional (Continuous Evaluation) 40 Marks					
Assessment/	End Semester Examination30 MarksTotal (EE-499A+EE-499B)100 Marks						
Evaluation/G rading Policy							

Course Title				ELECTRONIC DEVICES AND CICUITS		
Course number			EL-201			
Credit Value			4			
Course Category	у			ESA		
Pre-requisite				<b>Basics of Electrical and Electronics Engine</b>	ering	
Contact Hours (L-T-P)				3-1-0		
Type of Course				Theory		
Course Objectives The ob		e obj	jective of this course is to help the student to understand the			
		func	dame	ntal devices of electronics engineering such as diode, transistor,		
		amp	olifie	r and oscillators etc. Further this course discusses the characteristics		
of ampl			mpli	fiers at low frequencies and high frequencies.		
Course After co		er co	mpleting this course the students should be able to:			
Outcomes 1. Unde		Inder	rstand the behaviour of fundamental electronic devices.			
2. Unde		Inder	rstand different applications of electronic devices			
3. Unde		und h	rstand and analyse different types of transistor based circuits at low			
Syllabue			110 11 <b>TT 1</b>	igh frequencies.		
Sylladus UNIT PN Iu		Iun	ction Diode Characteristics and Parameters: Diode Resistance			
Transiti		nsitic	on Canacitance and Diffusion Canacitance: Special Diode Types:			
Schottk		ottky	Barrier Diode, Photo Diode, LED, Tunnel Diode, Varactor Diode			
and The			The	ir Applications.		
UNIT 2			IT 2:			
Transist			nsiste	or as an Amplifier; Analysis Using Hybrad and T Models; High		
Frequen		quen	cy Hybrid Model; BJT and FET Characteristics, Parameters,			
Configu		nfigu	rations and Applications; UJT and Its Applications.			
UNIT		IT 3	3:			
Biasing		sing	g of BJT and FET; Bias Stability; Biasing Circuits; Classification of			
Amplif		plifie	ers; Frequency Response of RC Coupled Amplifier; Power Amplifiers			
		with	h The	err Classifications; Regulated Power Supply.		
		II 4				
Feedba		dbac	ck Concept; General Feedback Structure; Properties of Negative			
Feedbac Deced		ed O	k; Basic Feedback Topologies; Condition of Oscillation; BJT and FET			
			IT 5	, semator encurs, erystar Osemators, rrequent	y Stability.	
		Diff	feren	tial Amplifier: Operational Amplifier Characte	eristics and Parameters:	
Slew F		w R	ate. CMRR. Offset Voltage and Its Removal: Application as			
Instrum			rume	entation Amplifier. Voltage to Current and Current to Voltage		
Convert			verte	er, Log and Antilog Amplifier, Waveform Generator, Comparator		
Books*/References 1. M. N		M. M	1. Mano, Digital Logic and Computer Design, PHI 1986.			
2. A.P.		A.P.	Malvino, Digital Principles and Application.			
3 Ron		Rona	ld I. Tocci. Digital Systems- Principles and Ar	polications PHI 1995		
Course		5.1	Δο	signments (2 to 3)	10 Marks	
Assessment/	Sessional Qu Mi			$i_{2}$ (3 to 4) Best two may be considered	05 Marks	
Evaluation/G			Mi	d Term Examination (I Hour)	25 Marks	
rading Policy			1111	Sectional Total	40 Marks	
	End	Semeste	r Ev	amination (3 Hours)	60 Marks	
			Total	100 Marks		

Course Title			Logic and Digital Circuits	Logic and Digital Circuits		
Course number			EL-203N	EL-203N		
Credit Value			4			
Course Category			ESA			
Pre-requisite			Nil			
Contact Hours (	L-T-P)		3-1-0			
Type of Course			Theory			
Course Objecti	ves	To introduce the concepts of logic gates, realization of combination as sequential circuits. To study data acquisition and conversion methods a circuits.				
Course		At the end of the course the students will be able to				
Outcomes		1. Implement the number system.				
		2. F	ealize logic circuits	ze logic circuits		
		3. F	educe the combinational circuits using K-map and	ce the combinational circuits using K-map and Boolean algebra.		
		4. E	code, decode, multiplex and de-multiplex the data.			
5. Suc		5. 8	uccessfully perform acquisition and conversion of	cessfully perform acquisition and conversion of signals using digital		
circu		С	ircuits.			
Syllabus UNIT I		UN	T I: Introduction			
Nur		Nun	ber system: Decimal, Binary Octal, Hexadecimal; Base Conversion;			
Bin		Bina	ary Arithmetic; Binary Codes; Boolean Algebra: Basic Theorems and			
Post		Post	ulates; Basic AND, OR, NAND, NOR, EX-OR Gates.			
		UNIT II: Digital Circuits				
		SW1	Switching Characteristics of Semi- Conductor Devices: Realization of Various			
		Logic Gates: DTL, TTL, HTL, ECL and MOS Logics; Comparison of Various				
		Logic Families.				
		UNIT III: Design of Combination Circuits Truth Table Representation: Canonical Forms: Minimization of Switching				
		Functions- Karnaughs Maps: Design of Combinational Circuits: Encoders				
		Decoders Multiplexers ROMs				
		UNIT IV: Sequential Logic Systems				
		Definition of Sequential Circuits; State table and Diagram Representation:				
		Flip- Flops: SR,JK,T and D Type; Ripple Counter; Shift Registers: RAMs.				
		UN	UNIT V: Data Acquisition and Conversion			
A/D		A/D	and D/A Converters; sample and Hold	Circuits; comparators;		
Mult		Mul	tivibrators- Astable and Distable.			
Books*/References		1. N	1. M. M. Mano, Digital Logic and Computer Design, PHI 1986.			
		2. A.P. Malvino, Digital Principles and Application.				
		3. F	onald J. Tocci. Digital Systems- Principles and Ar	polications, PHI, 1995.		
Course	Ι		Assignments (2 to 3)	10 Marks		
Assessment/	Sessional Qu Mi		Ouiz (3 to 4) Best two may be considered	05 Marks		
Evaluation/G			Mid Term Examination (I Hour)	25 Marks		
rading Policy			Sessional Total	40 Marks		
End		Semester Examination (3 Hours)		60 Marks		
		-	Total	100 Marks		
<b>Course Title</b>			Electronics Engg. Lab			
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Course number			EL-294X			
Credit Value			2			
Course Category			ESA			
Pre-requisite			Power Electronics			
Contact Hours (	L-T-P)		0-1-2			
Type of Course			Theory			
Course Object	ives	To ele	familiarize the different types of characteris	stics of various types tifier circuits.		
Course		At	end of this course, students will be able to:			
Outcomes		1.	Understand the forward and reverse bias	derstand the forward and reverse biased characteristics of		
			semiconductor diode.			
		2.	Understand the voltage regulation characteristic of	zener diode.		
		3.	Design inverting and non-inverting amplifier.			
		4.	Implement 3-bit binary to gray and gray to binar	ry code converter. 4-bit		
			parity checker and generator and Mod-6 counter.	j,,		
		5.	Realize rectifier circuit for particular application.			
Syllabus List of		Li	t of Experiments:			
		1	To plot the forward and reverse biased characteristics of semiconductor			
		1.	diode Also find out the cut-in voltage of the diode			
		2	2 To determine the breakdown voltage of the given zener diode & plot its			
		۷.	voltage regulation characteristics			
		2				
		3.	To trace the output of half-wave and full-wave re-	ctifier with and without		
			ilter.			
		4.	4. To plot the output characteristics of a given BJT.			
		5.	. To design and test inverting and non-inverting amplifier.			
		6.	. Design and implement a circuit to integrate Sine and Square waveforms.			
		7.	. To implement and test a 3-bit binary to gray and gray to binary code			
			converter.			
		8.	To implement and test a 4-bit parity checker and generator			
		9.	Fo design and test a Mod-6 synchronous counter.	design and test a Mod-6 synchronous counter		
Books*/Refere	nces	1	Adel S Sedra Keneth C Smith Microelect	ronic circuits Oxford		
books / References		1.	University Press. Sixth edition.			
2		2.	Morris Mano M., "Digital Circuits and Logic De	esign", Prentice Hall of		
			India, II Edition, 1996.			
		3.	Materials provided in lab.			
<b>Course</b> E			Experiment Reports	40 Marks		
Assessment/	Sessio	onal	Viva-Voce	20 Marks		
Evaluation/G			Sessional Total	60 Marks		
rading Policy	End Se	emeste	Examination (3 Hours)	40 Marks		
	1		Total	100 Marks		

Course Title			COMMUNICATION SKILLS			
Course number			EN-101			
Credit Value			4			
Course Category			HU			
Pre-requisite			Nil			
Contact Hours (	L-T-P	)	2-2-0			
Type of Course		1	Theory			
Course Objecti	ves	1.	ntroduce the chief features of writing various formal letters.			
		2.	To inform and instruct about drafting let	tters of bu	siness communications	
			nd to acquaint students about the bas	ic knowle	edge and techniques of	
			cademic/conventional writing.			
		3.	t aims for the development and enha	ncement	of verbal/spoken skills	
			equired in both business and academic s	etup.		
Course Outcom	ies	1.	Student will be more eloquent and fluen	nt in writi	ng official letters either	
			of business, academic or of any other kin	ıd.		
		2.	Students will gain more confidence through	ugh oral c	communication learning	
			which will help them in articulating t	themselve	s more efficiently and	
			iffectively which is prerequisite in	n the fi	eld of business and	
		2		lemia/academe.		
3. The		5.	course will finally result in the overall enhancement and development			
			of student's skills and personality.			
Synabus I. Write Design T		I. Doc	riting official letters	nt lattara	placing orders anguiry	
Basic pl		Das.	d response latters, latters of complaint	and anol	practing orders enquiry	
curri			rriculum vitae	and apoi	ogy, persuasive ieners,	
		21	niculum vitae.			
		(a) (	lossary of husiness terms			
		(b) Drafting business messages: memos, telexes, e-mails, press notice				
		r (U)	references, tenders and bids, employment advertisements.			
		3. /	cademic Writing			
		(a) ]	ote-making and note-taking, abstracting	use of g	raphics (tables and free	
		ć	grams) preparing bibliography.			
		(b) '	ting academic papers and reports			
		4. (	Communication in Business Setup			
		Atte	ng interviews, telephonic conversation, reception of visitors, holding			
		r	eetings.	ings.		
5. Oral		5. (	Communication in Academic Setup:			
Participa		Part	eipating in group discussions, Presenting	ating in group discussions, Presenting prepared papers and reports,		
Semi		5	minar Strategies.			
Books*/Referen	ices					
Course			Classwork		40 Marks	
Assessment/	Assessment/ Sessiona		Mid Term Examination (I Hour)		20 Marks	
Evaluation/G			Session	nal Total	60 Marks	
rading Policy	End	Semeste	Examination (3 Hours)		40 Marks	
				Total	100 Marks	

Course Title		Basic Thermal Science
Course number		ME101
Credit Value		4
Course Category		DC
Pre-requisite		Nil
Contact Hours (L-T-P)		3-1-0
Type of Course		Theory
Course Objectives	At the	end of this course the student will
	I. Be	able to have the basic concepts of thermal sciences and their
	app	lication to in formulating the thermal engineering problems.
	2. Hav and	will be in
	3. a p	position to fully understand the analysis to be taught at the higher
	4. Be	in a position to check the feasibility of proposed processes and cycles
	usin	ig the ideas of second law of thermodynamics and entropy.
	5. Hay	we the understanding of basic principles of heat transfer and related
	sim	ple problems.
Course	After t	aking this course the students shall be able to have:
Outcomes	1. The	e basic concepts of units and dimensions, systems(open and closed
	syst	tems and control volumes) and its boundaries, properties, state,
	pro	cess, cycle, quasi-static process etc required as foundation for
	dev	elopment of principles and laws of thermodynamics
	2. Intu	ative problem solving technique
	3 Kn	owledge of two property rule and hence thermodynamic tables
	the	rmodynamic diagrams and concept of equation of state: also their
	sim	nle application
	4 U.s.	the mode and first law of the menduranies. Analisetion of energy
	4. DC	a, work and first law of thermodynamics. Application of energy
	5. Sec	ond law of thermodynamics and its corollaries viz. absolute
	(the	ermodynamic) temperature scale, reversibility, entropy, feasibility of a
	pro	cess based on first law and second law, isentropic efficiency of
	adia	abatic machines.
	6. Intr	oductory knowledge of power and refrigeration cycles. Their
	effi	ciencies and coefficients of performance.
	7. Intr	oductory ideas of heat transfer in conduction, convection and
	rad	iation modes. Application of these concepts to heat transfer in single
	and	combined modes.
Syllobus	LINIT	T
Synabus	Dime	-
	proper	ty cycle thermodynamic equilibrium and quasi-static
	propes	s. Pressure and its measurement, zero'th law of thermodynamics,
	tempe	rature and its measurement, numerical problems.
	UNÎT	-11
	Therm	odynamic and mechanics' definition of work, displacement work and
	its exp	pressions, engine indicator and indicated work, introduction to 2-stroke
	and 4	-stroke engines, heat, work and heat as energy interactions, Joule's
	experi	ment & mechanical equivalent of heat, first law of thermodynamics
	intorna	al energy enthalpy specific heats first law for a control volume
	steadv	flow energy Equation (SFEE), and it's applications, numerical

Pure substance, different phases of pure substance, two-property rule, property diagrams, tables and charts, equation of state of an ideal gas, t~r, t~p, p-v, and p-h diagrams, phase boundaries,         S-L-V region, CP and TP, dryness fraction and its measurement using throttling calorimeter, limitation of throttling calorimeter, separating & throttling calorimeter, numerical problems.         UNIT-IV       Limitations of first law , heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t-s and h-s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through slab or plane wall, hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling. electrical analogy and overall heat transfer, Newton's law of cooling. electrical analogy and overall heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical pro			pr	oblems.				
Property diagrams, tables and charts, equation of state of an ideal gas, t-τ ,         t-p, p-v, and p-h diagrams, phase boundaries,         S-L-V region, CP and TP, dryness fraction and its measurement using throttling calorimeter, numerical problems.         UNIT-IV         Limitations of first law , heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, versible and irreversible processs, t-s and h-s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer, rediction and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         3. Engineering Thermodynamics by P.C.Puguta and R. Prakash.       60 Marks         Course       Assignments (2 to 3)       10			P	ure substance different phases of pure substan	ice two-property rule			
Top, p→, and p-h diagrams, phase boundaries,         S-L-V region, CP and TP, dryness fraction and its measurement using throttling calorimeter, limitation of throttling calorimeter, separating & throttling calorimeter, numerical problems.         UNIT-IV         Limitations of first law, heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t~s and h~s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres with multi-layers, convective heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity. grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics by D.B. Spalding and E. H. Cole.       2. Engineering Thermodynamics by P.K.Nag.         Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         Sessional       Ass			property diagrams, tables and charts, equation of state of an ideal gas, $t \sim \tau$					
SL-V       region, CP and TP, dryness fraction and its measurement using throttling calorimeter, limitation of throttling calorimeter, separating & throttling calorimeter, numerical problems.         UNIT-IV       Limitations of first law , heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, tors and h-es diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by P. Spalding and E. H. Cole.       3. Engineering Thermodynamics by P. Spalding and E. H. Cole.         3. Engineering Thermodynamics by P. K.Nag.       5. Engineering Thermodynamics by P. K.Nag.       5. Engineering Thermodynami			$t \sim p$ , $p \sim v$ , and $p \sim h$ diagrams, phase boundaries,					
Books*/References <ul> <li></li></ul>			S-	L-V region, CP and TP, dryness fraction and	its measurement using			
throttling calorimeter, numerical problems.         UNIT-IV         Limitations of first law , heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t-s and h-s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V         Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References         1       Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by R. Nag.       5. Engineering Heat Transfer by C.P.Gu			th	rottling calorimeter, limitation of throttling calo	orimeter, separating &			
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Evaluation of first law , heat engine, heat pump, refrigerator, second law of thermodynamics- Kelvin Planck's and Clausius statements and their equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t~s and h~s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, reficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, by D.B. Spalding and E. H. Cole.         Bergineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         6. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         7. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         8. Engineering Th			UNIT-IV					
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equivalence, efficiency of heat engine and coefficient of performance of heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t~s and h~s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by P.K.Nag.         5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         6. Engineering Thermodynamics by P.K.Nag.       6. Marks         div (3 to 4), Best two may be considered         Marks         Korine Examination (1 Hour)         25 Marks			thermodynamics- Kelvin Planck's and Clausius statements and their					
heat pump and refrigerator, reversible and irreversible processes, Carnot cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t-s and h-s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by P.K.Nag.         3. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course       Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Assessment/       Examination (1 Hour)       25 Marks			eq	uivalence, efficiency of heat engine and coeffic	ient of performance of			
cycle and its efficiency, corollaries of second law, the thermodynamic temperature scale. inequality of Clausius, entropy, principle of increase of entropy, isentropic process, t~s and h~s diagrams (Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V       Modes of heat transfer, Fourier's law of steady state heat conduction (one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through slab or plane wall, hollow cylinders and spheres conduction through slab or plane wall, nollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power, stefan Boltzmann's law, isplacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by P.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by P.K.Nag.         5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         6. UNIX       Yuii (3 to 4), Best two may be considered       05 Marks <th></th> <th></th> <th>he</th> <th colspan="4">heat pump and refrigerator, reversible and irreversible processes, Carnot</th>			he	heat pump and refrigerator, reversible and irreversible processes, Carnot				
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entropy, isentropic process, t-s and h~s diagrams ( Mollier chart), second law applications, air standard otto, diesel, dual, simple Brayton and steam power cycles (Rankine ycle), numerical problems.         UNIT V         Modes of heat transfer, Fourier's law of steady state heat conduction ( one dimensional conduction), thermal conductivity and its unit, conduction through slab or plane wall, hollow cylinders and spheres conduction through composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power and monochromatic emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.       Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks       Mid Term Examination (I Hour)       25 Marks			tei	mperature scale. inequality of Clausius, entropy,	principle of increase of			
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Books*/References       image: figure f			UNIT V Modes of heat transfer. Fourier's law of steady state heat conduction ( one					
Books*/References       Infermion conduction, thermal conduction, and the use of			dimensional conduction) thermal conductivity and its unit conduction					
composite walls and hollow cylinders and spheres with multi-layers, composite walls and hollow cylinders and spheres with multi-layers, composite walls and hollow cylinders and spheres with multi-layers, convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law,, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.       5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course       Assignments (2 to 3)       10 Marks         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Wuiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks			through slab or plane wall, hollow cylinders and spheres conduction through					
convective heat transfer, Newton's law of cooling, electrical analogy and overall heat transfer, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by P.K.Nag.         3. Engineering Thermodynamics by P.K.Nag.       5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/       Sessional         Evaluation/G rading Policy       Sessional       10 Marks         Mid Term Examination (I Hour)       25 Marks         Bend Semester Examination (3 Hours)       60 Marks			co	mposite walls and hollow cylinders and sphe	eres with multi-layers.			
Series       overall heat transfer coefficient, combined conductive and convective heat transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law,, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.       5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course       Assignments (2 to 3)       10 Marks         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks       Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks       60 Marks			co	nyective heat transfer. Newton's law of cooling.	electrical analogy and			
transfer, radiation and radiation properties of surfaces, black body, emissive power, Stefan Boltzmann's law,, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References         1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/         Evaluation/G       Assignments (2 to 3)       10 Marks         Mid Term Examination (I Hour)       25 Marks         Mid Term Examination (I Hours)       60 Marks			overall heat transfer coefficient, combined conductive and convective heat					
Books*/References       power, Stefan Boltzmann's law,, emissivity, monochromatic emissive power and monochromatic emissivity, grey body, Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.       3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.       5. Engineering Thermodynamics by P.K.Nag.         5. Engineering Thermodynamics by P.K.Nag.       5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course       Assessment/         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         60 Marks       60 Marks			transfer, radiation and radiation properties of surfaces, black body, emissive					
and monochromatic emissivity, grey body, displacement law, numerical problems.       Kirchoff's law, Wien's displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/ Evaluation/G rading Policy         Sessional         End Semester Examination (I Hours)         25 Marks         60 Marks			power, Stefan Boltzmann's law,, emissivity, monochromatic emissive power					
displacement law, numerical problems.         Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/         Evaluation/G       Quiz (3 to 4), Best two may be considered       05 Marks         Quiz (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Serester Examination (3 Hours)       60 Marks			and monochromatic emissivity, grey body, Kirchoff's law, Wien'					
Books*/References       1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and Michael A Boles.         2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/ Evaluation/G rading Policy         Policy         Policy         End Semester Examination (3 Hours)			displacement law, numerical problems.					
Michael A Boles.         2.       Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3.       Engineering Thermodynamics by R. Joel.         4.       Engineering Thermodynamics by P.K.Nag.         5.       Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/       Assignments (2 to 3)         Value (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         Mid Term Examination (I Hours)       40 Marks         End Semester Examination (3 Hours)       60 Marks	Books*/Referen	ices	1. Thermodynamics, An Engineering Approach by Yunus A. Cengel and					
2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.         3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/         Evaluation/G         rading Policy         End Semester Examination (3 Hours)         End Semester Examination (3 Hours)			Michael A Boles.					
3. Engineering Thermodynamics by R. Joel.         4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/         Evaluation/G         rading Policy         End Semester Examination (3 Hours)         Assessional         60 Marks         60 Marks			2.	2. Engineering Thermodynamics by D.B. Spalding and E. H. Cole.				
4. Engineering Thermodynamics by P.K.Nag.         5. Engineering Heat Transfer by C.P.Gupta and R. Prakash.         Course         Assessment/         Evaluation/G         rading Policy         End Semester Examination (3 Hours)         Assessional			3.	3. Engineering Thermodynamics by R. Joel.				
Course       Assignments (2 to 3)       10 Marks         Assessment/       Quiz (3 to 4), Best two may be considered       05 Marks         Valuation/G       Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks			4.	Engineering Thermodynamics by P.K.Nag.	11-			
Assessment/       Sessional       Assignments (2 to 3)       10 Marks         Evaluation/G       Value (3 to 4), Best two may be considered       05 Marks         Mid Term Examination (I Hour)       25 Marks         End Semester Examination (3 Hours)       60 Marks	Commo		5.	Engineering Heat Transfer by C.P.Gupta and R. Pi	akash.			
Assessment/ Evaluation/G rading Policy     Sessional     Quiz (3 to 4), Best two may be considered     05 Marks       Mid Term Examination (I Hour)     25 Marks       End Semester Examination (3 Hours)     60 Marks	Course Assessment/			Assignments (2 to 3) Ouiz (3 to 4) Best two may be considered	10 Marks			
rading Policy     Interfermination (1 Hour)     25 Marks       End Semester Examination (3 Hours)     60 Marks	Evaluation/G	Sessi	onal	Mid Term Examination (I Hour)	25 Marks			
End Semester Examination (3 Hours)     60 Marks	rading Policy			Sessional Total	40 Marks			
	<b>-</b>	End S	emester	r Examination (3 Hours)	60 Marks			
Total   100 Marks		0		Total	100 Marks			

Course Title		Applied Mechanics
Course number		ME-111
Credit Value		4
Course Category		DC
Pre-requisite		None
Contact Hours (L-T-P)		3-1-0
Type of Course	I	Theory
Course Objectives	1. To g scier area 2. To e	give students practice in applying their knowledge of mathematics, nce, and engineering and to expand this knowledge into the vast of Applied Mechanics. Enhance students' ability to design by requiring the solution of open
	ende 3. To 1 Mec	ed problems. prepare the students for higher level courses such as courses in hanics of Solids, Mechanical Design and Structural Analysis.
Course	After ta	king this course students should be able to:
Outcomes	1. worl for a	comfortably with basic engineering mechanics concepts required analyzing static structures.
	2. iden isola	tify an appropriate structural system to study a given problem and ate it from its environment.
	3. mod equi	el the problem using good free-body diagrams and accurate librium equations
	4. iden act c	tify and model various types of loading and support conditions that on structural systems.
	5. apply	y pertinent mathematical, physical and engineering mechanical ciples to the system to solve and analyze the problem.
	6. com man	municate the solution to all problems in an organized and coherent ner and elucidate the meaning of the solution in the context of the dem
	7. deve empl prod	elop concepts of rigid body kinematics and dynamics with an hasis on the modeling, analysis, and simulation of how forces luce motion of rigid body systems.
	8. deter prob	rmine simple dynamic variables and solve simple dynamic lems involving kinematics, energy and momentum.
	9. deter inter Diag	rmine internal actions in statically determinate structures and draw rnal action diagrams –Shear Force (SFD) and Bending Moment grams (BMD) for these structures.
Syllabus	UNIT 1 Fundam of force bodies i Friction work. UNIT 2 Analysi and ang principl UNIT 3 Translav and rela plane m bodies, and a sy UNIT 4	<ul> <li>inental Concepts and principles of Mechanics. Reduction of a system as to a force couple system, Free body diagrams, equilibrium of rigid in 3 dimensions, reactions, loading indeterminancy and solvability. In forces and laws of dry friction. Principle and application of virtual</li> <li>is of Multiple particle system: Aplication of Newton's laws, linear gular momentum, kinetic energy and work energy principle, the of impulse and momentum to a system of particles.</li> <li>it to and rotation about a fixed axis, general plane motion, absolute ative velocity in plane motion, angular momentum of rigid body in notion. Problems of motion of rigid bodies and system of rigid principle of work and energy, conservation of energy for rigid body ystem of rigid bodies.</li> </ul>
	Analysi state of	s of stress and strain: Mechanical properties, analysis of simple stress and strains, elastic constants, example of state of tension,

	compression and shear.				
		UN	IT 5:		
		Ben	ding shear and torsion: Concept of bending	and shear forces in simple	
		beams, Relationship between load, bending moment and shear force.			
		Bending and shear stresses in simple beams, concepts of torsion in circular			
		shaf	its.	-	
Books*/References		1. I	Beer Ferdinand P. and Johnston Jr. E Rus	sel, Vector Mechanics of	
	Engineering: Statics and Dynamics, Metric edition, Mc. Graw Hill			ition, Mc. Graw Hill, New	
Delhi			Delhi.		
		2. Popov E., Engineering Mechanics of Solids, PHI, Delhi.			
3			Merium, JL, Engineering Mechanics (Volume I and II), 3rd edition, (SI		
			version) John Wiley and sons, Inc, NT.		
		4. 7	Timoshenko S. and Young DH, Elements of strength of materials,		
		DYNC, New York			
Course Assessment/		Assignments 15 Marks each			
<b>Evaluation/Grading</b>	Ses	sional	Mid Term Examination (I Hour)	25 Marks	
Policy		Sessional Total 40 Marks			
	End	Semeste	r Examination (3 Hours)	60 Marks	
			Total	100 Marks	

Course Title		Engineering Graphics Lab		
Course Number		ME-193		
Credits		2		
Course Category		DC		
Pre-Requisites(s)		None		
Contact Hours		0-0-3		
Type of Course		Lab		
Course Objectives	1. T 2. T 3. T B	To understand and appreciate the importance of Engineering Graphics. To understand the basic principles of Technical/Engineering Drawing. To understand the different steps in producing drawings according to BIS.		
	<u>4.</u> T	o learn basic engineering drawing formats.		
Outcomes	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Understand the theory of plane geometric projection and its classifications. Use Plane/diagonal/isometric scales in engineering graphics. Apply various concepts like dimensioning, conventions and standards related to engineering graphics in order to become professionally		
	4. ] 5. ]	efficient. Read and interpret drawings of simple machine parts/ sectional views in first and third angle of projection systems. Explain the conventions and the methods of orthographic projection		
6. 7. 8.		mprove their visualization skills so that they can apply these skills in leveloping new products. Model simple machine parts in isometric projections. Develop skills to communicate ideas and information through		
SyllabusUNIT- Introdu Lines a dimensi curvesUNIT- Necess projectNecess projectUNIT- Orthog Choice NecessUNIT- Axono		<ul> <li>T-1:</li> <li>Deduction to graphic language, Instruments and their use, Conventional es and their uses. Printing of letters and numerals, Methods of ensioning. Construction and use of scales, Construction of cycloidal es and involutes.</li> <li>T-2:</li> <li>essity for orthographic projections 1st &amp; 3rd angle methods of ection. Projection of points &amp; lines on three coordinate planes, ections of plane surfaces.</li> <li>T-3:</li> <li>nographic projections of simple machine parts on different planes.</li> <li>ice of view, Hidden lines, Preparation of multi view drawings.</li> <li>essity of sectional views and their drawings.</li> <li>T-4:</li> <li>nometric Projections. Drawing of isometric projection of simple solids; elopment of surfaces of simple solids. Use and methods of drawing.</li> </ul>		
Books*/References1. Be En 2. Gr 3. Poj 4. Me ver 5. Tin DY		Beer Ferdinand P. and Johnston Jr. E Russel, Vector Mechanics of Engineering: Statics and Dynamics, Metric edition, Mc. Braw Hill, New Delhi. Popov E., Engineering Mechanics of Solids, PHI, Delhi. Merium, JL, Engineering Mechanics (Volume I and II), 3rd edition, (SI ersion) John Wiley and sons, Inc, NT. Timoshenko S. and Young DH, Elements of strength of materials, DYNC, New York		
Course Assessment/	Sessional	Assignments 60 Marks each		
Evaluation/Grading		Sessional Total 60 Marks		
roncy	End Semester	r Examination (2 Hours) 40 Marks Total 100 Marks		

Course Title		Manufacturing Process Laboratory-I	
Course Number		ME 194	
Credits		2	
Course Category		DC	
Pre-Requisites(s)		None	
Contact Hours		0-0-3	
Type of Course	I	Laboratory	
Course Objectives	1. Kno	wledge and understanding of various type	s of ferrous and non-
	ferr	ous materials used for manufacturing proce	esses.
	2. Und	erstanding and selection of processes base	d upon jobs drawings
	used	l for manufacturing.	
	3. Bas	ic knowledge of hot and cold working prod	cesses.
	4. Sele	ction and knowledge of various tools appl	ied for cold and hot
	wor	king processes.	
	5. Exp	osure and understanding of machine tools	required for
	mar	ufacturability.	
	6. Ana	lyze the job manufactured from practical r	elevance point of view.
Syllabus	List of	Experiments	
	1. To j	prepare through tennon and mortise joint.	
	2. Тор	prepare a funnel of GI sheet.	
	3. To j	perform filling, drilling and tapping operat	ions.
	4. To j	perform electroplating.	
	5. Prep	paration of green sand mould and to perfor	m casting process.
	6. To j	prepare a square headed bolt.	
	7. To a	carry out gear cutting by simple indexing.	
	8. To	prepare a single V-butt joint by arc w	velding and study of gas
	wel	ding process.	
	9. To j	perform facing, simple turning, taper turning	ng, threading and knurling
	ope	rations on a lathe machine.	
	10. To	perform plaining and slot cutting operati	ons on shaper and slotter
	mac	hines.	
Course Assessment/	Sessional	eports/Viva Voce	60 Marks each
Evaluation/Grading		Sessional Total	60 Marks
Policy	End Semester E	xamination	40 Marks
		Total	100 Marks

Course Title			Economics and Management			
Course number			ME-340			
Credit Value			4			
Course Category			HM			
Pre-requisite			Communication skills and Basic Mathemat	tics		
Contact Hours (	L-T-P)		3-1-0			
Type of Course		1	Theory			
Course Objectives To intr		To in	oduce the concepts of management, organization, planning,			
manage		manage	ment strategies, leadership, engineering	nent strategies, leadership, engineering economy, forecasting,		
		breakey	en analysis, replacement studies, risk analysis, o	depreciation.		
Course		At the e	end of the course the students will be able to			
Outcomes		1. Mar	age and plan organizational design.			
		2. App	reciate leadership skills required in an organizat	tion.		
		3. App	ly the engineering economy in industry.			
		4. Prop	ose an organizational plan with minimal risk by	/ using risk analysis.		
		5. App	ly the knowledge of depreciation to determine the	he value of an asset.		
Syllabus UNIT-I			Ι			
Man		Manage	ement process, planning and strategic management, organizing,			
		organizational design, organizational structure, power and authority.				
		UNIT-II				
Le Ul		Leading UNIT-	g, Leadership styles, motivation theories, contro	lling function.		
		Introdu	ction to engineering Economy, Economic	c Laws, Forecasting,		
		Breake	Breakeven Analysis.			
		UNIT-	UNIT-IV			
		Money	Money – Time relationships and their types, selection among alternatives.			
		UNIT-	V			
		Replace	ement studies, risk analysis, depreciation.			
Books*/Referen	nces	1. DeC	armo, E.P., Sullivan, W.G. and Bontadelhi, J.A	., 1988. Engineering		
		Eco	conomy, ed. VIII, Macmillon.			
2. R		$2. \operatorname{Rigg}$	gs,J.I., Bedworth, D.B. and Randhawa, S.U., 1996, Engineering			
		Eco	nomy, ed. VIII, Macmillan.			
3. Ston		3. Stor	er, J.A.F., Freeman, R.E. and Gilbert, D.R., 200	)3, Management, ed.v1,		
G	1	PHI		10 10 1		
Course		A	$\frac{1}{2} = \frac{1}{2} = \frac{1}$	10 Marks		
Assessment/	Assessment/ Evaluation/G Sessional M		uiz (5 to 4), Best two may be considered	US Marks		
Evaluation/G			id Term Examination (I Hour)	25 Marks		
rading Policy			Sessional Total	40 Marks		
	End	semester E	xamination (3 Hours)	60 Marks		
			Total	100 Marks		