Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur



Curriculum and Structure

for

Electronics Engineering (Under Graduate Programme) From Academic Year 2019-2020



Kolhapur Institute of Technology's

College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for

Second Year B.Tech. Program in Electronics Engineering Semester-III

Course	Curriculum	Course	Te	ach	ing	scheme		Evalua	ation So	cheme		
Code	component		L	Т	P	Credit		Scheme	N	larks		
	_					S			Max	Mi	n	
								ISE-I	10			
	DC	Engineering	2	1		4		MSE	30		40	
UELN0301	B2	Maths-III	3	1	-	4		ISE-II	10		40	
								ESE	50	20		
UELN0302							1 [ISE-I	10			
	PC	Electronic Devices	3	-	-	3		MSE	30		40	
		and Circuits						ISE-II	10		40	
								ESE	50	20		
							1	ISE-I	10			
LIEI NO202	PC	Digital Dasign						MSE	30		40	
UELINUSUS	FC	Digital Design	3	-	-	3		ISE-II	10		40	
								ESE	50	20		
							-	ISE-I	10			
LIFL N0304	PC						-	MSE	30		40	
OLLIN0304	10	Network Analysis	3	1	-	4	-	ISE-II	10		-0	
								ESE	50	20		
		Electronic					-	ISE-I	10			
LIEL NO205	DC	Measurement and	2			2	_	MSE	30		40	
UELINUSUS	PC	Instrumentation	3	-	-	3		ISE-II	10		40	
								ESE	50	20		
UELN0361	Audit-I	Environmental Studies	2	-	-	-		- 100 4		40	40	
LIEL NO221		Electronic Devices						ISE	50	20)	
UELNUSSI	PC	and Circuits LAB	-	-	2	1		ESE (POE)	50	20)	
UELN0332	РС	Electronic Measurement and Instrumentation LAB	-	-	2	1		ISE	50	50 20		
LIEI NO222	DC	Digital Design			2	1		ISE	50	20)	
UELIN0333	FC	using HDL LAB	-	-	2	1		ESE(POE)	50	20)	
UELN0334	DC	Computer Aided			~	1		ISE	50	20)	
	PC	Design LAB	-	-	2	1		ESE(POE)	50	20)	
UELN0351	PRJ	Micro project- I LAB	-	-	2	1		ISE	50	20		
Total			15+ 2	2	10	22		-	900 (+100 Audit)	360(Aud	+40 lit)	

Total Credits: 22 Total Contact Hours/Week: 29Hrs



Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for

Second Year B.Tech. Program in Electronics Engineering Se	Semester-IV
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	Curricul	Course	Tea	ichi	ng s	scheme	Evalu	uation S	Schem	e
Course	um		L	Т	P	Credit	Scheme		Mark	5
Code	compone					S		Max		Min
	••••••••••••					~	ISE-I	10		
		Linear Integrated					MSE	30		40
UELN0401	PC	Circuits	3	-	-	3	ISE-II	10		
		Circuito					ESE	50	20	
							ISE I	10	20	40
							MSE	30		40
UELN0402	PC	Analog Circuit	4	-	-	4	ISE-II	10		
		Design					ESE	50	20	
							ISE-I	10		40
	DC		2			2	MSE	30		
UELN0403	PC	Control System	3	-	-	3	ISE-II	10		
		Engineering					ESE	50	20	
							ISE-I	10		40
LIEL NO404	DC	Analog	2			2	MSE	30		
UELIN0404	PC	Communication	3	-	-	3	ISE-II	10		
							ESE	50	20	
							ISE-I	10		
LIEL NO405	DC	Signals &	3	1		4	MSE	30		40
UELIN0403	rC	Systems	3	1	-	4	ISE-II	10		
							ESE	50	20	
UELN0461	Audit -II	Content Creation using Information and web Technologies	2	-	-	-	ESE	100	40	40
	DC	Linear Integrated			•		ISE	50	2	20
UELN0431	PC	Circuits LAB	-	-	2	1	ESE(POE)	50	2	20
		Analog Circuit			_		ISE	50	2	20
UELN0432	PC	Design LAB	-	-	2	1	ESE(POE)	50		20
		Analog					ISE	50	2	20
UELN0433	PC	Communication LAB	-	-	2	1	ESE (POE)	50	20	
UELN0434	РС	Control System Engineering LAB	-	-	2	1	ISE	50	20	
UELN0451	PRJ	Micro project-II LAB	-	-	2	1	ISE	50	20	
Total			16+ 2	1	10	22	-	900 (+100 Audit)	3 (+40	60 Audit)

Total Credits: 22 Total Contact Hours/Week: 29 Hrs

Note:

- **ESE:** End Semester Examination, **MSE:** Mid Semester Examination, **ISE:** In Semester Evaluation.
- HS: Humanities, Social science and Management, BS: Basic sciences including mathematics
- ES: Engineering Science, PC: Professional Core, PE: Professional Elective
- **OEL:** Open elective, **PRJ**: Project work, Seminar, Internship in industry etc.
- ** :Course code for Open Elective
- XX : Course code for Professional Elective
- \$\$: Course code for Audit Course

List of Audit Courses

Vear	Course Code	Audit Course	Audit Course
Second Year B.Tech-I	UELN0361	Audit Course-I	Environmental Studies
Second Year B.Tech-II	UELN0461	Audit Course-II	Content Creation using Information and web Technologies



Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for Third Year B.Tech. Program in Electronics Engineering Semester-V

$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	
CodeumIISMaxMinUELN0501PCElectromagnetic Engineering31-4ISE-I10-4ISE-II10ISE-II10ISE-II10-4UELN0502PCDigital Communication33-3ISE-II10-4ISE-II10ISE-II10ISE-II10-4UELN0502PCCommunication33ISE-II10-4UELN0502PCISE-II103ISE-II10-4	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	- 40 20 - 40 20 - 40 - 40
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	- 40 20 - 40 20 - 40 - 40 - 40
UELN0501PCEngineering 3 1 $ 4$ ISE-II 10 4 UELN0502PCDigital Communication 3 $ 3$ $ 3$ $ 4$ $1SE-II$ 10 $ 4$ UELN0502PCCommunication 3 $ 3$ $ 3$ $ 4$ UELN0502PCCommunication $ 3$ $ 3$ $ 4$ UELN0502PCCommunication $ -$ UELN0502PCCommunication $ -$	
UELN0502 PC Digital Communication 3 - - 3 - - 3 - 4 UELN0502 PC Communication 3 - - 3 - 10 4 UELN0502 PC ISE-II 10 - 4	20 -40 20 -40 -40
UELN0502 PC Digital Communication 3 3 ISE-I 10 ESE 30 - 4 ESE 50 20	- $ 40$ $ 40$ $ 40$ $ 40$
UELN0502PCDigital Communication33MSE30-4ISE-II101010101010101010	- 40 20 - 40 40
UELN0502PCCommunication33ISE-II104ESE5020	
ESE 50 20	20
	40
	40
Power Electronics MSE 30 -	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	20
$\begin{array}{c c} \hline \hline \\ $	20
ISE-I 10	
LIEL NO504 DC Microsophysillars MSE 30 - 4	- 40
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	40
ESE 50 20	20
ISE-I 10	
Professional 2 MSE 30 -	- 10
UELNOSXX PE Elective-I 3 3 ISE-II 10 4	40
ESE 50 20	20
UELN0561 Audit-III Industry 4.0 2 - - ESE 100 40 4	40 40
LIEL NO521 Digital ISE 50 20	20
DELIN0531PCCommunication21ESE(OE)5020LABII	20
Power Electronics ISE 50 20	20
UELN0532PCFower Electronics21ESE(POE)5020	20
LIEL N0533 PC Microcontroller 2 1 ISE 50 20	20
CEEN0333 I C LAB I I ESE(POE) 50 20	20
UELN05XX PE Professional Elective-I - 2 1 ISE 50 20	20
UELN0551PRJMicro project-III LAB21ISE5020	20
Total - 900 360	360
$\begin{vmatrix} 10^{+} \\ 2 \end{vmatrix}$ 1 10 22 (+100 (+40 Aud) (+40 Audit)
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Total Credits: 22 Total Contact Hours/Week: 29Hrs

Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for Third Year B.Tech. Program in Electronics Engineering Semester-VI

(Third Year B.Tech-II)

Course	Curriculum	, , , , , , , , , , , , , , , , , , ,	Tea	ichi	ng s	scheme	Evaluation Scheme				
Code	component	Course	L	Т	P	Credit	Scheme		Weighta	nge	
	•					s		Ma]	Min	
		Computer					ISE-I	10			
		Architecture and					MSE	30	-	40	
UELN0601	PC	Operating	4	-	-	4	ISE-II	10			
		System					ESE	50	20		
							ISE_I	10		40	
		Digital Signal					MSE	30	_	-10	
UELN0602	PC	Processing	3	-	-	3	ISE-II	10			
		Trocessing					ESE	50	20		
							ISE_I	10	20	40	
							MSE	30		40	
UELN0603	PC	Data Structures	3	-	-	3	ISE-II	10	-		
		and Algorithms					ESE	50	20		
							ISE-I	10	20		
	0.5		2			2	MSE	30	-	40	
UOEL06**	OE	Open Elective-I	3	-	-	3	ISE-II	10		_	
							ESE	50	20		
							ISE-I	10			
							MSE	30	-		
UELN06XX	PE	Professional	3	-	-	3	ISE – II	10		40	
		Elective-II					ECE	50	20		
							ESE	50	20		
		Aptitude									
UELN0661	Audit-IV	Enhancement	2	-	-	-	ESE	100	40	40	
		with Vedic									
		Maths					ICE	25	1	0	
LIEI N0641	DDI	Mini Project			r	1	ISE	25	1	0	
UELIN0041	ΓŊ		-	-	Ζ	1	ESE(OE)	50	20		
		Computer									
	DC	Architecture and			•		ICE				
UELN0631	PC	Operating	-	-	2	1	ISE	50	2	20	
		System LAB									
		Model Based					ICE	25		0	
UELN0632	PC	Design	-	-	4	2	ISE	25	1	0	
	_	LAB					ESE (OE)	50	2	0	
		Doto Structuros					ISE	50	2	0	
LIEL NO622	DC	Data Structures			r	1	EGE	50		0	
UELIN0055	PC		-	-	Ζ	1	ESE	50	2	.0	
		LAD					(POE)				
	PC	Digital Signal	-	_	2	1	ISE	50	2	20	
UELN0634	ĨĊ	Processing LAR	-		4	1	ESE	50	2	0	
							(POE)				
			16+					900	3	50	
	Total		2	-	12	22	-	(+100	(+40	Audit)	
			-					Audit)			

Total Credits: 22 Total Contact Hours/Week: 29 Hrs Note:

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- ES: Engineering Science, PC: Professional Core, PE: Professional Elective
- **OEL:** Open elective, **PRJ**: Project work, Seminar, Internship in industry etc.
- ** :Course code for Open Elective
- XX : Course code for Professional Elective
- \$\$: Course code for Audit Course

List of Professional Electives

Year	Professional Elective	Course Code	Communicatio n Stream	Course Code	Embedded VLSI Stream	Course Code	Systems and Technologi es Stream
Third Year B.Tech -I	Professional Elective-I	UELN0521	Wireless Communicatio n Networks	UELN0522	CMOS VLSI Design	UELN0523	Automotive Electronics
Third Year B.Tech -II	Professional Elective-II	UELN0621	Digital Image Processing	UELN0622	Embedded System Programmi ng	UELN0623	Bio- Medical Electronics

List of Professional Electives LAB

Year	Profe <mark>ssio</mark> nal Elective	Course Code	Communic ation Stream	Course Code KOL	Embedded VLSI Stream	Course Code NS ITTU	Systems and Technologies TE Stream
Third Year B.Te <mark>ch-I</mark>	Professional Elective-I	UELN0534	Wireless Communicat ion Networks	OF UELN0535	CMOS VLSI Design	UELN0536	Automotive Electronics

List of Audit Courses

Year	Course Code	Audit Course	Audit Course
Third Year B.Tech-I	UELN0561	Audit Course-III	Industry 4.0
Third Year B.Tech-II	UELN0661	Audit Course-IV	Aptitude Enhancement with Vedic
			Maths

List of Open Electives

Year	Course Code	Open Elective-I
Third Year B.Tech-II	UOEL0625	Microcontroller Architectures and Programming
	UOEL0626	Industrial Automation



Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for Final Year B.Tech. Program in Electronics Engineering Semester-VII

(Final Year B.Tech-I) **Teaching scheme Evaluation Scheme** Curriculu Course Course m L ΤP Credits Scheme Weightage Code componen Max Min t ISE-I 10 40 MSE 30 UELN0701 PC Embedded System 4 4 _ _ ISE-II 10 Design 20 ESE 50 ISE-I 10 MSE 30 40 **UELN0702** PC Computer 4 _ 4 ISE-II 10 Networks ESE 50 20 ISE-I 10 **MSE** 30 40 **UOEL07**** OE **Open Elective-II** 3 3 _ _ ISE-II 10 ESE 50 20 ISE-I 10 MSE 30 Professional **UELN07XX** PE 3 3 40 _ ISE-II 10 Elective-III ESE 50 20 Scripting ES **UELN0703** 1 1 ISE 50 20 20 _ Languages Smart UELN0761 Audit-V 2 ESE 100 40 40 _ _ _ Manufacturing ISE 50 20 Embedded System ESE(POE) 50 20 PC Design LAB 2 1 UELN0731 _ _ Scripting 2 **UELN0732** ES 1 ISE 50 _ _ Languages LAB 20 ISE 50 20 Computer **UELN0733** PC 2 1 _ 50 20 ESE(POE) Networks LAB ISE 50 20 4 UELN0751 PRJ Project-I 2 _ _ ESE(OE) 50 20 800 15+2 0 10 20 (+100)320(+40 Audit) Total _ Audit)

Total Credits: 20 Total Contact Hours/Week: 27 Hrs



Kolhapur Institute of Technology's College of Engineering (Autonomous), Kolhapur Teaching and Evaluation scheme for

Final Year B.Tech. Program in Electronics Engineering Semester-VIII

	Curricul		Tea	ichi	ng s	scheme	Eva	luatio	n Schem	e
Course	um	Course	L	Τ	Р	Credit	Scheme		Weighta	ige
Code	compone					S			Min	
							ISE-I	10		
LIEL MOOVY	DE	Professional	2			2	MSE	30		40
UELINUOAA	PE	Elective-IV	3	-	-	3	ISE-II	10		
							ESE	50	20	
							ISE-I	10		
		Professional				1	MSE	30		
UELN08XX	PE	Elective -V	1	-	-	1	ISE-II	10		40
							ESE	50	20	
UELN0861	Aud <mark>it-VI</mark>	Audit Course-VI	2	-	-	KOLF		100	40	40
		(Online Course)						\sim	rc	
UELN0851	PRJ/WI	Project-II	-	-	12	6	ISE-I	50	2	80
		and				CC	ISE-II	50	20	
		Winter					ESE (OE)	100	40	E
		Internship (WI)								
		Professional					ISE	50	20	NU
UELN08XX	PE	Elective -IV	-	-	2	1	ESE(POE)	50	20	40
		LAB				KU			UK	
		Professional			~	1	ISE	50	20	
UELNO8XX	PE	Elective -V LAB	-	-	2	1	ESE(OE)	50	20	40
								600		
	Total		4+2	0	16	12	-	(+100)	240(+40	Audit)
								Audit	ì	,

(Final Year B.Tech-II)

Total Credits: 12 Total Contact Hours/Week: 22 Hrs

Note:

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- **OEL:** Open elective, **PRJ**: Project work, Seminar, Internship in industry etc.
- ** : Course code for Open Elective
- XX : Course code for Professional Elective
- \$\$: Course code for Audit Course

List of Professional Electives

Year	Professional Elective	Course Code	Communication Stream	Course Code	Embedded VLSI Stream	Course Code	Systems and Technologies Stream
Final Year B.Tech- I	Professional Elective-III	UELN0721	Antennas and Wave Propagation	UELN0722	SOC Design and Testing	UELN0723	Soft Computing
Final Year B.Tech- II	Professional Elective-IV	UELN0821	Microwave Theory and Techniques	UELN0822	Mixed Signal Design	UELN0823	Modern Power Electronics
Final Year B.Tech- II	Professional Elective-V	UELN0824	Digital TV	UELN0825	IOT and Cloud Computing	UELN0826	PLC and SCADA

List of Professional Electives LAB

Year	P <mark>rofessiona</mark> l Elective	Course Code	Communic ation Stream	Course Code	Embedde d VLSI Stream	Course Code	Systems and Technologies Stream
Final Year B.Tech-II	Professional Elective-IV	UELN0834	Microwave Theory and Techniques	UELN0835	Mixed Signal Design	UELN0836	Modern Power Electronics
Final Year B.Tech-II	Professional Elective-V	UELN0837	Digital TV	UELN0838	IOT and Cloud Computin g	UELN0839	PLC and SCADA

List of Audit Courses

Year	Course Code	Audit Course	Audit Course
Final Year B.Tech-I	UELN0761	Audit Course-V	Smart Manufacturing
Final Year B.Tech-II	UELN0861	Audit Course-VI	Online

List of Open Electives

Year	Course Code	Open Elective-II
Final Year	UOEL0725	Artificial Intelligence
B.Tech-I	UOEL0726	Introduction to Control systems

Title of	the Course:]	ENGI	NEERI	NG M	ATHE	MATI	CS-III	[L	Т	Р	Credits
Course	Code: UEL	N0301								3	1		4
Course	Pre-Requ	isite:	Basi	c te	ermino	logies	of	diffe	erentia	al	equa	tions,	vector
algebra	, concepts of	proba	bility, 1	rules a	nd for	mulae	ofderiv	ative a	and in	tegr	ation.		
Course	Description:	This C	Course	contai	ns line	ar diff	erentia	l equa	tions,	vect	or cal	culus,	,
		Lapla	ce trar	nsform	is, prol	oability	v distri	bution	s, Fou	irier	serie	5,	
~	<u></u>	Fouri	er Tra	nsforn	ns.								
Course	Objectives:		1 • •		•.• • • •		1.1	1 .1.		CT	, ., .	11	.1 •
1.	To develop at	ostract,	logical	and c	ritical t	hinking	g and th	ie abili	ty to r	effec	t criti	cally u	pon their
2	WORK. To study yori	0110 m 0	thomat	ical to	ala lika	diffor	ntial a	motion	a into	aro1	tronof	orma	vootor
Ζ.	calculus prok	ous ma sability	to dev	ical too	JIS IIKe		ions fo	r probl	s, inte	giai	u alisi 1 in or	orinee	ring
3	The student n	nust he	able to	formu	ilate a r	ig solut nather	natical 1	nodel <i>i</i>	of a re	al lif	e and	engine	ering
5.	problem, solv	e and i	nterpre	t the so	olution	in real	world		51 4 10	ai 111	c und	Singlin	
Course	Outcomes:	- 4114 1		e ine bi									
COs	After the con	npletio	n of th	e cours	se the s	tudent	will be			Blo	om's	Cogni	tive
	able to	1								leve	el D	Descrip	otor
CO1	Summarize	funda	mental	prop	ertieso	f vect	or cal	culus	and	II	U	Inders	tanding
	integral trans	sforms	<mark>of</mark> sing	le vari	able co	ntinuou	us func	tions.					_
CO2	Apply the kr	owled	re of d	ifforon	tial agu	untion t	o get t		tions	п		nnlvii	
02	of electrical	circuit	proble	ms	uai equ	iation t	o get u	ie solu		< #	NS1	rppryn	
CO3	Apply the	knowle	edge o	of Lar	lace t	ransfor	ms to	solve	the	Otr		nnlvii	ησ
005	problems ari	ses in e	electror	nics en	gineeri	ng.		-50170				-PP1/11	-5
CO4	Make use of	appror	oriate p	robabi	lity dist	ributio	n for fi	nding		II	IA	pplvii	1g
	probabilities	of eve	nts.									rr-j.	
CO5	Develop For	irier sei	ries exp	oansior	n of a fi	unction	over th	ne give	n	II	I A	pplyii	ng
	interval.							V.					
CO6	Determine F	ourier	transfo	rms an	d inver	se Fou	rier trai	nsforms	S	IV	ΙΑ	nalyz	ing
	ofgiven func	<mark>tion</mark> an	d use i	t to sol	ve the	related	proble	ms.			ΛP		K
CO-PO	Mappin <mark>g:</mark>												
						-	-	-		-1		- I-	
CO	1 2	3	4	5	6	7	8	9	10	1	1	12 PS	SO1PSO2
1 CO1	3 2			1	1	1	1		1	1		1	

CO		2	3	4	5	6	1	8	9	10	11	12	PSOI	PSO2
CO1	3	2										1		
CO2	3	2										1		
CO3	3	2										1		
CO4	3	2										1		
CO4	3	2										1		
CO5	3	2										1		
CO6	3	2										1		

End Sem	ester Examination (ESE) having 20%, 30	0% and 50% weights respectively.	
	Assessment	Marks	
	ISE 1	10	
	MSE	30	
	ISE 2	10	
	ESE	50	
ISE 1 an	d ISE 2 are based on assignment/declared	l test/quiz/seminar/Group Discussions etc	
MSE: A	sessment is based on 50% of course cont	tent (Normally first three units)	
ESE: A	sessment is based on 100% course c	content with60-70% weightage for cou	rse conten
(normall	y last three units) covered after MSE.		
Course	Contents:		0.11
Unit I: I	Linear Differential Equations with Con	istant Coefficients and Its	8 Hrs.
1	Applications	1	
1. 1 /	Definition, general form, complete so	olution	
1.4	Short methods for finding particular	integral	
1	General rule for finding particular int	egral	
1.4	Applications to electrical circuits	egrai	
1.	repriedious to electrical circuits		ITE
Unit 2: V	Vector Calculus		7 Hrs.
2	1 Differentiation of vectors		/ 11.50
2.2	Velocity and acceleration		
2.3	Gradient of scalar point function and	directional derivative	UF
2.4	Divergence of vector point function		
2.5	Curl of a vector point function		RIN
2.	5 Solenoidal and Irrotational vector fie	lds	
Unit 3: I	Laplace Transforms	NULHAPU	8 Hrs.
3.1 De	finition, transforms of elementary function	ons, properties of Laplace	
	transform		
3.2	2. Transforms of derivative and integral		
3.	Inverse Laplace transforms		
3.4	Inverse Laplace transforms by using	partial fractions and	
	convolution theorem.		
3.:	Transforms of periodic functions and	d Heaviside unit step function.	
3.0	Solution of linear differential equation	ons with constant coefficients by	
	Laplace transform method.		
[]	ushshilita Distributions		6 IIma
UIIIL 4; 1 4 1 D	andom variable		0 mrs.
+.1 K 4 2	Probability mass function and probab	ility density function	
4.2 4 3	Binomial distribution	my density runchon	
4.3 4.4	Poisson distribution		
4 5	Normal distribution		
 ا ۱۰ IInit	Fourier Series & Fourier Transform		7 Hrs.
$5.1 D_{\ell}$	finition. Euler's formulae		/ 111.5.
DC	Dirichlet's conditions, functions havi	ng points of discontinuity	
5.2	Change of interval		
			i i
5.4	Expansion of odd and even periodic f	functions	

Unit 6: Fourier Transform	6 Hrs.
6.1 Fourier integral theorem	
6.2 Fourier transforms	
6.3 Fourier sine and cosine transforms	
6.4 Finite Fourier sine and cosine transforms	
6.5 Properties of Fourier transforms	
6.6 Convolution theorem for Fourier transform	
6.7 Parseval's identity for Fourier transform	
Recommended Books:	
1. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna Publishers, Delhi.	
2. A Text Book of Applied Mathematics, Vol. I, Vol. II and vol. III by P. N. Wartikar	
& J. N. Wartikar, Pune VidyarthiGrihaPrakashan, Pune.	
Reference Books:	
1. Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India Pvt. Ltd.	
2. Advanced Engineering Mathematics by H. K. Dass, S. Chand, New Delhi.	
3. A text book of Engineering Mathematics by N. P. Bali, Iyengar, Laxmi Publications (P)	1
Ltd., New Delhi.	
4. Mathematics for Engineers Vol-I & Vol-II by Rakesh Dube, Narosa Publishing House.	
Unit wise Measurable Learning Outcomes:	
o	
Unit 1: Linear Differential Equations with Constant Coefficients and Its	
Applications	
Students will be able to KOLLAPLER INSTIT	
a) Solve linear differential equations with constant coefficients.	
b) Solve the problems on electrical circuits.	
Unit 2: Vector Calculus	
Students will be able to	
a) Differentiate vector quantity.	
b) Find the directional derivative of scalar point function.	
c) Find the divergence and curl of vector point function.	
d) Determine solenoidal and irrotational fields with the help of divergence and curl	
respectively.	
Unit 3: Laplace Transforms	
Students will be able to	
a) Find Laplace transform by using definition	
b) Recall properties of Laplace transform and use to find transforms of given function	ons.
c) Use Laplace transform method to solve linear differential equations.	
Unit 4: Probability Distributions	
Students will be able to	
a) Verify the function as probability mass and density function.	
b) Use probability distributions in solving physical and engineering problems.	
Unit 5 : Fourier Series	
Students will be able to	
a) Define Fourier series, Euler's formulae.	
b) Develop Fourier series in an interval.	
a). L'ann an d-bhan ath ann an Alba lealth nan an anns an lealth nan an anairte annian	
c) Expand function as the nall range sine of nall range cosine series.	
C) Expand function as the nan range sine of nan range cosine series.	
C) Expand function as the nan range sine of nan range cosine series. Unit 6: Fourier Transforms Students will be able to	
 C) Expand function as the nall range sine of nall range cosine series. Unit 6: Fourier Transforms Students will be able to a) Find Fourier transforms of various functions 	
 C) Expand function as the nall range sine of nall range cosine series. Unit 6: Fourier Transforms Students will be able to a) Find Fourier transforms of various functions b) Find Fourier sine and cosine transforms of siven functions 	

Title of	f the Course:Electronics Devices and Circuits	L	Т	Р	Credit
Course	e Code:UELN0302	3	-	-	3
Course	Pre-Requisite: Basic knowledge of mathematics, atc	mic physi	ics.		
Course	Description:				
This co	urse encompasses the study of Semiconductor devices	and their	princ	iple o	of operation,
electric	al characteristics and analysis/design of basic applicat	ion circuit	s.		
Course	e Objectives:				
1. To u	nderstand nature & scope of semiconductor electronics	s.			
2. To d	escribe physical model of basic components				
3.To co	onstruct simple electronic circuits to accomplish specif	ic function	n.		
Course	e Learning Outcomes:				
СО	After the completion of the course the student	Blo	om's	Cogn	itive
	should beable to	laval			aganintan
		level			escriptor
CO1	Describe fundamentals of semiconductor physics.	II		Und	erstanding
CO2	Explain working principle and characteristics of	П		Und	arstanding
	Diodes, transistors and their applications.	11		Und	erstanding
CO3	Analyze transistor biasing circuits, various	IV		Ano	luzing
	configurations of transistor	OLHAY		Alla	
CO4	Analyze various transistor amplifier circuits and	= TECH	HNC		GY'S
	their hybrid models over frequency range,.	IV		Ana	lyzing

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	РО	РО	РО	PSO1	PSO2
										10	11	12		
CO1	3	2		"_"	"_"	"_"	"_"	··_"	"_"	"_"	" <u>-</u> "	- /	"_"	"_"
CO2	3	1		"_"	··_"	··_"	"_"	··_"	··_"	"_"		1	··_"	"_"
CO3	2	3	3		" <u>-</u> "	"_"	··_"	··_"	··_"	··_"	··_"		··_"	1
CO4	2	3	3		"_"		"_"	··_"	··_"	"_"	"_"	"_"	··_"	1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

	6 Hrs.
Review of Quantum Mechanics, Electrons in periodic Lattices, E-k diagrams. Energy bands in intrinsic and extrinsic silicon; Carrier transport: diffusion current, drift current, mobility and resistivity; sheet resistance, design of resistors	
Unit 2DIODE AND CHARACTERISTICS	6 Hrs.
Generation and recombination of carriers, I-V characteristics, Avalanche breakdown, Zener diode and its characteristics, Schottky diode, Point contact diode, LED, Photo diode.	
Unit 3 DIODE APPLICATIONSAND FILTERS.	8 Hrs.
P-N junction Diode applications-Rectifiers (Half wave, full wave: center tap and bridge type, parameters: PIV, TUF, efficiency, ripple factor, regulation, form factor etc.), Filters: Need of Filters, Types of Filters: Capacitor, Inductor, LC and CLC filters, Analysis of above Filters for ripple factor & Regulation. Design of unregulated power supply using FWR with all types of filters Voltage multipliers, Clipper and Clamper circuits.	
Unit 4:-BIPOLAR TRANSISTORS :	6 Hrs.
NPN Transistor, PNP Transistor, IV characteristics, Charge storage and	
transient response, Load line concept, Current voltage characteristics, Transistor Configurations(CE,CB & CC configuration), Biasing (fixed bias, collector to base bias & voltage divider bias) and stability factor for all biasing circuits.	
Unit 5:-BIPOLAR TRANSISTOR'S SMALL SIGNAL MODELS :	8 Hrs.
H-Parameters, Hybrid model for transistor (CE,CB&CC configuration), analysis	
of amplifier for Voltage gain, Current Gain, Input Resistance and Output Resistance in terms of h-parameters.	
of amplifier for Voltage gain, Current Gain, Input Resistance and Output Resistance in terms of h-parameters. Unit 6: BJT AMPLIFIERS Classification of amplifiers, frequency response of cascade amplifier, Feedback Amplifier: Classification of feedback amplifier(voltage Series ,Current series, voltage shunt, current shunt feedback amplifiers), Study of emitter Follower, Darlington amplifier with bootstrapping principle, Needof Cascading, Evaluation of Ri, Ro, Ai, Av, Types of coupling, RC coupled, Transformer coupled, Direct coupled amplifier, two stage ,RC coupled amplifier with and without feedback.	8 Hrs.
of amplifier for Voltage gain, Current Gain, Input Resistance and Output Resistance in terms of h-parameters. Unit 6: BJT AMPLIFIERS Classification of amplifiers, frequency response of cascade amplifier, Feedback Amplifier: Classification of feedback amplifier(voltage Series ,Current series, voltage shunt, current shunt feedback amplifiers), Study of emitter Follower, Darlington amplifier with bootstrapping principle, Needof Cascading, Evaluation of Ri, Ro, Ai, Av, Types of coupling, RC coupled, Transformer coupled, Direct coupled amplifier, two stage ,RC coupled amplifier with and without feedback. Textbooks:	8 Hrs.

References:

- 1. Electronic Devices and Circuit Theory by Boylestad, Pearson Publication.
- 2. Electronic Devices and Circuits by J.B.Gupta,Katson Publication
- 3. Electronic Devices and Circuits by Millman, Halkias, TMHPublication.
- 4. Schaum's Outlines, "Electronic Devices and Circuits"
- 5. Electronic Devices and Circuits by Allen Mottershead-PHI.
- 6. Solid State Electronic Devices by Ben Streetman, PearsonPublication.

Unit wise Measurable students Learning Outcomes:

1The student will be able to explain basics of semiconductor physics.

2. The student will be able to analyze diode circuit using basic engineering sciences.

3The student will be able tomake use of semiconductor devices as per industry practice in a satisfactory manner.

4 The student will able to analyze transistor biasing circuits.

5 The student will be able to estimate h-parameters of CB, CC & CE transistor's configurations

6 The student will be able to analyze and design various applications of bipolar junction transistors such as feedback amplifiers

KOLHAPUR INSTITUTE OF TECHNOLOGY'S COLLEGE OF ENGINEERING KOLHAPUR

Title of	f the C	ourse	:Digita	al Desig	gn usin	g HDL					L	Т	Р	C	redi
Course	Code	: UEL	N0303								3	-	-		3
Course	Pre-R	equisit	e:												
Number	systen	n basics	s, Logi	c Gate	s, Bool	ean Al	gebra								
Course	Descri	ption:													
This cou	urse co	vers the	e funda	amenta	ls of D	Digital 1	Design	, Boole	ean Lo	gic Sir	nplifi	cation	and C	Combi	natio
Logic D	esign,N	MSI de	vices,S	Sequen	tial Lo	gic Des	sign,Lo	ogic Fa	milies	and Se	emico	nduct	or Me	mories	s des
using H	DL.														
Course	e Obje	ctives:	1	· 1	.1 1	c	1.	• 1	1			1.			
1. 2	To exp	cuss in	e analy detai	tical m	ethods	TOP CO	of va	tional a	nd seq	uential	l logic ic far	c designilies	n. and (TPL D	FP
2.	archite	ctures.	i uctui	i uic i	speenic	auons	01 vu	lious I		51 105	ie iui	mies	unu (<i>.</i> п <i>..</i> ,	11,
3.	To dev	elop th	e meth	odolog	gy for d	ligital o	lesign	using V	/HDL.						
4.	To mo	tivate s	tudent	s to use	e EDA	tools f	or desi	gn and	simula	tion.					
Course	Lear	ning C	Outcor	nes:						<u> </u>					
CO	After	the c	omple	etion o	f the o	course	the st	tudent	,			Bl	oom's	5	
	shou	ld be a	ble to)						1	evel		Des	script	or
CO1	Desig	n com	binatio	onal lo	gic cire	cuits					VI		Cr	eating	3
CO2	Desig	n sync	hrono	us sequ	uential	logic o	circuits	5			VI		Cr	reating	3
CO3	Diffe	rent <mark>iat</mark>	e logio	c fami	lies, se	emicor	ducto	r m <mark>em</mark>	ories	ΑΡι	JR.	INS	Comp	rehen	sion
	an <mark>d P</mark>	LDs.								CH	ŇΟ	LD	Comp		5101
CO4	Desig	n and	simula	te digi	tal log	ic usin	g HDI	and E	EDA		VI		C	ontin	
	tools.										V I	0	CI	Cating	Ś
CO-PC) Map	ping:													
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CO1			3							10	- 11		2	2	2
CO2			3											2	2
CO3		2	5									-		-	-
CO4			3											2	3
Assessi	nents														
Teache	er Asse	essmer	nt:												
Two co	mpone	ents of	In Se	mester	: Evalu	ation	(ISE),	One N	/lid Se	meste	r Exa	mina	tion (MSE)	and
one En	d Seme	ester E	xamir	ation	(ESE)	havin	g 20%	. 30%	and 5)% we	eight	s resp	ective	lv.	
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			MSE								30				
			ISE 2	•							10				
			ESE 2	<i>,</i>							50				
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(norma			modu	ies) co	vered	anterr	NSE.								
	Cont	ents:											<u> </u>		T
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DOCL			1 fa	V IV-	-1		Dim	L 00 1.	. C-1	Com					

Unit 2: Combinational logic design: Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, Multiplexers, Encoder, Decoder, Driver & Multiplexed Display Barrel shifter, ALU, Comparators 7Hrs. Sequential Logic Design: Latches, flip-flops: S-R, D, JK and Master-Slave JK FF, Edge triggered FF, Flip Flop conversion, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Algorithmic State Machines charts. 7Hrs. Unit 4: Logic Families: TTL NAND,CMOS gates, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate, study of TTL and CMOS families and their interfacing. 5Hrs. Unit 5:Semiconductor memories and programmable devices: Memory Terminologies, General Memory Operation, Read-Only Memories, Flash Memory, Semiconductor RAM , Dynamic RAM (DRAM), Memory elements, Concept and architecture of Programmable logic devices like CPLD and FPGA. 5Hrs. Unit 6: Digital Design using VHDL: VLSI Design flow, Design entry(Schematic, FSM & HDL), different modelling, styles in VHDL, Data types and objects, Dataflow, Behavioural and Structural Modelling, Synthesis and Simulation, VHDL constructs and codes for combinational and sequential circuits. 5Hrs. 1. R. J. Tocci, N. S. Widmer, G. L. Moss "Digital Systems principles and Applications" Tenth Edition, Pearson. 5 2. M. Morris Mano, Michael D. Ciletti, "Digital Design" 5th edition, Pearson. 200 3. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles And Applications" 8th Edition, Tata McGraw Hill. 1. Hetters Hull 2nd edition 2012, References: 1. Bouglas Perry, "						
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VHDL	VHDI					

Title of the Course: Network Analysis	L	Т	P	Credit
Course Code:UELN0304	3	1		4

Course Pre-Requisite: Basic Electrical Engineering , Solution of Integral-Differential Equations, Laplace Transform

Course Description:

This Course aims to develop the basic concepts of network analysis, which is the pre-requisite for all the Electronics Engineering courses.

The course deals with understanding various network reduction techniques such as Sourcetransformation, Network theorems etc. and apply these techniques to simplify different complex R-L-C circuits. The course enables students to design resonant circuits which are used at different frequency spectrum. The course teaches students to understand two-port networks and synthesize different parameters using two-port networks. Students understand and implement types of passive filters .Students acquire knowledge about the Transient Response of complex R-L-C passive circuits and then they are able to design stable systems.

Course Objectives:

1. Solve different complex circuits using various network reduction techniques such as Source transformation, Network theorems etc.

2. To discriminate between series and parallel resonance and design Resonant circuits

- 3. To evaluate two port network parameters
- 4. To understand Time Domain system behaviour using pole zero plot
- 5. To understand and implement types of passive filters.

6. To Evaluate AC and DC transients Response for complex R-L-C series and parallel circuits and to analyze the system stability.

Course Learning Outcomes:

CO	After the completion of the course the student	Bloom's Cognit	ive
	should beable to	level	Descriptor
CO1	Analyzethe basic AC and DC circuits using	IV Analysis	Cognitive
	Nodal ,mesh analysis and network theorems	-	
CO2	Distinguish between series resonance and parallel	IV Analysis	Cognitive
	resonance concepts and perform parameter	V Complex	Psychomotor
	calculations for resonance frequency, half power	Overt	
	frequencies, BW, Q factor, current, voltages	Response	
CO3	Derivetwo port network parameters viz Z, Y,	V Synthesis	Cognitive
	ABCD, h and their interrelationships and		
	determine different network functions		
~ ~ .			~ · ·
CO4	ApplyLaplace Transform for steady state and	III Application	Cognitive
	transient analysis, appreciate the frequency domain	V Synthesis	
	techniques and design filters		

CO-PO Mapping:

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO	PO	PO	PSO1	PSO2
										10	11	12		
C01	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	3	-	-	-	-	-	-	-	3	-
CO3	-	3	1	-	-	-	-	-	-	-	-	-	-	3
CO4	-	3	-	3	3	-	-	-	-	-	-	2	-	1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Un <mark>it 1: Network Fund</mark> amentals:	-7- Hrs.
Representation of voltage & current sources.(Independent & Dependent), source transformation, series & parallel connection of passive elements(R,L,C), graph of network & its parts, loops & trees, linear graphs & incidence matrix, cut sets, planner & non-planner graph loop matrix. Star- Delta transformation, reduction of networks: Mesh analysis, Node analysis. Super mesh and super node analysis. Matrix approach of network containing voltage and current sources and reactances.	ERI UR
Unit 2:Ne <mark>twork Theo</mark> rems	-7- Hrs.
D.C. and A.C. network solution using dependent and independent sources:	
Superposition Theorem, Millman's Theorem, Norton's Theorem, Thevenin's	
Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem, Duality	
theorem, Compensation and Tellegen's theorem	
Unit 3: Resonance:	-6- Hrs.
Definition, Types: series & parallel resonance. Series resonance- resonant	
frequency, variation of impedance, admittance, current & voltage across L & C	
with respect to frequency, Effect of resistance on frequency response, Selectivity,	
B.W. and Quality factor. Parallel resonance – Anti resonance frequency, variation	
of impedance & admittance with frequency, Selectivity& B.W.	

Unit 4: Two Port Network & Network Functions:	-8- Hrs.
Two port network: Open circuit impedance (Z) parameters, Short circuit	
admittance (Y) parameters, Hybrid (H) parameter, Transmission	
parameters(ABCD), Interrelation of different parameters, Interconnections of two	
port network (Series, Parallel, Cascaded, Series- Parallel)	
Network functions: Network functions for one port & two port networks, Driving	
point impedance and admittance of one port network, Driving point impedance,	
admittance & different transfer function of two port network(Z,Y,H & T	
parameters). Concept of complex frequency, significance of poles & zeros.	
Restrictions on poles & zeros for transfer & driving points function, pole zero	
diagram.	
Unit 5:Filters & Attenuators:	-6- Hrs.
Filters:	
Definitions, classification & characteristics of different filters, filter fundamental	
such as attenuation constant, phase shift constant, propagation constant,	
characteristic impedance, relationship between decibel and neper. Design &	
analysis of constant K, M derived filters (low pass, high pass, band pass & band	
stop filters): T & Pi sections	
Attenuators -Definitions, classification, Analysis & design of T type, Π type , α	
Lattice, bridged-T & L types attenuators Equalizer: Inverse network, series and	
shunt equalizer	TITUTE
	V/C
Unit 6: Transient Response:	-6- Hrs.
Analysis of RC, RL, and RLC networks with and without initial conditions with	
Laplace transforms evaluation of initial conditions. Transient behaviour	
Steady state & transient response (Voltage & Current)	
DC response of RL, RC, RLC circuits	EKING
Sinusoidal response of RL, RC & RLC circuits	
Textbooks:	
1 A. Sudhakar , Shyammohan S. Palli 'Circuit & Network – Analysis & Synthesis' Illi	rd
Edition – Tata McGraw Hill Publication (Unit II,IV,VI)	
2 A.Chakrabarti 'Circuit Theory (Analysis & Synthesis)' - IIIrd Edition (Unit I,II)	
Dhanpat Rai & co	
3 D. Roy Choudhury 'Networks & Systems' - New Age International Publisher (Uni	t
4 Soni Gupta 'Electrical Circuit Analysis' Dhanpat Rai & Co. (Unit III,IV,V,VI)	T
3 JoshephEdministrar 'Theory & Problems of Electronic Circuit (Schaum's series)' -	– Tata
McGraw Hill, Publication	
References:	
I William H Hayt, Jack E Kimmerly and Steven M.Durbin, 'Engineering Circuit An	alysis',
Tata McGraw Hill	
2 M.E. Van Valkenburg ' Network Analysis' – IIIrd Edition, Pearson Education / PE	
3Boylestad 'Introductory Circuit Analysis' – Universal book stall, New Delhi.(Unit)	l,II)
Unit wise Measurable students Learning Autoomes.	
Unit1	
UO 1 1. Students will be able to apply Circuit analysis and Circuit reduction technic	mes
UO 1.2. Students will be able to apply Create Theory and form Leadence Matrice T:	Auco Sot
1.4 : Students will be able to apply Graph Theory and form incidence Matrix, 116	2-00l
Matrix, Cut – Set Matrix	

UO 1.3: Students will be able to apply Mesh and Nodal Analysis

Unit 2

UO 2: Students will be able to apply Network Theorems to DC and AC circuits with R,L,C components

Unit 3

UO 3.1: Students will able to design R-L-C series resonant circuit for different frequencies and evaluate Q factor, current and voltage variations across each component with respect to frequency.

UO 3.2: Students will able to design R-L-C parallel resonant tank circuit for different frequencies and evaluate Q factor, current and voltage variations across each component with respect to frequency

Unit 4

UO 4.1: Students will able to determine Z,Y, h and ABCD parameters of two port n/w and convert these parameters of two port n/w into each other.

UO 4.2: Students will able to determine parameters of Series connected / Parallel connected / Cascade connected/ Series-Parallel connected Two-Two port networks.

UO 4.3: Students will understand concept of complex frequency, significance of poles & zeros and determine system stability.

UO 4.4: Students will able to determine Restrictions on poles & zeros for transfer & driving points function

Unit 5

UO 5.1: Students will able to Design & analyze constant K filters (LPF, HPF, BPF and BSF) T & Pi sections.

UO 5.2: Students will able to Design & analyze M-Derived filters (LPF, HPF, BPF and BSF) T & Pi sections

UO 5.3: Students will able to design different types of attenuators

U<mark>nit 6</mark>

UO 6.1: Students will able to analyze Step or DC response of RC/RL/R-L-C series circuit

UO 6.1: Students will able to analyze Sinusoidal or AC response of RC/RL/R-L-C series

circuit

Title of the Course: Electronic Measurement And Instrumentation	L	Т	Р	Credit
Course Code: UELN0305	3	0	-	3

Course Pre-Requisite:

Basics of passive components, principles of electricity, Magnetism, heat, lights and materials.

Course Description:

This course will help to develop skills to measure electrical parameters using various instruments. By learning this course students will able to know basics of various Instruments, transducers and working of electronic circuits used in electronic test and measuring instruments.

Course Objectives:

1. To understand the working of basic measurement system and sources of errors in measurement system.

- 2. To study static and dynamic characteristics of instrument.
- 3. To study the operation & applications of different testing & measuring instruments.
- 4. To understand the working principle of sensors and transducers.
- 5. To study the operation & design of bridge circuit.

6. To study the operation of DAS & data convertors.

Course	Course Learning Outcomes:						
CO	After the completion of the course the student will	Bloom's C	ognitive				
	able to	Level	Descriptor				
CO1	Explain the principle of operation of generalized	II	Understanding				
	measurement system and different sources of errors in		_				
	measurements.		NICTITIITE				
CO2	Analyzedifferent static and dynamic characteristics of	IV	Analyzing				
	instrument & based on this will able to select particular	CHNO	LOGYS				
	instrument for measurement.	1.1.1					
CO3	Define units and standards, their conversions, characteristics	Ι	Remembering				
	and error analysis of measurement systems.						
CO4	Classify and select transducer for particular application	V	Evaluating				
CO5	Design AC and DC bridges for relevant parameter	VI	Creating				
	measurement.						
CO6	Demonstrate the use of Signal Generators, analyzers,	II	Understanding				
	frequency counter, CRO, DAS, ADC and DAC for						
	appropriate measurement.						
COP	Monning						

0010	Trap	B-												
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO
										0	1	2	1	2
CO1	2													
CO2		2												
CO3												2		
CO4												2		
CO5	2	2	3					2						2
CO6									2	1				2

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weight-age for course content

(normally last three modules) covered after MSE.					
Course Contents:					
Unit 1:Basics of Measurement Systems	6 Hrs.				
Introduction, definition of measurement, definition of instrumentation, generalized block diagram of measurement system, different sources of errors in measurement, calibration of instruments, performance characteristics of instruments – static characteristics, dynamic characteristics, accuracy and precision, statistical analysis of					
data, arithmetic mean, deviation, average and standard deviation, probable error.					
Unit 2:Analog and Digital Measurements	7 Hrs.				
Analog instruments- classification, PMMC, MI, MC – construction, working principle					
etc, range extension.					
Digital Instruments- Digital Voltmeter- ramp type DVM, integrating type DVM,					
successive approximation type DVM, DFM, DMM, Digital Tachometer, Line mains					
frequency indicator.					
Unit 3:Oscilloscopes and signal generators Digital Storage Oscilloscope- Block diagram, Working principle, measurement, Parameters. Types of CRO: Dual Beam, Dual Trace, CRO probes. Signal generators- introduction, audio frequency generators, radio frequency generators, function generator, pulse and square wave generators.	7 Hrs.				
Unit 4: Transducers	7 Hrs.				
Classification; Selection of Transducers; Resistive Transducers – Potentiometer, Strain	/				
gauges, Rosettes, Thermistor and RTD; Capacitive Transducers – Measurement of Liquid level by change in variation of dielectric constant; inductive transducers-LVDT; Piezoelectric Transducers; Photoelectric Transducers; thermocouple, pressure	GY'S				
transducers, load cell, Digital displacement Transducer, advanced industrial and					
Luit 5. A Cond DC Bridges	7 11.00				
DC Bridges- Introduction, Wheatstone bridge, Kelvin's bridge sensitivity and	/ Hrs .				
limitations.					
AC Bridges- Introduction, Maxwell's bridge, Hay's bridge, Andersons bridge, Schering					
br <mark>idge, w</mark> ein bridge					
Unit 6: Data Acquisition Systems Introduction to signal conditioning, various signal conditioning circuits, , S/H Circuits, Introduction To Data Acquisition System, Various DAS Configurations, Single Channel DAS, Multi-Channel DAS, IC Based DAS, Data Acquisition, Data Acquisition in PLC. Signal analyzers-Introduction, basic wave analyzer, heterodynes harmonic distortion analyzer, Logic Analyzer.	8 Hrs.				
Toythooka					
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measureme Pearson education 	ent techniques",				
References:					
 A. K.Sawhney. "A course in electrical & electronics measurements & instruments", DhanpatRai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publication. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua "Fundamentals of industrial instrumentation" Wiley India publication 					
5. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxfor 6. M.M.S.Anand, "Electronics instruments & instrumentation technology" PHI pu	rd publication.				
Unit wise Measurable students Learning Outcomes:					
1. Student would able to different terms and peremeters in Measurement system					

Student would able to different terms and parameters in Measurement system
 Student should beable to analyze Static and dynamic Characteristics with their error format in

an Instrument.

- 3. Student should beable to select Components and instrument for testing different Measurement
- 4. Student should beable to choose transducer to measure physical parameters.
- 5. Student should beable to Design AC &DC bridges for measurement of Parameters of different components.
- 6. Student should beable to Interpret the requirements of Data Acquisition system.



KOLHAPUR INSTITUTE OF TECHNOLOGY'S COLLEGE OF ENGINEERING KOLHAPUR

Audit Course-I

Shivaji University, Kolhapur

Second year undergraduate compulsory course in

ENVIRONMENTAL STUDIES

Course Code: UELN0361

Lecture: 02 Syllabus

Syllabus

1. Nature of Environmental Studies. (4 lectures)

Definition, scope and importance, Multidisciplinary nature of environmental studies, Need for public awareness.

2. Natural Resources and Associated Problems. (4 lectures)

a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.

d) Food resources: World food problem, changes caused by agriculture effect of modern agriculture, fertilizer-pesticide problems.

e) Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclear energy.

f) Land resources: Solar energy, Biomass energy, Nuclear energy,Land as a resource, land degradation, man induced landslides, soil erosion and desertification.Roleof an individuals in conservation of natural resources.

3. Ecosystems (6 lectures)

Concept of an ecosystem.Structure and function of an ecosystem.Producers, consumers and decomposers.Energy flow in the ecosystem.Ecologicalsuccession.Food chains, food webs and ecological pyramids.Introduction, types, characteristics features, structure and function of the following ecosystem :-

a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

4. Biodiversity and its conservation (6 lectures)

Introduction- Definition: genetic, species and ecosystem diversity.Bio-geographical classification ofIndia.Valueof biodiversity: consumptive use, productive use, social, ethical,aesthetic and option values.India as a mega- diversity nation.WesternGhat as a biodiversity region.Hot-spot ofbiodiversity.Threats to biodiversity habitat loss, poaching of wildlife, man- wildlife conflicts.Endangered and endemic species ofIndia.Conservationof biodiversity: In-situ and Ex-situ conservation of biodiversity.

5. Environmental Pollution (6 lectures)

Definition: Causes, effects and control measures of: Air pollution, Water pollution, soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of a individual in prevention of pollution.

6. Social Issues and the Environment (8 lectures)

Disaster management: floods, earthquake, cyclone, tsunami and landslides. Urban problems related to energy Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issue and possible solutions.Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.Wastelandreclamation.Consumerism and waste products.

7. Environmental Protection (8 lectures)

From Unsustainable to Sustainable development.Environmental Protection Act.Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act.Wildlife Protection Act.Forest Conservation Act.Population Growth and Human Health, Human Rights.

References :

1) Agarwal, K.C.2001, Environmental Biology, Nidi Pub. Ltd., Bikaner.

2) BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt.Ltd., Ahmedabad 380013, India, Email:mapin@icenet.net (R)

3) Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p

4) Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)

5) Cunningham, W.P. Cooper, T.H.Gorhani, E. & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Pub. Mumbai, 1196p

6) De A.K., Environmental Chemistry, Wiley Wastern Ltd.

7) Down to Earth , Centre for Science and Environment , New Delhi.(R)

8) Gleick, H.,1993, Water in crisis, Pacific Institute for studies in Dev., Environment& Security. Stockholm Env. Institute. Oxford Univ. Press 473p

9) Hawkins R.E., Encyclopediaof Indian Natural History, Bombay Natural History Society, Bombay (R)

10) Heywood, V.H.& Watson, R.T.1995, Global Biodiversity Assessment, Cambridge Univ. Press 1140p.

11) Jadhav, H.and Bhosale, V.M.1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi 284p.

12) Mickinney, M.L.and School. R.M.1196, Environmental Science Systems and Solutions, Web enhanced edition, 639p.

13) Miller T.G. Jr., Environmental Science. Wadsworth Publications Co.(TB).

14) Odum, E.P.1971, Fundamentals of Ecology, W.B.Saunders Co. USA, 574p.

15) Rao M.N.and Datta, A.K.1987, Waste Water Treatment, Oxford & IBHPubl. Co. Pvt. Ltd., 345p

16) Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse,

Meerut

17) Survey of the Environment, The Hindu (M)

18) Townsend C., Harper, J. and Michael Begon, Essentials of Ecology, Blackwell Science (TB)

19) Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I and II, Environmental Media (R)

20) Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB)

21) Wagner K.D., 1998, Environmental management, W.B. Saunders Co.Philadelphia, USA 499p.

22) Paryavaran shastra – Gholap T.N.

23) ParyavaranSahastra - Gharapure

(M) Magazine

(R) Reference

(TB) Textbook

Title of	f the Course:Electronics Devices and Circuits LAB	L	Т	P	Credit			
Course	e Code:UELN0331	0	0	2	1			
Course	Pre-Requisite:							
Basic k	nowledge of Electron physics, Electrical Engineering.							
Course	Course Description:							
This course provides students, the fundamental concepts of Electronic Devices their analysis								
and various circuit applications.								
Course	Course Objectives:							
1.	1. To construct simple electronic circuits to accomplish specific function.							
2.	2. Testing of circuits developed in lab.							
3. Evaluate performance of experiment studied.								
Course Learning Outcomes:								
CO	After the completion of the course the student should be	Blo	om's	Cogn	itive			
	able to	leve	el	Desc	riptor			
CO1	Analyze circuits(rectifiers, wave shaping circuits, and amplifiers) to meet requirements	IV		Anal	yzing			
CO2	Design circuits (rectifiers, wave shaping circuits, and amplifiers) to meet requirements.	VI		Crea	ating			
CO3	Build circuits (rectifiers, wave shaping circuits, and amplifiers) to meet requirements.	, III	RII	App	lying			
CO4	Evaluate circuits (rectifiers, wave shaping circuits, and amplifiers) performance parameters.	V	JQI	Evalu	lating			
CO5	Interpret results of experiment and compare with standard value.	v	E	Evalu	ating			

CO-PO Mapping:

	TATC	թթու	5.											
CO	PO	PO	PO	PO	PO	PO	PO	PO	PO 9	РО	PO	PO	PSO1	PSO2
	1	2	3	4	5	6	7	8		10	11	12		
CO1	3	2	2	1	" <u>-</u> "	"_"	"_"	"_"	"_"	"_"	"_"	"_"	1	"_"
CO2	2	2	3	3	"_"	"_"	··_"	··_"	··_"	··_"	··_"	··_"	··_"	3
CO3	2	2	3	3	"_"	"_"	"_"	··_"	··_"	··_"	··_"	··_"	··_"	3
CO4	2	1	2	3	"_"	"_"	··_"	··_"	··_"	··_"	··_"	··_"	1	3
CO5	1	2	··_"	"_"	··_"	··_"	··_"	··_"	··_"	··_''	··_"	··_"	1	1

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

ISE 50	
151	
ESE 50	

ISE are based on practical performed/ Quiz/ Lab assignments/ Presentations/ Group Discussions/ Internal oral etc.

ESE: Assessment is based on oral examination and lab experimentation.

Course Contents:

Experiment No. 1:---

2Hrs.

Aim and Objectives: To Study of VI characteristics of PN junction diode. **Outcomes:** The students will be able toplot V-I Characteristics of the PN Junction Diode for the both Forward and Reverse Bias conditions. **Theoretical Background:** Theoryof V-I characteristics of diode.

Experimentation: Characteristics of PN Junction Diode

Results and Discussions: Observed Waveforms and noted analysis Parameters	
Conclusion: Implemented circuit and observed the result	211
Experiment No. 2:	2Hrs.
Aim and Objectives: To Study of V-I characteristics of zener junction diode.	
Outcomes: The students will be able toplot V-I Characteristics of the zener Diode for the	
both Forward and Reverse Blas conditions.	
Incoretical Background: Theoryof V-I characteristics of zener diode.	
Experimentation: Characteristics of zener Diode	
Results and Discussions: Observed waveforms and noted analysis Parameters	
Conclusion: Implemented circuit and observed the result	2Hag
Experiment No. 3:	ZHIS.
Ann and Objectives: To Study of full wave fectifier.	
Theoretical Background Theory and energian principle of Destifiers	
Encorrence Background: I neoryand operation principle of Rectifiers	
Experimentation: Analysis, designing and implementation of full wave fectifier	
Results and Discussions: observed waveforms and noted analysis Parameters	
Conclusion: Implemented rectifier circuits and observed the result	211
Experiment No. 4:	2Hrs.
Ann and Objectives: 10 Study of C-inter using full wave rectifier.	
Outcomes: The students will be able to deign and evaluate C-filter using full wave	
rectifier.	
I neoretical Background: I neoryand operation principle of C-filter	
Experimentation: Analysis, designing and implementation of C-filter using full wave	
rectifier	Y'S
Results and Discussions: observed waveforms and noted analysis Parameters	
Conclusion: Implemented C-filter using full wave rectifier circuits and observed the result	
Experiment No. 5:	2Hrs.
Aim and Objectives: To Study of L-filter using full wave rectifier.	
Outcomes: The students will be able to deign and evaluate L-inter using full wave	EKIN
The exectional Residence and the execution main single of L filter	
Example 1 and the second seco	
Experimentation: Analysis, designing and implementation of L-inter using full wave	
Regulta and Discussions, cheeryed Wayoforms and noted analysis Deremators	
Conclusion Implemented I filter using full wave regifier singuits and observed the regult	
Conclusion: Implemented L-Inter using full wave rectifier circuits and observed the result	OIIma
Aim and Objectives To Study of LC filter using full wave restifier	2 1115.
Ann and Objectives: To Study of LC-filter using full wave fectifier.	
rectifier	
Theoretical Packground Theory and operation principle of LC filter	
Experimentation: A value is designing and implementation of LC filter using full wave	
rectifier	
Regults and Discussions, observed Waysforms and noted analysis Deremators	
Conclusion Implemented I C filter using full wave rectifier circuits and observed the	
conclusion: implemented LC-inter using full wave rectifier circuits and observed the	
Experiment No. 7.	2Hrs
Aim and Objectives: To Study of different types of elipper circuits	21115.
Outcomes: The students will be able to compare different types of clipper circuits.	
Theoretical Background: Theoryand operation principle of different types of elipper	
circuits	
Experimentation : Analysis and implementation of different types of clipper circuits	
Descripter and Discussions: Observed Waveforms	
Conclusion: Implemented different types of alippor aircuits and observed waveforms	
Experiment No. 8 .	2 U rc
Laper Intent 190. 0:	21115.
Ann and Objectives: To Study of different types of clamping circuits.	
Theoretical Background: Theoryand operation principle of different types of clamping	
Theoretical Dackground: Theoryand operation principle of different types of clamping	

circuits.		
Experimentation: Analysis, implementation of different types of clipper circuits.		
Results and Discussions: Observed Waveforms.		
Conclusion: Implemented different types of clamping circuits and observed waveforms.		
Experiment No. 9:	2Hrs.	
Aim and Objectives: To determination of H-parameter for CE configuration using input		
and output characteristics		
Outcomes: The students will be able to determine H-parameter for CE configuration		
using input and output characteristics		
Theoretical Background: Knowledge of hybrid model for different configurations of		
transistors.		
Experimentation: Analysis, designing and implementation of CE configuration		
Results and Discussions: Noted input, output voltages and currents.		
Conclusion: Implemented rectifier circuits and plotted input output characteristic graph to		
obtain h-parameters practically.		
Experiment No. 10:	2Hrs.	
Aim and Objectives: To study frequency response of single stage RC coupled amplifier.		
Outcomes: The students will be able to plot frequency response of single stage RC		
coupled amplifier		
Theoretical Background: Theory and operation principle of single stage RC coupled		
amplifier		
Experimentation: Analysis, designing and implementation of single stage RC coupled		
amplifier KOIHAPUR INS	TITUTE	
Results and Discussions: Noted output voltage for different frequencies.	$\gamma \gamma c$	
Conclusion: Plotted frequency response for single stage RC coupled amplifier NULUC	IT D	
And observed three different frequency regions of an amplifier.		
Experiment No. 11:	2Hrs.	
Aim and Objectives: To design and frequency response of two stage RC coupled		
amplifier	ERIN	
Outcomes: The students will be able to plot frequency response of two stage RC coupled		
amplifier		
Theoretical Background: Theory and operation principle of two stage RC coupled	UK	
amplifier		
Experimentation: Analysis, designing and implementation of of two stage RC coupled		
amplifier		
Results and Discussions: Noted output voltage for different frequencies.		
Conclusion: Plotted frequency response for two stage RC coupled amplifier		
And observed three different frequency regions of an amplifier.		
Experiment No. 12:	2Hrs.	
Aim and Objectives: To design and frequency response of two stage RC coupled		
amplifier with feedback		
Outcomes: The students will be able to plot frequency response of two stage RC coupled		
amplifier with feedback		
Theoretical Background: Theory and operation principle of two stage RC coupled		
amplifier with feedback		
Experimentation: Analysis, designing and implementation of of two stage RC coupled		
amplifier with feedback		
Results and Discussions: Noted output voltage for different frequencies.		
Conclusion: Plotted frequency response for two stage RC coupled amplifier		
And observed three different frequency regions of an amplifier.		
Textbooks:		
1. Electronic Devices and circuits by S.Salivahanan, N Suresh Kumar, A Vallavaraj.		
2. Electronic Devices and Circuits by Anil K. Maini, Varsha Agarwal- Wiley India.		
3. Electronic Devices and Circuits by A.P.Godse and U.A.Bakshi.		
4. Electronic Devices and Circuits by Mantri & Jain.		
References		

- 2. Electronic Devices and Circuit Theory by Boylestad.
- 3. Electronic Devices and Circuits by J.B.Gupta.
- 4. Pulse, Digital & Switching Waveforms by Millman, Halkias, TMH.
- 5. Schaum's Outlines, " Electronic Devices and Circuits"
- 6. Electronic Devices and Circuits by Allen Mottershead-PHI.
- 7. Solid State Electronic Devices by Ben Streetman, Pearson.

Experiment wise Measurable students Learning Outcomes:

- 1. The students will be able to plot V-I characteristics of P-N junction diode
- 2. The students will be able to plot V-I characteristics of Zener diode
- 3. The students will be able to design and evaluate full wave rectifier.
- 4. The students will be able to design and evaluate C-filter using full wave rectifier.
- 5. The students will be able to design and evaluate L-filter using full wave rectifier.
- 6. The students will be able to design and evaluate LC-filter using full wave rectifier.
- 7. The students will be able to compare different types of clipper circuits.
- 8. The students will be able to compare different types of clamping circuits.
- 9. The students will be able to determine H-parameter for CE configuration using input and output characteristics
- 10. The students will be able to plot frequency response of single stage RC coupled amplifier.
- 11. The students will be able to plot frequency response of two stage RC coupled amplifier
- 12. The students will be able to plot frequency response of two stage RC coupled amplifier with feedback

COLLEGE OF ENGINEERING KOLHAPUR INSTITUTE OF TECHNOLOGY'S ENGINEERING

Title of the Course: Electronic Measurement And Instrumentation	L	Т	P	Credit
Course Code:UELN 0332	0	0	2	1

Course Pre-Requisite: Basic Understanding of passive components, Hands on experience of handling DMM

Course Description:

This course will help to handle analog and digital instruments. The course will help student understand the working and application of various transducers. Students will help in understanding the working of PLC and DAS.

Course Objectives:

1. To understand the measurement of electrical parameters using CRO and DSO

2. To study the operation &use of different transducers

- 3. To understand measurement of parameters such as R, L, C with the help of AC, DC bridges
- 4. To study the working of PLC and Data Acquisition System

Course	e Learning Outcomes:				
CO	After the completion of the course the student will	Bloom's Cognitive			
	able to	Level	Descriptor		
CO1	Explain the measurement of electrical parameters using CRO and DSO	II	Understanding		
CO2	Analyze the operation and use of various transducers	IV	Analyzing		
CO3	Explain the measurement of R,L,C with the help of AC,DC bridges	II	Understanding		
CO4	Explain the working of PLC and DAS	H PUR I	Understanding		

<u>) Ε ΤΕCΗΝΟΙ ΟGΥ</u>

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2								J			
CO2			2									
CO3		2									Μ	JK
CO4					2							

Assessments : ISE (50 Marks)

Total I	Marks : 50
Project Based Learning (25 Marks)	Laboratory Experiment work (25 Marks)
Project Evaluation Committee (10 Marks)	Journal Completion (10 Marks)
Project Work (10 Marks)	Oral (10 Marks)
Report (5 Marks)	Quiz (5 Marks)

Project Evaluation Committee :

- Project Evaluation committee will analyze the work done by the project group and viva will be taken based on the project.
- Project Work will be evaluated based on the rubrics designed.
- Each project group has to submit a report on the project (Max.10 Pages)

Course Contents:	
Experiment No. 1:Study of Cathode Ray Oscilloscope	
Aim and Objectives: To Measure electrical parameters using CRO	02 Hrs.
Outcomes: Hands on experience and understanding of functions of CRO	
Experiment No. 2: Measurement of frequency and phase using Lissageous	02 Hrs
Aim and Objectives, frequency and phase measurement	
Ann and Objectives. Inequency and phase measurement	
Theoretical Background: working of oscilloscope	
Experimentation:	
Calibrate the instrument first	
• Canorate the instrument first	
• Make connections	
• Vary the frequency and obtain Lissajeous pattern	
• Measure unknown frequency and phase	
Experiment No. 3: Study of digital storage oscilloscope	02 H mg
	02 Hrs
Aim and Objectives: Measure electrical parameters using DSO	
Outcomes: Hands on experience and understanding of functions of DSO	ELLER E
Experiment No 4: Study of temperature transducers:	IUIE
a) RTD	'S
b) Thermistor	
Aim and Objectives: Measure temperature using above devices	
And and Objectives. Incasure temperature using above devices	
Theoretical Background: Working principle of RTD. Thermistor	
Experimentation:	
Calibrate the instrument first	
	JR
• Connect the RTD in bridge circuit	
Increase temperature	02 H rs
• Record DPM reading	02 111 5
• Find the slope of graph	
Results and Discussions: After completion of this experiment student will learn	
how to measure temperature using above devices.	
Conclusion: RTD is a PTC device, Thermistor is a NTC device and thermocouple	
gives linear relationship between temp. and output	
Experiment No. 5: Study of temperature using Thermocouple	02 Hrs.
Aim and Objectives: Massurement of Temperature	
Ann and Objectives: Measurement of Temperature	
Theoretical Deakground, working principle of Thermosouris	
r neorencar background: working principle of Thermocouple	

Experiment No. 0 Study of AC and DC bruges. (Any one)	02 Hrs
a) Whatstones' bridge	02 1115.
a) Which bridge	
c) well blidge	
Ann and Objectives: Inding unknown resistance and unknown impedances	
Outcomes: unknown resistance and unknown impedances	
Theoretical Background: working of whetstones' bridge and wein bridge	
Experimentation:	
• Calibrate the instrument first	
Make connections	
 Vary the resistance and balance the bridge 	
Measure unknown resistance and record it	
Results and Discussions: After completion of this experiment student will learn	
now to measure unknown resistances and impedances	
Experiment No. 7:Study of weight measurement using strain gauge	
Aim and Objectives: measurement of weight	
Theoretical Background: working principle of strain gauge, load cell etc.	
• Experimentation:	
• Calibrate the instrument first using gain control knob HAPIIR INST	TUTE
Connect strain gauges with correct polarity	
 Very the weight in escending and descending order 	5
• Vary the weight in ascending and descending order	
• Record DPM reading	
• Find the slope of graph	
Experiment No. 8:- Study of DAC using R-2R ladder network	02 Hrs.
Experiment No. 9:Study of DAC using R-2R ladder network	02 Hrs.
Even rimont No. 10 : Study of many rement of Canaditance using Schering Bridge	02 Hrs
Experiment 10. 10 : Study of measurement of Capacitance using Schering Bridge	02 1115.
Experiment N0.11 : Study of PLC	02 Hrs.
Taythooks	
A D Helfik W N Cooper "Modern electronic instrumentation & measurement technique	es" Pearson
A. D. Helfik, W. N. Cooper, "Modern electronic instrumentation & measurement technique education	ies", Pearson
A. D. Helfik, W. N. Cooper, "Modern electronic instrumentation & measurement technique education References:	ies", Pearson
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique education References: 1 A. K. Sawhney "A course in electrical & electronics measurements & instruments" Dhanna 	t
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique education References: 1. A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. 	t
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 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique education References: 1. A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. 2. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publication. 3. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. 	t on.
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique ducation References: 1. A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. 2. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publication. 3. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. 4. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. 	t nes", Pearson t
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique ducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publication. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. 	t.
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 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique ducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publication. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. Unit wise Measurable students Learning Outcomes: Student would able to different terms and parameters in Measurement system 	t
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique education References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicatio H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. Unit wise Measurable students Learning Outcomes: Student would able to different terms and parameters in Measurement system Student should beable to analyze Static and dynamic Characteristics with their error in the system 	t on.
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique ducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil, K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicati 3. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. Unit wise Measurable students Learning Outcomes: Student would able to different terms and parameters in Measurement system Student should beable to analyze Static and dynamic Characteristics with their error to Instrument. 	ies", Pearson t on. `ormat in an
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement techniqueducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicati H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. M.M.S.Anand, "Electronics instruments & instrumentation technology", PHI publication. Unit wise Measurable students Learning Outcomes: Student should beable to analyze Static and dynamic Characteristics with their error instrument. Student should beable to select Components and instrument for testing different Measurement. 	t t on. cormat in an surement
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement techniqueducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicati H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. M.M.S.Anand, "Electronics instruments & instrumentation technology", PHI publication. Unit wise Measurable students Learning Outcomes: Student would able to different terms and parameters in Measurement system Student should beable to select Components and instrument for testing different Measurement. 	t t on. cormat in an surement
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement techniqueducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicati 3. H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. M.M.S.Anand, "Electronics instruments & instrumentation technology", PHI publication. Student would able to different terms and parameters in Measurement system Student should beable to select Components and instrument for testing different Measurement. Student should beable to choose transducer to measure physical parameters. 	t on. Cormat in an surement
 A. D. Helfik , W. N. Cooper, "Modern electronic instrumentation & measurement technique ducation References: A. K. Sawhney. "A course in electrical & electronics measurements & instruments", Dhanpa Rai & sons publication. S. N.Patil,K.P. Pardesi "Electronics measurements & instrumentation", Electrotech publicatio H.S.Kalsi, "Electronics instrumentation", second edition, Tata McGraw Hill publication. Alok Barua, "Fundamentals of industrial instrumentation", Wiley India publication. David A.Bell, "Electronics instrumentation & measurements", 3rd edition Oxford publication. M.M.S.Anand, "Electronics instruments & instrumentation technology", PHI publication. Unit wise Measurable students Learning Outcomes: Student should beable to analyze Static and dynamic Characteristics with their error instrument. Student should beable to select Components and instrument for testing different Meaa4. Student should beable to choose transducer to measure physical parameters. Student should beable to Design AC &DC bridges for measurement of Parameters of components. 	t on. Cormat in an surement different

Title of the Course: Digital Design using HDL Laboratory	L	Т	Р	Credit
Course Code:UELN0333	0	0	2	1

Course Pre-Requisite: Knowledge oflogic gates, number systems viz. Binary, octaland hexadecimal, Basics of PC and programming, familiarity with Multimeter and oscilloscope.

Course Description:

This course covers hands on experience of interconnection ofgates, building logic circuits and Sequential circuits by wiring on kits and programming on PC in VHDL and downloading on FPGA and testing.

Course Objectives:

- 1. To implement combinational and sequential logic design using LSI, MSI logic families.
- 2. To motivate students to use EDA tools for design and simulation.
- 3. To develop the methodology for digital design using VHDL.
- 4. To implement combinational and sequential logic design using CPLD, FPGA.

Course Learning Outcomes:						
CO	After the completion of the course the student will	Bloom's				
	able to	Level	Descriptor			
CO1	Implement combinational and sequential logic circuitsusing LSI, MSI logic families.	VI	Creating			
CO2	Design and simulate logic using HDL and EDA tools.	VI	Creating			
CO3	Design and test digital logic using VHDL.		Creating			
CO4	Implement digital logic using CPLD and FPGA.	VI	Creating			

CO-PO Mapping:

СО	PO 1	PO 2	РО 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1			3										5	
CO2			3										2	3
CO3			3										2	3
CO4			3											
L						1	1	1	1	1		1		1

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE is based on practical performed/ Quiz/Lab Assignments / Presentation/ Group Discussion/ Internal oral etc.

ESE: Examination is based on practical and oral examination.
Course Contents:

Note: Minimum of 15 experiments to be conducted on Digital IC Trainer and Programming in VHDL in different modelling styles in VHDL (Dataflow, Behavioural and Structural Modelling).

Experiments should be on the following topics.

Design of Half and Full Adders, Subtractors, Serial and Parallel Adders, BCD Adder, ALU, S-R, JK and Master-Slave JK FF, Edge triggered FF, Ripple and Synchronous counters, Shift registers, Finite state machines, Design of synchronous FSM, Pseudo Random Binary Sequence generator, in different modelling styles in VHDL, Data types and objects, Dataflow, Behavioural and Structural Modelling



COLLEGE OF ENGINEERING KOLHAPUR INSTITUTE OF TECHNOLOGY'S

Course Code: UELN0334 -	-	2	1

Course Pre-Requisite:

- 1. GUI based PC software handling
- 2. Understanding of Network analysis.

Course Description:

Analysis and design of RC, RL, and RLC electrical networks. Sinusoidal steady state analysis of passive networks, mesh and nodal analysis, Noise analysis, Kirchhoff's Laws, Analysis of Circuits with a Dependent Source using various types of Analysis i.e. Bias point, Time domain, AC Sweep, DC Sweep, Parametric.

Course Objectives:

The course aims to:

1 Provide an introduction to P-Spice & simulation and CAD tools (like OrCAD / Proteus, MultiSim).

2 Develop the ability to analyze electronic circuits using simulation software for their AC & DC analysis. 3 Develop skills to design PCB as per required specification.

Course Learning Outcomes:

CO	After the completion of the course the student	Bloom's Cognitive						
	should be able to	level	Descriptor					
001	Lindiferent and services and from its form	LHAPUR II	NSTITUT					
COI	Identify/select various components from different	TECHINO	Applying					
	libraries for schematic entry.	IECHNUL	C.PP-J-115					
CO2	Analyze electronics devices and circuits using CAD tools	IV	Analyzing					
CO3	Create a PCB layout of the given circuit using CAD tools.	V	Create					
		NGIN	FFR					

CO-PO Mapping:

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C01					3									
CO2					3								2	2
CO3					3								2	2

Assessments:

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE (POE)	50

ISE is based on practical performed/ Quiz/ Lab assignment/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Examination is based on practical and oral examination.

Course Contents:

Introduction, Description of P-Spice and OrCAD, Types of analysis, Description of simulation software tools (like OrCAD / PROTEL / Proteus / Microcap) Schematic Description: Introduction, Input files, element values, Nodes, circuit elements, sources, output variables, format of circuit and output files, drawing the schematic, Design rule Check (DRC), Netlist details

Circuit Elements: Voltage and Current, Electrical Resistance, Ohm's law, Model Circuit Types of Analysis: Bias point, Time domain, AC Sweep, DC Sweep, Parametric, Noise analysis, Kirchhoff's Laws, Analysis of Circuits with a Dependent Source

Simple Resistive Circuits: Resistors in Series, Resistors in Parallel Simple Resistive Circuits: The Voltage-Divider Circuit, The Current-Divider Circuit, Measuring Voltage and Current, The Wheatstone Bridge. Techniques of Circuit Analysis: Introduction to the Node-Voltage Method, The Node-Voltage Method and Dependent Sources, The Node-Voltage Method: Some Special Cases.

Techniques of Circuit Analysis: Introduction to the Mesh-Current Method, The Mesh-Current Method and Dependent Sources, The Mesh-Current Method: Some Special Cases, The Node-Voltage Method versus the Mesh-Current method.

Techniques of Circuit Analysis: Source Transformations, Thevenin and Norton Equivalents, Maximum Power Transfer, Superposition theorems. Amplitude and Frequency modulation, spectrum representation of Amplitude and frequency modulation

Inductors and Capacitors: The Inductor, The Capacitor, Series-Parallel Combinations of Inductance and Capacitance.

Filters: HPF, LPF, BPF, BSF frequency response. Magnitude and Phase Plots.

Response of First-Order RL and RC Circuits: The Natural Response of an RL Circuit, The Natural Response of an RC Circuit.

Response of First-Order RL and RC Circuits: The Step Response of RL and RC Circuits, A General Solution for Step and natural Response

Natural and Step Response of RLC Circuits: The Natural Response of a Parallel RLC Circuit, The Step Response of a Parallel RLC Circuit

Natural and Step Response of RLC Circuits: The Natural Response of a Series RLC Circuit, The Step Response of a Series RLC Circuit

Sinusoidal Steady-State Analysis: The Sinusoidal Source, The Sinusoidal Response, The Passive Circuit Elements in the Frequency Domain, Kirchhoff's Laws in the Frequency Domain

Sinusoidal Steady-State Analysis: Series and Parallel Simplifications, Source Transformations and Thevenin-Norton Equivalent, The Node-Voltage Method, The Mesh-Current Method, Transformers building using inductors .

PCB Design: IC packages, Types of Connectors, Netlist for layout, Types of PCB's, Description of layout design tool, foot- print creation, Setting board parameter (board template, layer strategies), Component placement considerations, Routing strategies, Design Rule check, back annotation, post processing reports.

Note:

Minimum 10 Experiments must be conducted from the topics based on syllabus.

Textbooks:

1. M. H. Rashid 'Introduction to P-spice using OrCAD for circuits and Electronics' –Pearson Education

References:

1. User manuals of PROTEL, PROTEUS, OrCAD, Microcap.

2. W.C. Bosshart 'Printed Circuit Boards-Design & Technology'–Tata McGraw-Hill Publication



Title of the LAB: Micro project 1 LAB	L	Т	Р	Credit
(Social problem solutions)	0	0	2	1
Course Code: UELN0351	U	U	2	

LAB Pre-Requisite:

First Year engineering, 3D printing, Basics of electronics (Bread boarding, soldering, testing), C programming etc.

LAB Description:

This lab prepares students to develop thinking process to solve social problems by application of science and engineering in innovative manner. The group of students not more than 3 should identify social problems, perform requirement analysis. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of micro-project. As per requirements the group should develop specifications offinal outcome of the project. The students should think critically and undertake design of the project with skills available with them to meet the requirements and specifications. The group is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and submit the proposal within first week of the semester. The student is expected to exert on design, development and testing of the proposed work as per the schedule. The working model of the project should be demonstrated for internal submission.

This LAB will help to develop sensitivity of students towards social problem, think critically to find innovative solutions to simplify human life

Completed micro project and documentation in the form of micro project report is to be submitted at the end of semester. The project should complete in 12 weeks including field trails if any.

At the end of project the guide should advise students to protect IP either in the form of Patent or registration of design or publish paper on work completed or participate in project competition

The probable areas of the project work (but not only restricted to): Environment protection, global warming, safe drinking water, waste management, renewable energy utilities, biomedical engineering, accident prevention, enabling weaker section of society, efficiency/cost/ time improvements, human hardship reduction, prosthesis, smart city, smart transportation.

Course Objectives:

1. Evaluate social needs.

- 2. Identify suitable problem that can be solved using first year engineering knowledge and basic knowledge of electronics engineering and C programming.
- 3. Design and implement the solution using hardware / software or both
- 4. Testing of the implementation
- 5. Write project report as per standard format

Course	e Learning Outcomes:		
CO	After the completion of the course the student will	Bloom's C	ognitive
	able to	Level	Descriptor
CO1	Identify social problem that can be implantable using first principles of science, engineering and skills like AUTOCAD, C Programming, basics of electronics (components soldering and testing using test equipment)	П	Evaluating
CO2	Analyze and build logical/ mathematical/ mechanical model of the project.	IV	Analyzing
CO3	Design / simulate the model/ project work	Ι	Designing
CO4	Implement the project using resources available in project LAB	VI	Creating
CO5	Developcomprehensive report on project work as per prescribed format	VI	Creating

				1		1							
PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
	3				2						1		2
2													2
		3				2							2
				3									2
								2	3				2
	2	3 2	3 3 2 3 3 3	3 3 2 3 3 3	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE is based on practical performed/ Quiz/ Project task assigned/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on oral examination



COLLEGE OF ENGINEERING KOLHAPUR

[
Title o	f the C	ourse:	Linea	ar Inte	grate	d Circ	uits			I	_]	P	<u> </u>	redit
Course	Code:	JELNO	401								; .	-		3
Course	Pre-Re	equisite	e: Basio	c know	ledge	of Elec	tronic	Device	5.					
Course	o Docor	intion	Con	tonta	lool w	ith the	haria	00000	nta of	onor	ationa	lamn	lifion 1	noor b
	e Desci	liesti			AD IA		o dasie	conce	pis or	opera	ationa	amp		
non-lin	iear ap		on or	OP-AI	MP. It	cover	s desi	gn and	1 anar	ysis c	of freq	uency	selecti	ive and
tuning circuits like oscillators, active filters, PLL and its use for communication and industria												dustrial		
applications. Along with switching applications like that of comparators, course content finds												finds a		
due scope to learn IC based design of voltage regulators.														
Course	Object	ives:												
1. Exp	1. Explain the internal circuit of operational amplifier and its electrical parameters.													
2. Ind	licate th	e impo	ortance	e of an	Op-an	np in b	uilding	g analo	og com	putati	ions.			
3. Exp	plain th	e appli	cation	of Op	-amps	in bui	lding s	ignal o	conditi	oning	circu	its, fil	ters, wa	veform
gen	nerators	etc.												
CO	After	the cor	npletio	on of th	ne cour	se the	studen	t			Bloc	om's		
	should	d be ab	le to							level		D	escriptor	r
CO1	Defin	e Op-A	MP par	rameter	rs and c	characte	eristics.			I Reme				ng
CO2	Select	ct appropriate analog ICs by reviewing data I Rememb						Ι			emberi	ng		
	sheets	for ind	u <mark>stria</mark> l	and do	mestic	applica	ations							
CO3	Analy	ze BJT	Operation Operation	ational	amplif	ier for	DC an	d AC		Π		A	nalyzing	g
	inputs		Î										тт	ITE
CO4	Desig	nof am	plifiers	s. signa	al cond	litioner	s. filter	s and		VI		-0	reating	
	oscilla	tors us	ing on-	amn ci	rcuits		,) H I	ECH		LO	GY S	
COF	Build		honing	oirouit	o unino	on om	n			VI	1.1		monting	
COS	Duna	wave s	napnig	circuit	s using	op-am	p.			VI			reating	UF
CO-PO) Mappi	ing:							EN					
	DO 1	DO 1	DO 2	DO 4	DO 5	DO C	DO 7	DOS		DO	DO	DO	DSO1	DSO2
CO	POT	PO 2	PU 3	PO 4	PO 5	PO 6	PO /	PO 8	PO 9	PO 10	PO 11	12	PS01	PS02
COI	1	1								10				
COL		1												

C01	1	1								U	
CO2				1					3		
CO3	1	2	1	1							
CO4			3	1				1			
CO5		2	3				1				

3

3

3

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks						
ISE 1	10						
MSE	30						
ISE 2	10						
ESE	50						
ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.							
MSE: Assessment is based on 50% of course content (Normally first three modules)							

ESE: Assessment is based on 100% course content with 60-70% Weightage for course content (normally last three modules) covered after MSE. **Course Contents:** Unit 1:---06 Hrs. **Differential Amplifiers** Differential Amplifier-Configuration, DC & AC Analysis of Dual Input Balanced Output Configuration. Comparative study of other configuration of Differential amplifiers, Constant Current Bias, Current Mirror, DC coupling & Cascade differential stages, Level Translator & its need. Unit 2:---08 Hrs. **OP-Amp Characteristics** Block Diagram of Op-Amp, Ideal & Practical Op-amp specifications, Transfer characteristics of Op-amp, Op-amp parameters & measurement: Input & output offset voltages, Input & output offset currents, Input Bias current, slew rate, CMRR, PSRR, Thermal drift. Comparative study of Data Sheets – μ A 741, OP 07, LM 324, LM 311, LM 308, LM380, CA 3140. Unit 3:---07 Hrs. **Negative Feedback In Op-Amps:** Open Loop & closed Loop- Inverting, Non-Inverting and Differential (Using one op-amp). Analysis for Av, Ri, Ro, Bandwidth, and Total output offset voltage. AC & DC amplifiers – all configurations. (Numericals are expected). Open loop frequency Response, closed loop frequency response, circuit stability, slew rate. Unit 4:---09 Hrs. **Op-amp Applications** Summing amplifier (Inverting & Non-Inverting), Subtractor, Integrator, Differentiator, Instrumentation Amplifier (3 op-amps), Instrumentation amplifier using transducer bridge, Single Chip Instrumentation Amplifier (INA Series), I-V & V-I converter. (Numericals are expected). Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and antilog amplifier, precision rectifier, sample and hold circuit. Unit 5:---04 Hrs. **V** Active Filters First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject, & All Pass Filters (Analysis & Numericals are Expected). **Unit 6:---Specialized IC Applications** 06 Hrs. Sine wave generator- RC phase Shift, Wein Bridge, & Quadrature oscillator. Square wave (AstableMultivibrator), Monostable Multivibrator, & Triangular Wave generator, V-F, F-V converter using Op-Amp. IC 555 (Timer): Block Diagram, Multivibrators and Applications. IC 566 VCO, PLL- Introduction, Block Diagram, Principles & description of individual blocks, IC 565 PLL & Applications. IC 8038 Waveform generator (Numericals are expected). **Textbooks:** 1 Ramakant. A. Gayakwad, "Op-Amps & Linear Integrated Circuits", 3rd Edition, PHI. 2 S.Salivahanan&Bhaaskaran, "Linear Integrated Circuits", 1st Edition, Tata McGraw Hill. **Reference Books:** 1. National Analog & Interface products Data book—National Semiconductors 2. Sergio Franco, "Design with op-amp & Analog Integrated Circuits", 3rd Edition, Tata McGraw Hill. 3. K.R.Botkar."Integrated Circuits" Khanna publications, 10th Edition. 4. David. A. John & Ken Martin, "Analog Integrated Circuit Design", Student Edition, Wiley. 5 Roy Choudhary & Shail. B. Jain, "Linear Integrated Circuits", 2nd Edition, New Age.

Unit wise Measurable Students Learning Outcomes:

- 1. Students should be able to have a firm grasp of basic principles of many operational amplifiers.
- 2. Student should beable to differentiate between different types of op-amps as well as able to choose proper op-amp as per application requirement.
- 3. Student should beable to analyze and design op-amp parameter compensating networks.
- 4. Student should be able to find out circuit stability from frequency response as well as frequency dependent parameters.
- 5. Students should be able to analyze and design different op-amp linear and non linear applications.
- 6. Student should be able to analysis of different types of Active filters, different types of monolithic ICs and its applications.



Title of	f the Course:Analog Circuit Design	L	Т	Р	Credit					
Course	e Code:UELN0402	4	-	-	4					
Course	Pre-Requisite:	I								
Basic k	nowledge of mathematics, semiconductor physics will	be benef	icial							
Course Description:										
This course contains fundamentals of Semiconductor devices and various electronic circuits;										
This course enables to students to analyze and design of basic application circuits such as										
oscillators, multivibrators, and power amplifiers by using transistor.										
Course Objectives:										
1.	1. To study FET, it's types, construction and working principle.									
2.	To understand various types of power amplifiers.									
3.	To understand working principle of various regulators	s and pov	ver su	pplies						
Course	e Learning Outcomes:									
СО	After the completion of the course the student	Bloom's	Cogn	itive						
	should beable to	leve	1	D	escriptor					
CO1	Analyze transistor applications as oscillator and	W		٨	noluzing					
	mult <mark>ivibrator.</mark>	1 V		A	naryzing					
CO2	Design oscillators and multivibrators.	VI	מדונ		Creating					
CO3	State working principal of power amplifiers and		OK	Und	arstanding					
	classification.	IFG			erstanding					
CO4	Explain working principle of various regulators	V		E-	voluction					
	and power supplies.	v		E						

CO-PO Mapping:

CO	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CO1	1	2	1	··_"	" <u>"</u>	"_"	"_"	··_"	"_"	" <u>"</u>	"_"	··_"	1	2
CO2	1	1	3	1	"_"	··_"	··_"	··_"	··_"	۰۰_٬٬	··_"	··_"	3	3
CO3	1	"_"	··_"	"_"	"_"	··_"	··_"	"_"	··_"	··_"	··_"	"_"	1	··_"
CO4	2	1	"_"	"_"	··_"	··_"	··_"	··_"	··_"	··_"	··_"	··_"	1	··_"

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% Weightage for course content (normally last three modules) covered after MSE.

6 Hrs.

Course Contents:

Unit 1:-FET(Field Effect Transistor):

JFET: Types, Construction, operation, V-I characteristics, Parameters of JFET,

Biasing of JFET, analysis of Common Source Amplifier (CS) amplifier.	
MOSFET: Configuration, construction and operation of different MOSFET	
(NMOS, PMOS), Transfer Characteristics, Comparison of FET, BJT &	
MOSFET.	
Unit 2:Oscillators	8 Hrs.
Oscillators: Barkhausens' Criteria, Frequency and amplitude Stability,	
classification of oscillator (RC Oscillators, LC Oscillators), Crystal Oscillator,	
Unit 3:Multivibrators	8 Hrs.
Multivibrators: Classification of Multivibrators, Triggering Methods:	
Symmetrical and Unsymmetrical, Schmitt Trigger	
Unit 4:Power Amplifiers:	9 Hrs.
Power Amplifiers, Need of power amplifiers, Classification of power amplifier:	
Class A, Class B, Class C, Class AB, concept of Cross over distortion, methods	
to eliminate Cross over distortion, Complimentary symmetry amplifiers.	
Unit 5Linear Power Supplies:	9 Hrs.
Need of Voltage Regulator, Stabilization factor, Analysis of Shunt regulator	
(using Zener diode & BJT), Emitter follower regulator, series voltage regulator	
(using BJT), Series voltage regulator with Pre- regulator, Short circuit &	
Overload protection circuit. IC regulators: Study of regulators using 78XX &	SITUIE
79XX, LM317, IC 723.	DGY'S
Unit 6:Switch Mode Power Supplies:	8 Hrs.
Introduction of SMPS, comparison of SMPS with linear power supply, SMPS	
topologies, Step-down SMPS, Step -up SMPS, Polarity Inversion, Push-pull,	
etc, Detail study of LM3524.	EEKING
Textbooks:	DID
1. Electronic Devices and circuits by S.Salivahanan, N Suresh Kumar, A Vallavar	aj. U N
2. Electronic Devices and Circuits by Anil K. Maini, Varsha Agarwal- Wiley Indi	a.
3. Electronic Devices and Circuits by A.P.Godse and U.A.Bakshi.	
4. Electronic Devices and Circuits by Mantri & Jain.	
References:	
 Pulse, Digital & Switching Waveforms by Millman, Taub, Rao. Schemele Outlines "Electoric Devices on I Cinerite" 	
 Schaum's Outlines, Electronic Devices and Circuits Electronic Devices and Circuits by Allen Mettershead PHI 	
4 Electronic Devices and Circuit Theory by Boylestad, Pearson Publication	
5. Electronic Devices and Circuits by LB Gupta Katson Publication	
6. Electronic Devices and Circuits by Millman, Halkias, TMH Publication.	
7. Solid State Electronic Devices by Ben Streetman, PearsonPublication.	
Unit wise Measurable students Learning Outcomes:	
1The student will be able tomake use of semiconductor devices as per industry	practice in a
satisfactory manner	
2. The student will be able to analyze and design various applications of bipolar junct	ion transistors
such as oscillators,	
3. The student will be able to analyze and design various applications of bipolar junct	ion transistors
such asmultivibrators,	
4 The student will be able to explain and analyze various types of power amplifiers.	
5 The student will be able to define various regulator circuits	
6. The student will be able to describe SMPS	

Title of the Course:Control System Engineering	L	Т	Р	Credit
Course Code:UELN0403	3	-	-	3

Course Pre-Requisite: Knowledge of Derivative, Integration, Matrices and Laplace transform.

Course Description:

The course studies dynamic systems encountered in a variety of instrumentation and Mechatronics systems, the modelling of such systems and the response of these systems to a disturbance. In addition, the control of dynamic systems using feedback and the design of control systems using different design techniques will be studied.

Course Objectives:

Objectives of this course are:

1. To study the fundamental concepts of Control systems and mathematical modeling of the system.

2. To study the concept of time response and frequency response of the system.

3. To study the basics of stability analysis of the system.

CO	After the completion of the course the student should be able to	Bloom's Cognitive					
		level	Descriptor				
CO1	Analyze mathematical models of mechanical and	IV	Analyzing				
	electrical systems by their transfer functions using						
	differential equations.	KULHAPUI	K INSTITUT				
CO2	Analyze time domain and frequency domain	OF TIVCHN	Analyzing S				
	systems with response to test inputs.						
CO3	Determine the stability of the systems by using	V	Evaluating				
	Routh's criteria, Nyquist criteria, Bode plot and root						
	locus.						
CO4	Design of automated system using PLC and PID.	VI	Creating				
CO-P() Manning						

CO PO1 PO₂ **PO3 PO4** PO5 **PO6 PO7 PO8 PO9** PO PO PO PSO1 PSO2 10 11 12 2 3 **CO1** 3 CO₂ **CO3** 2 **CO4** 2 1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE and 30-40 % weightage of first three units.

Unit 1:Introduction to Feedback Control System	06 Hrs.
Classification of control System, Mathematical models of physical system-	
Electrical & Mechanical System, Transfer function of electrical and Mechanical	
systems, Block diagrams and reduction techniques, signal flow graphs using	
Mason's gain formula.	
Unit 2:: Feedback characteristics of Control system	04 Hrs.
Feedback & Non-feedback systems, Reduction of parameter variations by use of	
feedback, control over system dynamics by use of feedback, control of effect of	
disturbance signals by use of feedback, The concept of stability, Routh Hurwitz	
stability criteria.	
Unit 3: Time Domain Analysis	06 Hrs.
Time response of first order & second order system using standard test signal,	
steady state errors and error constants, Root locus techniques- Basic concept, rules	
of root locus, application of root locus techniques for control system.	
Unit 4: Frequency Domain Analysis	06 Hrs.
Introduction, correlation between time & frequency domain, Bode plots, gain	
margin, phase margin, effect of addition of poles & zeros on bode plots, Nyquist	
stability. Stability using Bode plot.	
Unit 5: State Space Analysis	05 Hrs.
Concept of state, state variables & state model State-space representation,	
computation of the state transition matrix, transfer function from the state model,	
controllability of linear system, observability of linear system.	
Unit 6: Compensators & controllers	05 Hrs.
a. Compensators- Need of compensation, lead compensation, lag compensation, Lead-lag	
compensation.	
compensation. b. Introduction to PID controller.	ΕC
compensation. b. Introduction to PID controller. c. Introduction to PLC controller.	
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Title of	f the	Cours	e: Ana	alog C	ommu	inicati	ion				L	Т	Р	Credit
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den	nodula	ation												
2. To	under	stand v	vorkin	g of A	M and	FM re	ceiver							
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4. To	Unde	rstand	the dif	ferent	types c	of noise	e, ante	nna and	l funda	amenta	als of V	Wave	Propa	gation
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	pow	er of t	ransm	itter.										
CO3	Test	the pe	erform	ance c	of radio	o recei	vers in	n terms		VI		Cr	eating	
	of th	neir ch	aracter	ristics.			_							
CO4	Sele	ct vari	ious p	ulse m	nodula	tion te	echniqu	ues for		I		Re	memł	pering
	vari	ous ap	plicati	ons.										
CO5	Clas	ssify v	various	types	of an	itennas	s. Dep	ending	5	IV		Un	derst	anding
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and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules) ESE: Assessment is based on 100% course content with 60-70% Weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Unit 1: UNIT-I: Amplitude Modulation: (9 Hrs)	-09Hrs.
Block diagram of communication system, base band signals, RF bands, Necessity	
of modulation, Amplitude Modulation principle, AM envelope, frequency	
spectrum & BW, phase representation of AM wave, Modulation index, %	
modulation (Numerical expected) AM modulating circuits: Low level AM	
modulation, medium power AM modulation, high power modulation(diode and	
transistor circuits), AM transmitters: Block diagram of low level DSBFC, High	
level DSBFC, Trapezoidal patterns, SSB, Suppression of carrier using balanced	
modulator, Suppression of unwanted sideband methods: Filter system, phase shift	
& third method, Quadrature Carrier Multiplexing(QAM), Vestigial sideband(VSB)	
in television system, ISB transmissions.	
Unit 2: AM Receiver: (6 Hrs)	06 Hrs.
Simplified block diagram of AM receiver, receiver parameters: Sensitivity,	
Selectivity, BW, Dynamic range, Tracking, fidelity, Types of AM receiver: TRF	
and superhetrodyne (block diagram). AM detection types: using diode, practical	
diode detector, distortion in diode detector. Negative peak clipping & diagonal	
clipping. Demodulation of SSB using: product demodulator & diode balanced	
modulator. Automatic Gain Control (AGC). Noise in AM.	
Unit 3: Angle Modulation: (6 Hrs)	06Hrs.
Theory of frequency and phase modulation mathematical analysis deviation	
sensitivity FM and PM waveforms Representation of FM and PM signals phase	
deviation and modulation index frequency deviation and percentage modulation	iY'S
Spectral characteristics of angle modulated signals angle modulation circuits using	
varactor diode PLL using frequency analysis of angle modulated wave-Bessel	\mathbf{F} ()
function BW requirements deviation ratio Noise in angle modulation	
Unit 4 FM Receiver: (6 Hrs)	06 Hrs
Block diagram of Double conversion FM receivers FM demodulator, tuned circuit	00 1115.
frequency discriminators slope detectors fosters seeley discriminator ratio	
detectors PLL-FM demodulators FM noise suppression Pre emphasis and De	UN
emphasis in FM Comparison of Noise Performance of different modulation	
schemes	
Unit 5: Pulse Modulation: (5 Hrs)	05 Hrs
Pulse amplitude modulation. Sampling theorem & type: Natural & flat top PAM	05 1115.
modulation circuit PAM demodulation circuit TDM and FDM Crosstalk in	
TDM pulse time modulation generation of PTM signals (direct_indirect method)	
PWM modulator PPM modulators demodulation of PTM	
Unit 6: Noise Antenna and Waya Propagation: (8 Hrs)	AS Hrs
Noise types (Internal noise, external noise) Noise figure. Introduction to radio	00 111 5.
wave propagation ground wave space wave and sky wave Antenna: basic	
consideration of radiation machanism Antanna Parameters: Antanna gain	
consideration of radiation mechanism, Antenna Falameters. Antenna gain,	
been width BW input impedance. Types of Antennas Elementary devilet	
Half wave dipole folded dipole vaggi uda antenna	
Tail wave uipole, lolueu uipole, yaggi-uua alleillia.	
1 George Kennedy (Electronics Communication System) Wth Edition Tata Macro	w Hill
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r unication. 2. Wayna Tamagi (Elastronias Communication System). Fundamentals through A	duanacd
2. wayne romasi Electronics Communication System -Fundamentals Infolgin A Wth Edition Deerson Education	uvanceu
vui Europia E Energal (Deinsinlag of Electronics Communication Systems) 2nd did	ion Tata
5. Louis E. Frenzei, Frincipies of Electronics Communication Systems 3rd edit McGraw Hill Publication	1011- 1 ata

References:

1. Dennis Roddy, John Coolen. 'Electronics Communications 'IVth Edition-Pearson Education

2. V. Chandra Sekar, 'Analog Communication', Oxford university.

3. R P Singh, S D Sapre 'Communication System-Analog & Digital 'IInd Edition –Tata Mc Graw Hill Publication

4. B. P. Lathi, Zhi Ding, 'Modern Digital and Analog Communication Systems' 4th edition, Oxford university.

5. Blake, 'Electronics Communication Systems' 2nd edition, cengage Learning.

Unit wise Measurable students Learning Outcomes:

- 1. Students are able to explain concept of modulation and different types of Modulation.
- 2. Students are able to explain types of AM receiver and their working.
- 3. Students are able to differentiate FM and PM modulation and their types.etc.
- 4. Students are able to explain different types of FM Demodulation, types of AM receiver.
- **5.** Students are able to explain difference between analog modulation and pulse modulation and advantages of pulse modulation over analog modulation.
- 6. Students are able to explain concept of Noise, their types etc. Students are also able to explain ground wave, space wave and sky wave. Antenna: basic consideration of radiation

Fitle o	f the	Cour	se: Sig	mals a	& Svs	tems					L	Т	P	Credit
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Course	Pre-	Requis	site: Ba	asics of	f trans	form th	neory							
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CO2	Exp syst	olain o em	differei	nt pro	perties	and	type	of sig	nals a	nd	П	U	nderst	anding
CO3	App pro	oly dif	ferent	transfo	rm tec	chnique	es to so	olve th	e syste	em	ш		Apply	ving
CO4	Eva con the cros	volution frequents frequents	responsion in the ncy dop elation	se of line time main, t and po	hear sy doma he con wer de	ystems in, and icepts ensity s	to any d by tra of auto spectru	input ansfori correl m.	signal nation ation a	by to nd		-	Evalua	
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MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% Weightage for course	se content						
(normally last three modules) covered after MSE.							
Course Contents:							
Unit 1: Basics of Signals & Systems							
Definition of signals, classification of signals, study of some standard signals viz.							
Impulse signal, step signal, ramp signal, rectangular pulse function, signum							
function, sinc function, exponential signal, properties of standard signals, basic							
operations on signals, Definition of system, classification of systems							
Unit 2: Linear Time Invariant Systems							
Concept of Eigen function in the development of convolution theory, properties of Eigen							
function, Concept of convolution in Discrete and Continuous time domain, concept of							
Linear Time Invariant systems and its properties, concept of correlation, Autocorrelation							
and Cross Correlation, similarity and difference between convolution and correlation, time							
domain analysis of CT systems							
Unit 3:Fourier Series Representation of Signals	6 Hrs .						
Introduction to Continuous Time Fourier Series (CTFS) Direchlet's conditions for the							
existence of Fourier series properties of CTES FS representation of Amplitude and							
Phase Spectrum relation between Fourier series and Fourier Transform							
Unit 4. Examine Transformer (FT)	0. 11.00						
Unit 4: Fourier Transform (FT)							
Continuous Time and Discrete Time, Concept and interpretation of FT, concept of							
magnitude and phase spectrum, existence of Fourier series, properties of FT, analysis of	Y'S						
LTI systems using FT							
Unit 5:Laplace Transform (LT)	7 Hrs.						
Introduction to Laplace Transform, Existence of LT, Concept of Region of Convergence							
and its properties, definition of Inverse LT, Properties of LT, Analysis of CT-LTI systems							
using LT, stability and Causality of CT-LTI system using LT, block diagram							
representation and system realization of CT-LTI system							
Unit 6:Z- Transform	7 Hrs.						
Introduction to Z Transform, Concept of Region of Convergence and its							
properties, Properties of Z Transform, Analysis of DT-LTI systems using Z Transform,							
stability and Causality of DT-LTI system using Z Transform, block diagram							
representation and system realization of DT-LTI system, Inverse Z Transform and time							
domain characteristics.							
Textbooks:							
1. Signals & systems by B.P.Lathi							
References:							
1. Signals and Systems (second edition) by Alan Oppenheim, Alan S. Willesky							
Pearson Publication							
2. Signals and Systems, Simon Haykin							
Unit wise Measurable students Learning Outcomes:							
1. Student should understand the Concept of signals and systems							
2. Student should understand the concept of LTI system							
3. Student should explain the concept of Fourier Series							
4. Student should understand Fourier Transform							
5. Student should understand the concept of Laplace transform							
6. Student should explain the concept of Z-transform							

Title of the Course:Content Creation using Information andLTP								C	redit					
web To	echnolo	ogies							2		-	-		0
Course	e Code:	UELN	0461											
Course Pre-Requisite: Awareness of computer programming and hardware resources.														
Course Description:														
This course encompasses the study of open source content creation software														
Course Objectives:														
1. To understand platforms open source content creation software														
2. 10 C	 2. To create a blog using open source content creation software 3. To create a website using open source content creation software 													
4. Creating and editing video and uploading on designed web site														
4. Ciea	ang an	u cuitii	ig video	o and u	pioaun	ig on u	esigned	I WED S	site					
Course	Lear	ing Or	utcome											
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Unit 2	SETTI	NG UF	THE	WORI	OPRES	SS SOF	TWA	RE						
File tra	inster p	protoco.	I, Intro	ductior	to PF	IP and	MySQ	L, Inst	allation	of V	VordP	ress,	4 Hrs.	
Config	uration	s IOT	optimu	im per	ing to l	ice and	a secu	irity, U	Jpgradi	ng v	voraP	ress,		
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Writing	J nost	exam	ining	differe	nce be	otween	nosts	and r	nages	Unlo	adino	and	5Hrs	
displaying photos and galleries exploring Podeasting and Video Blogging Working							51115.							
with custom fields, WordPress as a content management System														
Textbooks:														
1.	WordF	Press Fo	or Dun	nmies (For Du	ummies	(Com	puter/T	Tech))	(Engl	ish, P	aperb	ack, Lis	sa Sabin-
	Wilson, Matt Mullenweg)													
Refere	References:													
1.	WordF	Press for	or Beg	ginners	20XX	: A V	<i>'</i> isual	Step-by	y-Step	Guide	e to	Maste	ering W	/ordPress

(Webmaster Series Book 2) by Dr Andy Williams

Unit wise Measurable students Learning Outcomes:

- 1. The student will be able to explain basics of WordPress.
- 2. The student will be able to set the WordPress software.
- 3. The student will be able to explore various tools from WordPress dashboard.
- 4. The student will be able to create blog by using WordPress.



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Course Description: This is a course on the design and applications of operational applificate and applications.														
integrat	integrated circuits. Much attention is given to implementation of op-amp configurations, linear and non-													
linear a	nnlicati	ons of	on-am	n and a	active f	filter sy	nthesis	s It als	or op a deal	s with	imnle	mentat	ion of a	scillators
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Course	Course Objectives:													
4	4. Explain the internal circuit of operational amplifier and its electrical parameters.													
5	Indicate the importance of an Op-amp in building an analog computer.													
6	Explain the application of On-apps in building signal conditioning circuits filters													
0.	waveform generators etc													
7	waveform generations etc. Develop practical skills for building and testing circuits using analog ICs													
Course	/. Develop practical skills for building and testing circuits using analog ICs.													
1 Selec	ct an ar	nronri	ate Or	• 1-amn f	for a n	articul	ar annl	ication	ı hv re	ferring	o data	sheets		
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integ	grated c	ircuits	such a	IS IC 7	41,IC3	55, IC	303,IC	.300, C	A314	oana .		, IC02	0	
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50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE is based on practical performed/ Quiz/ Lab assignments / Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on practical and oral examination.

Experiment No. 1: 02 Hrs. Aim and Objectives: Measurement of op-amp parameters Using IC 741 01 a) Input offset current c) slew rate d) CMRR. 02 Hrs. Outcomes: Students will be able to determine op-amp parameters. 02 Hrs. Theoretical Background: Students should know parameters of different ICs. 02 Hrs. Experimentation: Experiment is to be performed by using hardware and ICs 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier using IC 741 02 Hrs. Outcomes: Students will be able todesignInverting amplifier Model and Discussions: 02 Hrs. Conclusion: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 04 Comes: Students will be able toanalyze Frequency Response of Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Conclusion: Experiment No. 4: 04 Experiment No. 4: Aim and Objectives: Study of op-amp a Summing. Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able todesigning IC IM 308 02 Hrs. Mim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Mim and Obj	Course Contents:	
Aim and Objectives: Measurement of op-amp parameters Using IC 741 a) Input offset current c) slow rate d) CMRR. Outcomes: Students will be able to determine op-amp parameters. Conclusion: Experimentation: Experiment is to be performed by using hardware and ICs. Experiment ICs. Experiment No. 2: Conclusion: 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs using IC 741 02 Hrs. 02 Hrs. Outcomes: Students will be able todesignInverting amplifier 02 Hrs. 02 Hrs. Conclusion: Experiment No. 3: 02 Hrs. Conclusion: Experiment No. 3: 02 Hrs. Aim and Objectives: Students will be able todesignInverting & Non-Inverting amplifier using IC 741 04 Conclusion: Conclusion: Experimentation: Results and Discussions: 02 Hrs. Aim and Objectives: Students will be able todanalyzeFrequency Response of Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able todesignInving, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier In Inverting & Non-Inverting Configuration asing Non-Inverting OP 07/LM308 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter	Experiment No. 1:	02 Hrs.
a) Input offset voltage b) Input offset current c) slw rate d) CMRR. Outcomes: Students will be able to determine op-amp parameters of different ICs. Experimentation: Experiment is to be performed by using hardware and ICs Results and Discussions: NA Conclusion: Experiment No. 2: Aim and Objectives: Study of Inverting and Non-Inverting amplifier for DC & AC inputs using IC 741 Outcomes: Students will be able to design/Inverting amplifier Theoretical Background: Basic knowledge of op-amp Experiment No. 3: Conclusion: Experiment No. 3: Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion: Experiment No. 4: Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting Rown Inverting Configuration using IC LM 308 Outcomes: Students will be able touldSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able touldSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able touldSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able touldSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able toulesignsignal conditioning usingInstrumentation Amplifier Results and Discussions: Conclusion: Experimentation: Results and Discussions: Conclu	Aim and Objectives: Measurement of op-amp parameters Using IC 741	
Outcomest: Students will be able to determine op-amp parameters. 0 Theoretical Background: Students should know parameters of different ICs. 0 Experimentation: Experiment is to be performed by using hardware and ICs 0 Results and Discussions: NA 0 Conclusion: 0 Experiment No. 2: 0 Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs using IC 741 0 Outcomest: Students will be able todesignInverting amplifier 0 Theoretical Background: Basic knowledge of op-amp 0 Experiment No. 3: 0 Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 0 Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier in Inverting & Non-Inverting Configuration using IC LM 308 0 Conclusion: 0 2 Experimentation:: 0 2 Results and Discussions: 0 0 Conclusion: 0 2 4 Results and Discussions: 0 0 4 Conclusion: 0 2 4 5 Results and Discusions: 0 2 <t< td=""><td>a) Input offset voltage b) Input offset current c) slew rate d) CMRR.</td><td></td></t<>	a) Input offset voltage b) Input offset current c) slew rate d) CMRR.	
Theoretical Background: Students should know parameters of different ICs. 82 Experimentation: Experiment is to be performed by using hardware and ICs 02 Results and Discussions: NA 02 Conclusion: 02 Background: Basic knowledge of op-amp 02 Experiment No. 3: 02 Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 02 Theoretical Background: Basic knowledge of op-amp 02 Experiment No. 3: 04 Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 02 Theoretical Background: Basic knowledge of op-amp 05 Experimentation: 02 Hrs. Results and Discussions: 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier in Inverting Configuration using IC LM 308 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Ai	Outcomes: Students will be able to determine op-amp parameters.	
Experimentation: Experiment is to be performed by using hardware and ICs 02 Hrs. Results and Discussions: NA 02 Hrs. Conclusion: 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs 02 Hrs. Theoretical Background: Back nowledge of op-amp 02 Hrs. Experimentation: 02 Hrs. Results and Objectives: Frequency Response of Inverting & Non-Inverting amplifier conclusion: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier conclusion: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier conclusion: 02 Hrs. Aim and Objectives: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting Configuration using IC 1LM 308 02 Hrs. Aim and Objectives: Study of op-amp as Summing. Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC 1LM 308 02 Hrs. Outcomes: Students will be able tobaildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC 1LM 308 02 Hrs. Conclusion: Experimentation: 02 Hrs. Resperiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Min and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. <tr< td=""><td>Theoretical Background: Students should know parameters of different ICs.</td><td></td></tr<>	Theoretical Background: Students should know parameters of different ICs.	
Results and Discussions: NA 02 Hrs. Conclusion: 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs using IC 741 02 Hrs. Outcomes: Students will be able todesignInverting amplifier 02 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 04 Hrs. Outcomes: Students will be able toanalyze/Frequency Response of Inverting & Non-Inverting amplifier 02 Hrs. Conclusion: 02 Hrs. ExperimentAtion: Results and Discussions: 02 Hrs. Conclusion: 04 Hrs. 04 Hrs. ExperimentAtion: Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. 04 Hrs. ExperimentAtion: Results and Discussions: 04 Hrs. Conclusion: 04 Hrs. 04 Hrs. Experiment No. 4: 04 Hrs. 04 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configurationusing op-amp. 02 Hrs. Min and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs.<	Experimentation: Experiment is to be performed by using hardware and ICs	
Conclusion: 02 Hrs. Experiment No. 2: 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs using IC 741 02 Hrs. Outcomes: Students will be able todesignInverting amplifier 02 Hrs. Theoretical Background: Basic knowledge of op-amp 02 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier using IC 741 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able toalkuldsumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able todesignignal conditioning usingInstrumentation Amplifier In Inverting & Non-Inverting Configuration using IC 1M 308 02 Hrs. Outcomes: Students will be able todesignignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP	Results and Discussions: NA	
Experiment No. 2: 02 Hrs. Aim and Objectives: Study ofInverting and Non-Inverting amplifier for DC & AC inputs using IC 741 04 Concussion: Outcomes: Students will be able todesignInverting amplifier 02 Hrs. Theoretical Background: Basic knowledge of op-amp 02 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier using IC 741 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting Conclusion: 02 Hrs. Experiment No. 4: 04 Discussions: 02 Hrs. Conclusion: 02 Hrs. 02 Hrs. Experiment No. 4: 04 Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting. 02 Hrs. Aim and Objectives: Study of of op-amp as Summing, Scaling, & Averaging amplifier in Inverting. 02 Hrs. Mine and Discussions: 02 Hrs. 02 Hrs. Outcomes: Students will be able todesignsignal conditioning using DP 07/LM308 02 Hrs. Min and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Min and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. </td <td>Conclusion:</td> <td></td>	Conclusion:	
Aim and Objectives: Study of Inverting and Non-Inverting amplifier or DC & AC inputs using IC 741 0 Outcomes: Students will be able todesignInverting amplifier 0 Results and Discussions: 0 Conclusion: 0 Experimentation: Results and Discussions: Conclusion: 0 Experiment No. 3: 0 Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 0 Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier using IC 741 0 Results and Discussions: 0 Hrs. Conclusion: 0 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 0 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier in Inverting & Non-Inverting Configurationusing op-amp. 0 Results and Discussions: 0 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier in Inverting & Non-Inverting Configurationus (PO 407/LM308) 0 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: 0 Reseults and	Experiment No. 2:	02 Hrs.
using IC 741 Outcomes: Students will be able todesignInverting amplifier Image: Conclusion: 02 Hrs. Experimentation: Results and Discussions: 02 Hrs. 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 01 Conclusion: 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier 01 Conclusion: 02 Hrs. Experimentation: Results and Discussions: 02 Hrs. 01 Free Frequency Response of Inverting & Non-Inverting amplifier Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting. 02 Hrs. Non-Inverting Configurationusing op-amp. 02 Hrs. Non-Inverting Configurationusing op-amp. 02 Hrs. Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemostrateindustrial applications usingV	Aim and Objectives: Study of Inverting and Non-Inverting amplifier for DC & AC inputs	
Outcomes: Students will be able todesignInverting amplifier 02 Hrs. Theoretical Background: Basic knowledge of op-amp 02 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 02 Hrs. 741 02 Hrs. Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier 02 Hrs. Theoretical Background: Basic knowledge of op-amp 04 Hrs. Experiment No. 4: 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. 02 Hrs.	using IC 741	
Theoretical Background: Basic knowledge of op-amp 22 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 74 Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier using IC 74 Theoretical Background: Basic knowledge of op-amp 01 Hrs. Experimentation: 02 Hrs. Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Experimentation: 02 Hrs. Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Preventing Configuration using IC LM 308 01 Hrs. Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 02 Hrs. Results and Discussions: 02 Hrs. 02 Hrs. Conclusion: Experiment No. 5: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInStrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741	Outcomes: Students will be able todesignInverting amplifier	
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Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 04 Hrs. 741 010 comes: Students will be able toanalyze Frequency Response of Inverting & Non-Inverting amplifier 02 Hrs. Theoretical Background: Basic knowledge of op-amp 05 FTECHNOLOGY'S 05 FTECHNOLOGY'S Experiment No. 4: 02 Hrs. 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Non-Inverting Configurationusing op-amp. 02 Hrs. Experimentation: Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. 02 Hrs. Experiment No. 5: 04 Instrumentation Amplifier using OP 07/LM308 04 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 <	Experimentation:	
Conclusion: 02 Hrs. Experiment No. 3: 02 Hrs. Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 01 741 0utcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier 01 Theoretical Background: Basic knowledge of op-amp 07 17 Experimentation: 02 Hrs. 02 Results and Discussions: 02 Hrs. 02 Conclusion: 02 Hrs. 02 Inverting & Non- Inverting Configuration using IC LM 308 02 Hrs. 02 Nutoring: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configurationusing op-amp. 02 Hrs. Results and Discussions: 02 Hrs. 02 Conclusion: Results and Discussions: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Aim and Objectives: Study of Schmit	Results and Discussions:	
Experiment No. 3:02 Hrs.Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC741Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifierITETheoretical Background: Basic knowledge of op-ampOF TECHNOLOGYExperimentation:Results and Discussions:02 Hrs.Conclusion:Conclusion:02 Hrs.Inverting & Non-Inverting Configuration using IC LM 30802 Hrs.Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using to LM 30802 Hrs.Netring Configurationusing op-amp.Results and Discussions: Conclusion:02 Hrs.Conclusion:Experiment No. 5:02 Hrs.Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Conclusion:Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-1 & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-1 & I-V. Converter02 Hrs.Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-1 & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter02 Hrs.Theoretical Background: Basic knowledge of op-amp Exper	Conclusion:	
Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC 741 741 741 Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion: Experiment No. 4: Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configurationusing op-amp. Theoretical Background: Basic knowledge of op-amp Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experiment No. 5: Aim and Objectives: Study of V-1 & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-1 & I-V. Conclusion: Experiment No. 6: Aim and Objectives: Study of V-1 & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-1 & I-V. </td <td>Experiment No. 3:</td> <td>02 Hrs.</td>	Experiment No. 3:	02 Hrs.
741 Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier Theoretical Background: Basic knowledge of op-amp OFTECHNOLOGY Experimentation: Conclusion: Conclusion: Conclusion: Experiment No. 4: O2 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting Configuration using 0P amp. 02 Hrs. Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Experiment No. 5: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemonstrateindustrial applications usingV-1 & I-V. 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemonstrateindustrial applications usingV-1 & I-V. 02 Hrs. Aim and Objectives: S	Aim and Objectives: Frequency Response of Inverting & Non-Inverting amplifier using IC	
Outcomes: Students will be able toanalyzeFrequency Response of Inverting & Non-Inverting amplifier ITE Theoretical Background: Basic knowledge of op-amp OF TECHNOLOGY Experimentation: 02 Hrs. Results and Discussions: 02 Hrs. Conclusion: 02 Hrs. Experiment No. 4: 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Theoretical Background: Basic knowledge of op-amp Experimentation: 02 Hrs. Results and Discussions: Conclusion: 02 Hrs. Conclusion: Experiment No. 5: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. 02 Hrs. Aim and Objectives: Study of V-I & I-V Converter using IC 741 02 Hrs. Outcomes: Students will be able todemonstratei	741	
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Theoretical Background: Basic knowledge of op-amp OF TECHNOLOGY Experimentation: Results and Discussions: O2 Hrs. Conclusion: Experiment No. 4: 02 Hrs. Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 02 Hrs. Theoretical Background: Basic knowledge of op-amp Experimentation: 02 Hrs. Results and Discussions: Conclusion: 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. 02 Hrs. Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 02 Hrs. 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 02 Hrs. 02 Hrs. Conclusion: Experimentation: 02 Hrs. 02 Hrs. King and Discussions: Conclusion: 02 Hrs. 02 Hrs. Conclusion: Experiment No. 6: 02 Hrs. 02 Hrs. Aim and Objectives: Study of V-1 & I-V Converter using IC 741 <	amplifier	
Experimentation: Results and Discussions: Conclusion:02 Hrs.Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configurationusing op-amp. Theoretical Background: Basic knowledge of op-amp Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: 	Theoretical Background: Basic knowledge of op-amp	
Results and Discussions: Conclusion:02 Hrs.Experiment No. 4: Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configuration using IC LM 308 Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non-Inverting Configurationusing op-amp. Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 5: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Experimentation:	OF
Conclusion:02 Hrs.Experiment No. 4: Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 308 Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configurationusing op-amp. Theoretical Background: Basic knowledge of op-amp Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter02 Hrs.Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Conclusion: Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Results and Discussions:	UF
Experiment No. 4:02 Hrs.Aim and Objectives: Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configuration using IC LM 30800Outcomes: Students will be able tobuildSumming, Scaling, & Averaging amplifier in Inverting & Non- Inverting Configurationusing op-amp.02 Hrs.Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrate Industrial applications usingV-I & I-V. Converter02 Hrs.Fineoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Outcomes: Students will be able todemonstrate industrial applications usingV-I & I-V. Converter02 Hrs.Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Conclusion:	
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Theoretical Background: Basic knowledge of op-ampImage: Conclusion: Conclusio	& Non- Inverting Configurationusing op-amp.	
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Results and Discussions: Conclusion:02 Hrs.Experiment No. 5: Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308 Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrate industrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.02 Conclusion:02 Hrs.04 Discussion: Converter02 Hrs.05 Discussion: Conclusion:02 Hrs.06 Discussion: Conclusion:02 Hrs.07 Discussion: Conclusion:02 Hrs.08 Discussion: Conclusion:02 Hrs.09 Discussion: Conclusion:02 Hrs.00 Discussion: Conclusion:02 Hrs.00 Discussion: Conclusion:02 Hrs.02 Discussion: Conclusion:02 Hrs.03 Discussion: Conclusion:02 Hrs.04 Discussion: Conclusion:02 Hrs.	Experimentation:	
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Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrate industrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.02 Conclusion:02 Hrs.03 Conclusion:02 Hrs.04 Converter Converter02 Hrs.05 Conclusion:02 Hrs.06 Conclusion:02 Hrs.07 Conclusion:02 Hrs.08 Conclusion:02 Hrs.09 Conclusion:02 Hrs.00 Conclusion:02 Hrs.01 Conclusion:02 Hrs.02 Conclusion:02 Hrs.02 Conclusion:02 Hrs.03 Conclusion:02 Hrs.04 Conclusion:02 Hrs.05 Conclusion:02 Hrs.06 Conclusion:02 Hrs.07 Conclusion:02 Hrs.08 Conclusion:02 Hrs.Conclusion:02 Hrs.Conclusion:02 Hrs.	Aim and Objectives: Study of Instrumentation Amplifier using OP 07/LM308	
Theoretical Background: Basic knowledge of op-ampImage: Conclusion:Image: Conclusion:Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 74102 Hrs.Outcomes: Students will be able todemonstrate tonverter02 Hrs.Theoretical Background: Basic knowledge of op-amp02 Hrs.Experimentation: Results and Discussions: Conclusion:02 Hrs.Theoretical Background: Basic knowledge of op-amp02 Hrs.Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Outcomes: Students will be able todesignsignal conditioning usingInstrumentation Amplifier	
Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrate industrial applications usingV-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Theoretical Background: Basic knowledge of op-amp	
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Conclusion:02 Hrs.Experiment No. 6: Aim and Objectives: Study of V-I & I-V Converter using IC 741 Outcomes: Students will be able todemonstrate industrial applications using V-I & I-V. Converter Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Results and Discussions:	
Experiment No. 6:02 Hrs.Aim and Objectives: Study of V-I & I-V Converter using IC 74102 Hrs.Outcomes: Students will be able todemonstrateindustrial applications usingV-I & I-V. Converter02 Hrs.Theoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:02 Hrs.Experiment No. 7:02 Hrs.Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Conclusion:	
Experiment No. 6:02 Hrs.Aim and Objectives: Study of V-I & I-V Converter using IC 74100Outcomes: Students will be able todemonstrate industrial applications using V-I & I-V.02ConverterTheoretical Background: Basic knowledge of op-ampExperimentation:Experimentation:Results and Discussions:02Conclusion:02Experiment No. 7:02Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM		
Aim and Objectives: Study of V-I & I-V Converter using IC 741Outcomes: Students will be able todemonstrate industrial applications using V-I & I-V. ConverterTheoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:Conclusion:Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM	Experiment No. 6:	02 Hrs.
Outcomes: Students will be able todemonstrate industrial applications using V-I & I-V. ConverterI-V. ConverterTheoretical Background: Basic knowledge of op-amp Experimentation: Results and Discussions: Conclusion:I-V. ConstructionExperiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Aim and Objectives: Study of V-I & I-V Converter using IC 741	
ConverterImage: ConverterTheoretical Background: Basic knowledge of op-ampImage: Conclusion:Experimentation:Image: Conclusion:Conclusion:Image: Conclusion:Experiment No. 7:O2 Hrs.Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM	Outcomes: Students will be able todemonstrate industrial applications using V-I & I-V.	
Theoretical Background: Basic knowledge of op-amp Image: Conclusion: Experiment No. 7: 02 Hrs. Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM 02 Hrs.	Converter	
Experimentation: Image: Conclusion: Conclusion: 02 Hrs. Experiment No. 7: 02 Hrs. Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM 02 Hrs.	Theoretical Background: Basic knowledge of op-amp	
Results and Discussions: Conclusion:02 Hrs.Experiment No. 7: Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Experimentation:	
Conclusion:02 Hrs.Experiment No. 7:02 Hrs.Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM	Results and Discussions:	
Experiment No. 7:02 Hrs.Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM02 Hrs.	Conclusion:	
Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM	Experiment No. 7:	02 Hrs.
	Aim and Objectives: Study of Schmitt Trigger using IC 324 & Window detector using LM	

311		
Outco	mes: Students will be able todemonstrateSchmitt Trigger.	
Theor	retical Background: Basic knowledge of op-amp	
Exper	imentation:	
Resul	ts and Discussions:	
Concl	usion:	
Exper	iment No. 8:	02 Hrs.
Aim a	Ind Objectives: Study of Comparator & ZCD using LM324	
Outco	Students will be able todemonstrateComparator & ZCD	
I neor	encal Background: Basic knowledge of op-amp	
Exper	imentation:	
Resul	ts and Discussions:	
Conci		
I Rai	makant. A. Gayakwad, "Op-Amps & Linear Integrated Circuits", 3rd Edition, PHI.	
2 8.8	alivahanan&Bhaaskaran, "Linear Integrated Circuits", 1st Edition, 1ata McGraw	
Hill.		
Refe	rence Books:	
1. Na	tional Analog & Interface products Data book—National Semiconductors	·
2.50	ergio Franco, "Design with op-amp & Analog Integrated Circuits", 3rd Edit	ion, Tata
MCG	raw Hill.	UTE
5. K.	R.Bolkar. Integrated Circuits Knanna publications, 10 Edition.	Vilou
4. Da	Wid. A. John & Ken Martin, Analog Integrated Circuit Design, Student Edition, V	v ney.
JKO	y Choudhary & Shah. B. Jah, Elhear Integrated Circuits ,2 Edition, New Age.	
Exper	Students Measurable students Learning Outcomes:	nonational
1.	sindents should be able to have a firm grasp of basic principles of many of	operational
2	Student should hash to differentiate between different types of on amount as well	as able to
2.	choose proper on amp as per application requirement	as able to
3	Student should be all to analyze and design on amp parameter compensating networks	vorke
J.	Student should be able to find out circuit stability from frequency response of	orks.
4.	frequency dependent parameters	is well as
5	Students should beable to analyze and design different on amp linear and t	non linear
5.	applications	
6	Student should be able to analysis of different types of Active filters differen	t types of
0.	monolithic ICs and its applications	i types of

Title of the Course: Analog Circuit Design LAB	L	Т	Р	Credit
Course Code:UELN0432	0	0	2	1

Course Pre-Requisite:

Basic knowledge of Multimeter, CRO, active and passive components,

Course Description:

This course is designed to provide students with fundamental concepts to design of ElectronicCircuits for lab experience. By learning this course student enables to design Oscillators and Waveform generators like Multivibrators and Schmitt trigger. This course deals with study operation and design of various types of voltage regulators.

Course Objectives:

- 1. To construct simple electronic circuits to accomplish specific function.
- 2. Testing of circuits developed in lab.
- 3. Evaluate performance of experiment studied.

Course Learning Outcomes:

CO	After the completion of the course the student should be	Bloom	n's Cognitive
	able to	level	Descriptor
CO1	Analyze circuits(oscillators, multivibrators, and regulators) as per requirement	IV	Analyzing
CO2	Design circuits(oscillators, multivibrators, and regulators) as per requirement	VI	Creating
CO3	Build circuits(oscillators, multivibrators, and regulators)as per requirement	PIIR	Applying
CO4	Evaluate circuits(oscillators, multivibrators, and regulators) as per requirement	V	Evaluating
CO5	Interpret results of experiment & compare with standard values	V	Evaluating

CO-PO Mapping:

		11	0											
CO	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CO1	3	3	1	" -"	"_"	"_"	"_"	۰۰_>>	··_"	··_>>	۰۰_٫٫	··_'	1	"_"
CO2	1	2	3	2	"_"	"_"	"_"	··_"	··-"	··_"	"_"	··_"	··_"	2
CO3	1	2	3	3	··_"	"_"	"_"	۰۰_٬٬	··_"	··_"	"_"	۰۰_٬٬	"_"	3
CO4	1	1	2	3	"_"	"_"	"_"	··_"	··-"	··_''	"_"	"_"	1	3
CO5	1	1	2	3	" <mark>"</mark> "	··_"	" <u>_</u> "	"_"	··-"	··_"	··_"	··_"	1	1

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE are based on practical performed/ Quiz/ Lab assignments/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on practical and oral examination.

Experiment No. 1:	2Hrs.
Aim and Objectives: To study of single stage common source (CS) amplifier.	
Outcomes: The students will be able to design single stage common source (CS) amplifier.	
Theoretical Background: Theory and operation principle of single stage common source	
(CS) amplifier.	
Experimentation: Analysis, designing and implementation of single stage common source	
(CS) amplifier.	
Results and Discussions: Noted output voltage for different frequencies.	
Conclusion: Plotted frequency response for single stage common source (CS)	
amplifier. And observed three different frequency regions of an amplifier.	
Experiment No. 2:	2Hrs.
Aim and Objectives: To study of RC phase shift oscillator using BJT	
Outcomes: The students will be able to design RC phase shift oscillator using BJT	
Theoretical Background: Theory and operation principle of RC phase shift oscillator	
using BJT	
Experimentation: Analysis, designing and implementation of RC phase shift oscillator	
using BJT	
Results and Discussions: Observed Waveforms	
Conclusion: Implemented RC phase shift oscillator using BJT and observed the waveform	
with designed frequency	
Experiment No. 3:	2Hrs.
Aim and Objectives: To design of colpitt's oscillator using BJT OL HAPLER INST	TUTIT
Outcomes: The students will be able to design colpitt's oscillator using BJT	
Theoretical Background: Theoryand operation principle of colpitt's oscillator using BJT	YS
Experimentation: Analysis designing and implementation of colpitt's oscillator using BJT	
Results and Discussions: Observed Waveforms	- (
Conclusion: Implemented colpitt's oscillator using BJT and observed the waveform with	
designed frequency	
Experiment No. 4:	2Hrs.
Aim and Objectives: To design of Hartely oscillator using BIT	21115.
Outcomes: The students will be able to design Hartely oscillator using BIT	
Theoretical Background : Theory and operation principle of Hartely oscillator using BIT	
Experimentation: Analysis designing and implementation of Hartely oscillator using BIT	
Results and Discussions: Observed Waveforms	
Conclusion: Implemented Hartely oscillator using BIT and observed the waveform with	
designed frequency	
designed frequency	2Hrs
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis designing and implementation of Astablemultivibrator	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibratorand observed waveforms	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibrator and observed waveforms Experiment No. 6:	2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes:The students will be able to design and evaluate Astablemultivibrator Theoretical Background:Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion:Implemented Astablemultivibratorand observed waveforms Experiment No. 6: Aim and Objectives: Todesign of Managetablemultivibrator	2Hrs. 2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibratorand observed waveforms Experiment No. 6: Aim and Objectives: Todesign of Monostablemultivibrator Outcomes: The students will be able to design and evaluate Monostablemultivibrator	2Hrs. 2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibratorand observed waveforms Experiment No. 6: Aim and Objectives: Todesign of Monostablemultivibrator Outcomes: The students will be able to design and evaluate Monostablemultivibrator Theoretical Background: Theory and operation principle of Monostablemultivibrator	2Hrs. 2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibratorand observed waveforms Experiment No. 6: Aim and Objectives: Todesign of Monostablemultivibrator Outcomes: The students will be able to design and evaluate Monostablemultivibrator Theoretical Background: Theory and operation principle of Monostablemultivibrator Particular Background: Theory and operation principle of Monostablemultivibrator Conclusion: The students will be able to design and evaluate Monostablemultivibrator Particular Background: Theory and operation principle of Monostablemultivibrator	2Hrs. 2Hrs.
designed frequency Experiment No. 5: Aim and Objectives: Todesign of Astablemultivibrator Outcomes: The students will be able to design and evaluate Astablemultivibrator Theoretical Background: Theory and operation principle of Astablemultivibrator Experimentation: Analysis, designing and implementation of Astablemultivibrator Results and Discussions: observed Waveforms Conclusion: Implemented Astablemultivibratorand observed waveforms Experiment No. 6: Aim and Objectives: Todesign of Monostablemultivibrator Outcomes: The students will be able to design and evaluate Monostablemultivibrator Theoretical Background: Theory and operation principle of Monostablemultivibrator Outcomes: The students will be able to design and evaluate Monostablemultivibrator Resperimentation: Analysis, designing and implementation of Monostablemultivibrator	2Hrs. 2Hrs.
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Conclusion:Implemented Bistablemultivibratorand observed waveforms	
Experiment No. 8:	2Hrs.
Aim and Objectives: To study zener shunt voltage regulator	
Outcomes: The students will be able to test zener shunt voltage regulator Theoretical	
Background: Theory and operation principle of zener shunt voltage regulator	
Experimentation: Analysis, designing and implementation of zener shunt voltage	
regulator	
Results and Discussions: Observed Waveforms and noted analysis Parameters	
Conclusion: Implemented zener shunt voltage regulator and plotted the graph which	
Indicates regulation action.	QUIng
Experiment No. 9:	2 Hrs.
Outcomes: The students will be able to test Emitter Follower Voltage Regulator	
Theoretical Background: Theory and operation principle Emitter Follower Voltage	
Regulator	
Experimentation: Analysis, designing and implementation of Emitter Follower Voltage	
Regulator	
Results and Discussions: Observed Waveforms and noted analysis Parameters	
Conclusion: Implemented Emitter Follower Voltage Regulator and plotted the graph	
which indicates regulation action.	
Experiment No. 10:	2 Hrs.
Aim and Objectives: To study Transistorised Series Voltage Regulator	
Outcomes: The students will be able to test Transistorised Series Voltage Regulator	ITUTE
Theoretical Background: Theory and operation principle of Transistorised Series Voltage	V'C
Regulator	
Experimentation: Analysis, designing and implementation of Transistorised Series	
Voltage Regulator	
Conclusion: Implemented Transistorized Series Voltege Regulator and plotted the graph	
which indicates regulation action	EKIN
Experiment No. 11:	2Hrs.
Aim and Objectives: To study of Step up and stepdown SMPS	
Outcomes: The students will be able to explain Step up and stepdown SMPS	
Theoretical Background: Theoryand operation principle of Step up and stepdown SMPS	
Experimentation: Analysis of Step up and stepdown SMPS	
Results and Discussions: comparative understanding of Step up and stepdown SMPS	
Conclusion: Studied Step up and stepdown SMPS	
Textbooks:	
1. Electronic Devices and circuits by S.Salivahanan, N Suresh Kumar, A Vallavaraj.	
2. Electronic Devices and Circuits by Anil K. Maini, Varsha Agarwal- Wiley India.	
3. Electronic Devices and Circuits by A.P.Godse and U.A.Bakshi.	
4. Electronic Devices and Circuits by Mantri & Jain.	
References:	
1. Pulse, Digital & Switching Waveforms by Millman, Taub, Rao.	
2. Schaum's Outlines, "Electronic Devices and Circuits"	
3. Electronic Devices and Circuits by Allen Mottershead-PHI.	
4. Electronic Devices and Circuit Theory by Boylestad. Pearson Publication	
5. Electronic Devices and Circuits by J B Gunta Katson Publication	
6 Electronic Devices and Circuits by Millman Halkias TMH Publication	
7 Solid State Electronic Devices by Ben Streetman PearsonPublication	
Experiment wise Measurable students Learning Outcomes.	
Experiment wise measurable students Learning Outcomes.	
1. The students will be able to design single stage common source (CS) amplifier using	g FET.
2. The students will be able to design RC phase shift oscillator using BJT	
3. The students will be able to design colpitt's oscillator using BJT	

- 4. The students will be able to design Hartelyoscillator using BJT
- 5. The students will be able to design and evaluate Astablemultivibrator
- 6. The students will be able to design and evaluate Monostablemultivibrator
- 7. The students will be able to design and evaluate Bistablemultivibrator
- 8. The students will be able to test zener shunt voltage regulator
- 9. The students will be able to test Emitter follower voltage regulator
- 10. The students will be able to design of transistorized series voltage regulator
- 11. The students will be able to explain Step up and stepdown SMPS



Title of	f the Course: Analog Communication LAB	L	Т	Р	Credit					
Course	e Code:UELN0433	-	-	2	1					
Course	Pre-Requisite: Knowledge ofsemiconductor devices, working	g Knowl	edge o	of elec	tronic					
instrum	instruments bread boarding, soldering and testing.									
Course	Course Description:									
This la	ab is based on constructing and testing analog modulation	circuits	s (AM	I, FM).Evaluating					
perforn	nance parameters and compare with standard values.									
Co	urse Objectives:									
1.	To construct simple electronic circuits to accomplish speci	fic func	tion.							
2.	Testing of circuits developed in lab.									
3.	3. Evaluate performance of experiment studied.									
CO	After the completion of the course the student Bloom	n's Cog	nitive							
	should be able to	evel		Desc	riptor					
CO1	Construct circuits of Amplitude, frequency	VI	C	Creatir	ng					
	modulation and demodulation.				-					
CO2	Construct circuits of pulse modulation circuits	VI	C	Creatir	ıg					
	viz. PAM, PPM, PWM, modulation and				-					
	demodulation.									
CO3	CO3 Test and Evaluate different parameters of AM VI Creating									
	radio receiver.									
-	RULF	HTU		1 CV	HUHE					

)F TECHNOLOGY'S

CO-PO Mapping:

00-10	map	ping.												
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO	PO	PO	PSO1	PSO2
										10	11	12		
CO1	3	2	1	"_"	··_"	··_"	··_"	··_"	··_"	"_"	··-"	"_"	··_"	1
CO2	3	2	1	··_"	"_"	··-"	··-"	··_"	"_"	"_"	"_"	"_"	"_"	"_"
CO3	2	2	1	"_"	··_"	··_"	··-"	··_"	··-"	"_"	··_"	··-"	"_"	1

Assessments :

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one EndSemester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar/Group Discussions etc. MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with60-70% Weightage for course content (normally last three modules) covered after MSE.

Course Contents:	
Experiment No. 1:	02 Hrs.
Aim and Objectives: Study of Amplitude Modulation (A.M.)	
Outcomes: Students should be able to explain and perform Amplitude Modulation	
concept.	
Theoretical Background: Knowledge of Basicmodulation system	
Experimentation: Students are able toperform experiment based on Amplitude	
Modulation (A.M.)	
Results and Discussions:	
Conclusion:	
Experiment No. 2:	02 Hrs.
Aim and Objectives: Study of AM Detection.	
Outcomes: Students should be able to explain and performAM Detection.	
Theoretical Background: Knowledge of Amplitude Demodulation	
Experimentation: Students are able toperform experiment based on	
Results and Discussions:	
Conclusion:	
Experiment No. 3:	02 Hrs.
Aim and Objectives: Study of AM Receiver Characteristics OLHAPUR INST	TTUTE
(Sensitivity Selectivity & Fidelity)	iY'S
Outcomes: Students should be able to explain and perform AM Receiver	
Characteristics	
Theoretical Background: Knowledge of radio parameters	
Experimentation: Students are able toperform experiment based on AM Receiver	EKIN
Characteristics	
Results and Discussions:	'UK
Conclusion:	
Experiment No. 4:	02 Hrs
Aim and Objectives: Study of Frequency Modulation (E.M.)	02 1115.
Ann and Objectives. Study of Frequency Woodulation. (1.1.W.)	
Demodulation	
Theoretical Background: Knowledge of Frequency Demodulation	
Experimentation : Students should headle to perform experiment based on	
Experimentation: Students should beable toperform experiment based on	
Prequency Demodulation	
Results and Discussions:	
Conclusion:	02.11
Experiment No. 5:	UZ HIS.
Aim and Objectives: Study of FM Demodulation.	
Outcomes: Students should beable to explain and perform FM	
Demodulation I heoretical Background: Knowledge of FM Demodulation.	
Experimentation: Students should beable toperform experiment based onFM	
Demodulation	
Results and Discussions:	
Conclusion:	
Experiment No. 6:	02 Hrs.

Aim and Objectives: Sampling And Reconstruction.	
Outcomes: Students should beable to explain and perform SamplingAnd	
Reconstruction.	
Theoretical Background: : Knowledge of Sampling And Reconstruction.	
Experimentation: Students should beable toperform experiment based on	
Results and Discussions:	
Conclusion:	
Experiment No. 7 :	
Aim and Objectives: Study of Pulse Amplitude Modulation (PAM)	
Outcomes: Students should beable to explain and performPulse Amplitude	
Modulation (PAM)	
Theoretical Background: : Knowledge of Pulse Amplitude Modulation (PAM)	
Experimentation: Students should beable toperform experiment based on	
Results and Discussions:	
Conclusion:	
Experiment No. 8:	02 Hrs.
Aim and Objectives: Study of Pulse Width Modulation. (PWM)	
Outcomes: Students should beable to explain and perform Pulse Width	
Modulation. (PWM)	TITUTE
Theoretical Background: : Knowledge of Pulse Width Modulation. (PWM)	iY'S
Experimentation: Students should beable toperform experiment based on Pulse	
Width Modulation. (PWM)	
Results and Discussions:	
Conclusion:	EKIN
Experiment No.9 :	02 Hrs.
Aim and Objectives: Study of Pulse Position Modulation. (PPM)	UK
Outcomes: Students should beable to explain and perform Pulse Position	
Modulation. (PPM)	
Theoretical Background: Knowledge of Pulse Position Modulation. (PPM)	
Experimentation: Students should beable toperform experiment based on Pulse	
Position Modulation (PPM)	
Results and Discussions:	
Results and Discussions: Conclusion:	
Results and Discussions: Conclusion: Experiment No.10 :	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable to explain Antenna Parameters	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable to explain Antenna Parameters Theoretical Background: Knowledge of Antenna	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable toexplain Antenna Parameters Theoretical Background: Knowledge of Antenna. Experimentation:Nil	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable toexplain Antenna Parameters Theoretical Background: Knowledge of Antenna. Experimentation:Nil Results and Discussions:	02 Hrs.
Results and Discussions:Conclusion:Experiment No.10 :Aim and Objectives: Study Of Antenna Parameters.Outcomes: Students should beable toexplain Antenna ParametersTheoretical Background: Knowledge of Antenna.Experimentation:NilResults and Discussions:Conclusion:	02 Hrs.
Results and Discussions:Conclusion:Experiment No.10 :Aim and Objectives: Study Of Antenna Parameters.Outcomes: Students should beable toexplain Antenna ParametersTheoretical Background: Knowledge of Antenna.Experimentation:NilResults and Discussions:Conclusion:Textbooks:	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable toexplain Antenna Parameters Theoretical Background: Knowledge of Antenna. Experimentation:Nil Results and Discussions: Conclusion: Textbooks: 1 George Kennedy 'Electronics Communication System'- Wth Edition-Tata McGray Hill	02 Hrs.
Results and Discussions:Conclusion:Experiment No.10 :Aim and Objectives: Study Of Antenna Parameters.Outcomes: Students should beable toexplain Antenna ParametersTheoretical Background: Knowledge of Antenna.Experimentation:NilResults and Discussions:Conclusion:I George Kennedy 'Electronics Communication System'- IVth Edition-Tata McGraw HillPublication.	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable toexplain Antenna Parameters Theoretical Background: Knowledge of Antenna. Experimentation:Nil Results and Discussions: Conclusion: Textbooks: 1 George Kennedy 'Electronics Communication System' - IVth Edition-Tata McGraw Hill Publication. 2. Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced.	02 Hrs.
Results and Discussions: Conclusion: Experiment No.10 : Aim and Objectives: Study Of Antenna Parameters. Outcomes: Students should beable toexplain Antenna Parameters Theoretical Background: Knowledge of Antenna. Experimentation:Nil Results and Discussions: Conclusion: Textbooks: 1 George Kennedy 'Electronics Communication System' - IVth Edition-Tata McGraw Hill Publication. 2. Wayne Tomasi 'Electronics Communication System' -Fundamentals through Advanced. Pearson Education.	02 Hrs.

Publication.

References:

- 1. Dennis Roddy, John Coolen. 'Electronics Communications 'IVth Edition-Pearson Education
- 2. V. Chandra Sekar, 'Analog Communication', Oxford university.

3. R P Singh, S D Sapre 'Communication System-Analog & Digital 'II Edition –Tata Mc Graw Hill Publication

4. B. P. Lathi, Zhi Ding, 'Modern Digital and Analog Communication Systems' 4th edition, Oxford university.

5. Blake, 'Electronics Communication Systems' 2nd edition, cengage Learning.

Experiment wise Measurable students Learning Outcomes: Students should able to

- 1. Students are able to explain and perform concept of modulation and different types of Modulation.
- 2. Students are able to explain and perform AM receiver characteristics.
- 3. Students are able to explain and perform FM modulation.
- 4. Students are able to explain and performFM Demodulation.
- 5. Students are able to explain and performpulse modulation.
- 6. Students are able to explain concept antenna parameters.

Title of	Fitle of the Course:Control System Engineering LAB L T P									Р	Cred	it			
Course	Code	:UEL	N0434			0	8				0	0	2	1	
Course Pre-Requisite: Knowledge of Derivative, Integration, Matrices and Laplace transform.															
Course	Course Description: The course studies dynamic systems encountered in a variety of instrumentation									on					
and Mechatronics systems, the modelling of such systems and the response of these systems to a															
disturbance. In addition, the control of dynamic systems using feedback and the design of control															
systems	using	differe	nt desi	gn tech	niques	will b	e studi	ed.							
Course	e Obje	ctives	:												
Objectiv	ves of t	his cou	Irse are	e:		~ 1		1	.1			1 1.	6.1		
1. 10 sti	udy the	funda	mental	conce	pts of C	Control	syster	ns and	mather	matica	I moo	leling	g of the	system.	
2. 10 SU	udy the	bosice	pt of the	me res	ponse a	and fre	quency	respoi	nse or	the sys	tem.				
Course		ning (S OF Sta	mos•	11a1y515		system	1.							
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CO	After the completion of the course the student should be Bloom's Cognitive														
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CO2	Analy	ins Uy l ize tir	ne do	main 4	and fr	ns usifi equenc	v don	nain e	vsteme	with	Г	V	Analyz	zina	\neg
02	respo	nse to i	test inr	nits	unu m	equene	y uon	iani s	ystems	vv 1t11	1	v	Anaryz	ling	
CO3	Deter	mine t	he stak	oility of	f the sy	stems	by usi	ng Rou	th's cr	riteria.	1	V	Evalus	ating	\neg
	Nyqu	ist crit	eria, B	ode plo	ot and r	oot	locus.	0-100	_ 01	,		•	/ urut	8	
CO4	Desig	n of au	utomate	ed syst	em usii	ng PLC	C and P	ID.	KO	IH2	DV	I R	Creati	ng	Т
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CO PC	Mon	ning													
	PO1	PINg: PO2	PO3	PO4	PO5	PO6	PO7	PO8	POQ	PO	PO	PO	PSO1	PSO2	
CO	101	102	105	104	105	100	10/	100	109	10	11	12	1501	1502	
CO1	2	3	··_"	"_"	"_"	"_"	··_"	۰۰_››	··_"	··_"	··_"	··_"	··_"	,	
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CO3	1	2	"_"	··_ "	"_"	··_"	۰۰_٬٬	"_"	۰۰_٫٫	"_"	··_"	۰۰_۰۰	2	··_"	P.
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ESE 50															
ISE is	based	lon	practic	al per	forme	d/Qu	iiz/ M	lini-Pr	oject	assign	ed/	Pres	entatior	n/ Grou	up
Discuss	sion/ I	nterna	l oral e	etc.					-	_					_
ESE: A	ssessn	nent is	s based	l on or	al exa	minati	on								
Course	e Cont	ents:													
A.	Hard	ware]	Exper	iment											
Experin	nent N	lo. 1:	-											2Hrs.	
Aim an	d Obje	ectives	:Detern	ninatic	on of tra	ansfer	functio	ns of p	hysica	l syste	m.				
Outcon	nes:The	e stude	nts wil	l be ab	le towr	ite diff	erentia	l equat	tion usi	ing app	oropr	iate 1	aws,		
apply L	aplace	transfo	orm and	l take r	atio of	output	to inp	ut.			-				
Theore	tical B	ackgro	ound:T	Theory	of mec	hanica	1 and e	lectrica	al syste	m					
Experir	nentat	ion: A	ny Phy	vsical s	ystem										
Results	and D	iscussi	ions: T	ransfe	r functi	on of p	ohysica	l syste	m						
Conclus	Conclusion: Transfer function of physical system														

Experiment No. 2:	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step	
input.	
Outcomes: The students will be able toplot response of first and second order system for a	
step input.	
Theoretical Background: Theory of standard test signals and transfer function.	
Experimentation: Time response of first and second order system.	
Results and Discussions: Observed response and noted analysis Parameters	
Conclusion: Implemented circuit and observed the result	
Experiment No. 3:	2Hrs.
Aim and Objectives: Verification of Bode plot using Lead Network.	
Outcomes: The students will be able to design and evaluate Lead Network.	
Theoretical Background: Theoryand operation principle of Lead Network.	
Experimentation: Analysis, designing and implementation of Lead Network.	
Results and Discussions: observed Waveforms and noted analysis Parameters	
Conclusion: Implemented Lead Network. and observed the result	
Experiment No. 4:	2Hrs.
Aim and Objectives: Verification of Bode plot using Lag Network.	
Outcomes: The students will be able to design and evaluate Lag Network.	
Theoretical Background: Theory and operation principle of Lag Network.	
Experimentation: Analysis, designing and implementation of Lag Network.	
Results and Discussions: observed Waveforms and noted analysis Parameters	
Conclusion: Implemented Lag Network. and observed the result (A D D N C	
Experiment No. 5:	2Hrs.
Aim and Objectives: To study ON-OFF controller. OF TECHNOLOG	YS
Outcomes: The students will be able to design and evaluateON-OFF controller	
Theoretical Background: Theoryand operation principle ON-OFF controller	
Experimentation: Analysis designing and implementation of ON-OFF controller	
Results and Discussions: observed and noted analysis Parameters	
Conclusion: observed and noted analysis Darameters	
Export No. 6:	211mg
Aim and Objectives: To Study of DID controller	21113.
Ann and Objectives: 10 Study of PID controller	
Theory tion I be alter up de Theory of a provincial of ADD controller.	
Theoretical Background: Theoryand operation principle of PID controller.	
Experimentation: Designing and implementation of PID controller.	
Results and Discussions: observed response of PID controller noted analysis Parameters	
Conclusion: Implemented PID using PLC setup.	
Experiment No. 7:	2 Hrs.
Aim and Objectives: To Study of PLC.	
Outcomes: The students will be able to study PLC.	
Theoretical Background: Theoryand operation principle of PLC.	
Experimentation: Implementation of different circuits using PLC	
Results and Discussions: Observed response of different circuits using PLC.	
Conclusion: Implemented different circuits using PLC and observed response.	
B. Software Experiment Using MATLAB	
Evnoviment No. 9.	+
Experiment No. o:	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input.	2Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a	2Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theory of standard test signals and transfer function	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theory of standard test signals and transfer function. Experimentation: Time response using MATLAB	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theory of standard test signals and transfer function. Experimentation: Time response using MATLAB. Results and Discussions: Observed response and noted analysis Parameters	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theoryof standard test signals and transfer function. Experimentation: Time response using MATLAB. Results and Discussions: Observed response and noted analysis Parameters Conclusion: Implemented using MATLAB	2 Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theoryof standard test signals and transfer function. Experimentation: Time response using MATLAB. Results and Discussions: Observed response and noted analysis Parameters Conclusion: Implemented using MATLAB.	2Hrs.
Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theoryof standard test signals and transfer function. Experimentation: Time response using MATLAB. Results and Discussions: Observed response and noted analysis Parameters Conclusion: Implemented using MATLAB. Experiment No. 9:	2Hrs. 2Hrs.
 Aim and Objectives: To study time response of first and second order system for a step and ramp input. Outcomes: The students will be able toplot response of first and second order system for a step and ramp input. Theoretical Background: Theoryof standard test signals and transfer function. Experimentation: Time response using MATLAB. Results and Discussions: Observed response and noted analysis Parameters Conclusion: Implemented using MATLAB. Experiment No. 9: Aim and Objectives: To study Bode plot, Nyquist plot and polar plot. 	2 Hrs. 2 Hrs.

transistors. Experimentation: Analysis, designing and implementation of plots using MATLAB. Results and Discussions: check stability of system								
Experimentation: Analysis, designing and implementation of plots using MATLAB.								
Results and Discussions: check stability of system								
Results and Discussions, check stability of system.								
Conclusion: Implemented using MATLAB and check stability of system.								
Experiment No. 10:	2Hrs.							
Aim and Objectives: To study state space analysis								
Outcomes: The students will be able to study MIMO systems.								
Theoretical Background: Theory and operation principle of state, space and variable.								
Experimentation: Analysis, designing and implementation using MATLAB								
Results and Discussions: Noted controllable and observable output.								
Conclusion: Check system is controllable and observable.								
Textbooks:								
1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International								
Publication								
2. R. Anandanatarajan, P. Ramesh Babu, "Control Systems Engineering", Scitech Publication	ns .							
3. A. Ananadkumar, "Control system Engineering" PHI publication 2nd edition.								
4. John R. Hackworth, Fredrick D. Hackworth "Programmable Logic Controller" Pearson publ	lication.							
References:								
1. Norman S. Nise "Control Systems Engineering", 8th edition, Wiley edition.								
2. Samarjeet Ghosh, "Control Systems Theory & Applications", 1st edition, Pearson education	n.							
3. S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearson education.								
4. S. N. Shivanandan, S. N. Deepa," Control System Engineering" Vikas Publications 2nd edit	tion							
5.Dhanesh N. Manik" Control Systems" Cengage learning.	V'C							
Experiment wise Measurable students Learning Outcomes:								
2. The students will be able to determine transfer functions of physical system.								
2. The students will be able to plot time response of first and second order system for a	step							
input.								
3. The students will be able to design and evaluate Bode plot using Lead Network.	- K II							
4. The students will be able to design and evaluate Bode plot using Lag Network.								
5. The students will be able to design and evaluate ON-OFF controller.								
6. The students will be able to design and evaluatePID controller.	UΠ							
7. The students will be able to study PLC								
8. The students will be able to plot response of first and second order system for a step a	and							
ramp input.								
9. The students will be able to determine phase margin and gain margin								
10. The students will be able to study MIMO systems.								

Title of the LAB: Micro project 2 LAB	L	Т	Р	Credit
(Digital problem solutions)	0	0	2	1
Course Code: UELN0451	U	U	4	-

LAB Pre-Requisite:

Digital Design with VHDL, EDA Tools and architecture of PLDs like CPLD and FPGA, CPLDetc.

LAB Description:

This lab prepares students to develop thinking process to solve Digital design problems by application of science and engineering in innovative manner. The group of students not more than 3 should identify digital design problems, perform requirement analysis. After interactions with course coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of micro-project. As per requirements the group should develop specifications offinal outcomeof the project. The students should think critically and undertake design of the project with skills available with them to meet the requirements and specifications. The group is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation. The group should submit the proposal within first week of the semester. The student is expected to exert on design, development and testing of the proposed work as per the schedule. The working model of the project should be demonstrated for internal submission.

This LAB will help to develop sensitivity of students towards digital design problem, think critically to find innovative solutions to simplify human life.

Completed micro project and documentation in the form of micro project report is to be submitted at the end of semester. The project should complete in 12 weeks including field trails if any.

At the end ofproject the guide should advise students to protect IP either in the form of Patent or registration of design or publish paper on work completed or participate in project competition.

The probable areas of the project work (but not only restricted to): Application of digital design for industry, home appliances, sports, agricultute, automotive industry, engineering computations, domestic applications etc.

Course Objectives:

- 1. Evaluate digital system needs.
- 2. Identify suitable problem that can be solved using digital design and engineering knowledge and basic knowledge of electronics engineering.
- 3. Design and implement the solution using hardware / software or both.
- 4. Testing of the implementation

5. Write project report as per standard format.

Course	Course Learning Outcomes:							
CO	After the completion of the course the student will	Bloom's Cognitive						
	able to	Level	Descriptor					
CO1	Identify social problem that can be implantable using engineering and skills like, EDA Tools, PLDs and basics of electronics (components soldering and testing using test equipment)	II	Evaluating					
CO2	Analyze and build logical/ mathematical/ analyticalmodel of the project.	IV	Analyzing					
CO3	Design / simulate the model/ project work	Ι	Designing					
CO4	Implement the project using resources available in the department.	V	Creating					
CO5	Developcomprehensive report on project work as per prescribed format	VI	Creating					

CO-PO Mapping:

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1		3				2						1		2
CO2	2													2
CO3			3				2							2
CO4					3									2
CO5									2	3				2
CO6								3			3			2

Assessments :

Teacher Assessment:

One component of In Semester Evaluation (ISE) and one End Semester Examination (ESE) having 50%, and 50% weights respectively.

Assessment	Marks
ISE	50
ESE	50

ISE is based on practical performed/ Quiz/ Project task assigned/ Presentation/ Group Discussion/ Internal oral etc.

ESE: Assessment is based on oral examination

OF TECHNOLOGY'S

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Kolhapur.K.I.T'S College of Engineering,
Kolhapur.