		Walc	hand College ((Government Aided	of Engineering	, Sangli							
			AY2	2022-23								
			Course I	nformation								
Progra	amme		B.Tech. (Electron	ics Engineering)								
Class.	Semester		Second Year B. T	Tech., Sem III								
Cours	e Code		6MA201	· · · · · ·								
Cours	e Name		Probability and S	tatistics								
Dociro	d Doquisi	tos	Mathematics cour	rse at Higher Secon	dary Junior College							
Desire	u Kequisi	165.	Wathematics cou	ise at Higher Secon								
	Taaahing	Sahama		Examination Sci	homo (Morks)							
Lootu	reaching	2 Hrg/wook	MSE			Total						
Tectul	re :-1	2 HIS/week			ESE	100						
lutor	181	-	30	20	50	100						
				Credi	ts: 02							
	I	Course Objectives										
1	Familiari	ze the students v	with techniques in p	probability and stati	stics.							
2	Design a	statistical hypot	hesis about the real	l world problem and	l conduct appropriate tes	t for						
2	drawing	valid inference a	bout the population	n characteristics.								
<u> </u>												
		Course	Outcomes (CO) w	ith Bloom's Taxon	omv Level							
At the	end of the	course the stud	ents will be able to									
CO1	Apply co	mputational too	ls to solve Mathem	, atical and Statistica	l problems	Apply						
CO2	O2 Solve problems in probability statistics											
CO3		· · · · · · · · · · · · · · · · · · ·	·····j, ~····									
CO4												
Modu	ıle		Module	Contents		Hours						
	Rand	lom Variable										
Ι	Discr Proba distril varial	ete random varia ability density fubution, Joint dis able, Examples	able, Continuous ra inction, Bivariate c tribution function	ndom variable, Pro liscrete random var of two dimensiona	bability mass function, iable, Joint probability l discrete random	4						
II	Prob	ability Distribu	tion			4						
	Poiss	on Distribution,	Gaussian Distribut	ion, Exponential Di	stribution, Examples							
III	Popul statist distril	lation, Sample, I tic, standard erro bution of propor	on Random samples, la or of Statistic, samj tion, Examples	arge sample, small s pling distribution of	sample, Parameter, f mean, sampling	5						
IV	distribution of proportion, Examples Testing of Hypothesis I Hypothesis, null and alternative hypothesis, critical region, level of significance, V Types of error, one tailed test, two tailed test, test of significance for large samples, Hypothesis testing for single population proportion, hypothesis testing for single population mean, Examples											
V	Testi Test o Defin Exam chi sc	ng of Hypothes of significance f ition and its pr pples, Chi-square puare test of goo	is II for small samples, of operties, Test the e distribution: Defi dness of fit, Examp	degrees of freedom significance of me nitions and its prop ples,	, student t distribution: an of random sample, perties, chi square test,	5						
VI	Statis	stics: elation, Linear re	gression, Curve fit	ting (a) straight line	e (b) logarithmic curve,	5						

Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

	Examples.
	Textbooks
1	Gupta and Kapoor, "Fundamentals of Mathematical Statistics".
2	Vijay Rohatgi, "An Introduction to Probability and Statistics".
3	
4	
	References
1	Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", Academic Press, (2009)
2	
3	
4	
	Useful Links
1	
2	
3	
4	

	CO-PO Mapping													
	Programme Outcomes (PO)												PSO	
	1 2 3 4 5 6 7 8 9 10 11 12												1	2
CO1	2	1												
CO2	1	1 2												
CO3														
CO4	CO4													
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High														
Each CO	Each CO of the course must map to at least one PO.													

Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

		Walc	hand College (Government Aided	of Engineering	g, Sangli						
			AY	2022-23							
			Course]	Information							
Progra	amme		B. Tech. (Electro	nics Engineering)							
Class,	Semester		Second Year B. 7	Second Year B. Tech., Sem. III							
Cours	e Code		6EN201								
Cours	e Name		Electronic Circui	t Analysis and Des	ign-I						
Desire	ed Requisi	tes:	Basic Electronics								
	-		0 0 0 0								
	Teaching	Scheme		Examination Scheme (Marks)							
Lectu	re	3 Hrs/week	MSE	ISE	ESE		Total				
Tutor	ial	-	30	20	50		100				
14001					lits: 3		100				
			Course	Objectives							
	Toomlo	in the montring	course	Objectives	diada valtara marvi	lator a	mulifiana				
1	10 expla	m use working (T and MOSFFT	s and feedback am	s. recurrers, Zener nlifiers	uioue voltage regu	ator, a	mpimers				
2	To illust	rate the small si	gnal models used f	for analysis of elect	tronic circuits						
3	To illust	rate the method	s of designing the e	electronic circuits u	using discrete comp	onents					
4	10 mustrate the methods of designing the electronic circuits using discrete components.										
	1	Course	Outcomes (CO) w	rith Bloom's Taxo	nomy Level						
At the	end of the	course, the stud	ents will be able to	,							
CO1	Analyze	the performance	e of diode circuits.	,			Analyze				
CO2	Analyze	the performance	e of electronic circu	uits (amplifiers) us	ing small signal mo	dels	Analyze				
	such as h	hybrid- π , r_e and l	<i>h</i> -parameter model		0 0		•				
CO3	Evaluat	e the performance	e of feedback amp	lifiers, oscillators a	and power amplifier	s.	Evaluate				
CO4	Design 1	the electronic c	ircuits (amplifiers)) for given specif	fications using disc	rete	Create				
	compone	ents such as BJT	, FET and MOSFE	Т.							
	•			a			**				
Modu			Module	e Contents			Hours				
	Diod	e Circuits		1. 1. 1.	1, 1, 1	11	4				
	Recti	fier circuits, RC	filter circuit, Zene	er diode voltage reg	gulator, voltage doi	lbler	4				
	BIT	Amplifiers	reuris, priotouroue	and LED circuits.							
	BITS	and its biasing i	nethods considerin	g stability factor: F	Basic BIT amplifier	· DC					
П	and A	C load line anal	vsis, small signal h	vbrid- π model: ana	lysis of common en	nitter	8				
	(CE).	, common collec	tor (emitter follow	er) amplifier and c	ommon base (CB)						
	ampl	ifier.	,	, 1	× ,						
	JFE	Γ Amplifiers									
ш	JFET	(Junction Field	Effect Transistor):	operation, character	eristics, biasing met	hods	5				
	for J	FET: self bias,	voltage divider bi	as; small signal e	equivalent circuit, J	FET	U				
	comr	non source ampl	ifter, JFET commo	on drain amplifier.							
	MOS	SFET Amplifier	'S tarrating anhangan	140.00							
IV	chara	cteristics biasi	ng in MOSFET a	reuit	8						
1 V	comr	non source (CS) amplifier comm	and	0						
	comr	non gate configu	ration; MOSFET								
	Feed	back Amplifier	s and Oscillators								
	Multi	istage amplifiers	, Darlington pair.	general feedback s	tructure, amplifiers	with					
V	negat	ive feedback, pr	operties of negative	e feedback, four ba	sic feedback topolo	gies;	9				
	Oscil	lators: basic prin	ciple of oscillation,	, Phase-Shift oscilla	ator; frequency resp	onse					
	of an	plifiers.			_ • •						

VI	Power Amplifiers Classification of power amplifiers: class-A, class-B, class-AB, class-C power amplifiers; transformer-coupled amplifiers, class-AB push-pull complementary output stage.	6
	Textbooks	
1	D. A. Neamen, <i>"Electronic Circuit Design and Analysis"</i> , 3 rd Edition, McGraw Hill (India) Private Limited, New Delhi, 2007.	Education
2	A. S. Sedra and K. C. Smith, " <i>Microelectronic Circuits</i> ", 5 th Edition, Oxford Unive 2004.	rsity Press,
3	Allen Mottershed, " <i>Electronic Devices and Circuits</i> ", 2 nd Edition, PHI, 1979.	
4	D. A. Neamen, " <i>Microelectronics: Circuit Analysis and Design</i> ", 4 th Edition, Mc Education (India) Private Limited, New Delhi, 2021.	Graw Hill
	References	
1	R. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", 9th Edition,	PHI, 2009.
2	Millman and Halkias, "Electronic devices and Circuits", 1st Edition, Tata McGraw H	Iill, 1991.
3	Gerald E. Williams, " <i>Practical Transistor Circuit Design and Analysis</i> ", 1 st Ed. McGraw Hill, New Delhi, 1973.	lition, Tata
4		
	Useful Links	
1	https://nptel.ac.in/courses/108105158	
2	https://nptel.ac.in/courses/117101106	
3	https://nptel.ac.in/courses/108101091	
4		

	CO-PO Mapping														
	Programme Outcomes (PO)													PSO	
	1	1 2 3 4 5 6 7 8 9 10 11 12 1 2													
CO1	2	3													
CO2	2	3													
CO3		3	3												
CO4	CO4 3 2														
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO of the course must map to at least one PO.															

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Assessment

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

		Walc	hand College ((Government Aided	of Engineering Autonomous Institut	g, Sangli									
	AY 2022-23 Course Information													
			Course I	nformation										
Progr	amme		B.Tech. (Electron	ics Engineering)										
Class,	Semes	ster	Second Year B. T	ech., Sem III										
Cours	e Code	9	6EN202											
Cours	e Nam	e	Circuit Theory											
Desire	ed Req	uisites:	Engineering Math	nematics, Basic Ele	ctrical Engineering									
	Teach	ing Scheme		Examination S	cheme (Marks)									
Lectu	re	3 Hrs/week	MSE	ISE	ESE	Total								
Tutor	ial	1 Hrs/week	30	20	50	100								
				Cred	its: 4									
			Course	Objectives										
	The t	heoretical structure,	formal representat	ion, computational	methods, notation, and	vocabulary								
1	of linear models to be able to apply them to the analysis and design of digital and analog													
	comn	nunications and con	trol systems.											
2	10 pe	erform signal analys	is with reference to	spectrum analysis	of deterministic signals									
<u> </u>														
	<u> </u>	Course	Outcomes (CO) w	ith Bloom's Taxor	nomv Level									
At the	At the end of the course, the students will be able to.													
CO1	Work	with basic fundame	entals, theorems us	sed in circuit's anal	ysis	Understa nding								
CO2	Carry	out transient and s	teady state analysi	s of different circui	ts	Analyzyin g								
CO3	Do ar	nalysis and synthesis	of circuit characte	eristics		Evaluatin g								
CO4	Desig	n a circuit and netw	ork			Creating								
Modu	ıle		Module	Contents		Hours								
I	Network Analysis Review of fundamentals of circuit components, complex numbers and phasors in circuits, applications to networks, graphs and trees, node and mesh analysis, matrix representations dual and inverse networks, admittance and impedance, state variable analysis, T-II transformations, bridged-T and lattice networks, Network Theorems: Superposition, Millman, Norton, Thevenin, Maximum													
II	power transfer, AC and DC analysis. Transient Response of Circuits RL and RC circuits, switching conditions, RLC circuits, Review of Laplace transform, important theorems and properties, application analysis of circuits in time domain, transfer function, Initial Conditions and Solutions to networks.													
Ш	T of St T	the Sinusoidal Steady St he Sinusoidal Forci f Voltage and Curr teady State Analysis heorems to AC Circ	ate Analysis ng Function, Phase rent, Instantaneous Using Mesh and uits.	or Concept, Averag s and Average Po Nodal Analysis, A	ge and Effective values ower, Complex Power, application of Network	6								

	Resonance and Magnetically Coupled Circuits U	
IV	Series resonance, impedance and phase angle of series resonant circuit, voltage and current in series resonant circuit, effect of resistance on frequency response curve, bandwidth, selectivity and quality factor. Parallel resonance, resonant frequency for tankcircuit, and variation of impedance with frequency factor of parallel resonant circuit, reactance curves. Magnetic coupled circuits: Mutual inductance, coefficient of coupling, single tuned anddouble tuned circuits.	6
	Two Port Networks	
v	Open and short circuit parameters, transmission parameters, hybrid parameters, matrix form of input output relations, interaction of two four terminal networks, unsymmetrical networks, propagation functions, lattice networks, balanced and unbalanced networks, bisection theorem.	8
VI	Network Functions Concept of complex frequency network functions for one port and two port network, poles and zeros of network functions, restrictions on poles and zeros location for driving point function and transfer function. Time domain behavior from poles and zero plot, stability of active network. Characteristics of RLC and LC high pass, low pass, band pass and band stop filter.	6
	Textbooks	
1	Van Valkenburg, "Network Analysis", PHI publication.	
2	Leonard S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University P	ress
3		
4		
	References	
1	L.P. Huelsman, "Basic Circuit Theory", PHI Publication, 3rd Edition, 2009.	
2	C. K. Alexander, M. N. O. Sadiku, "Electrical Circuits", Tata McGraw-Hill, 2008.	
3	Ravish R Singh, "Network Analysis and Synthesis", Tata McGraw-Hill, 2013	
4		
	Usoful Links	
1		
2		
3		
4		
· .	I	

	CO-PO Mapping														
	Programme Outcomes (PO)													PSO	
	1	1 2 3 4 5 6 7 8 9 10 11 12											1	2	
CO1	1	1													
CO2		1	2												
CO3		1		2									3		
CO4															
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															
Each CO of the course must map to at least one PO.															

Assessment

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		Walc	hand College o	of Engineering	, Sangli								
	(Government Aided Autonomous Institute) AY 2022-23												
			AY 2	2022-23									
Duogu	ommo		R Tach (Electroni	niormation									
Close	Somostor		Second Veer B. T.	ach Som III									
Class,	Semester		Second Tear D. To	ech., Sem m									
Cours	se Code		0EIN205										
Doging	d Doguici	tog.	Digital Electronics										
Desire	ea Requisi	tes:	Basic Electronics										
	Teaching	Scheme		Examination S	cheme (Marks)								
Lectu	re	3 Hrs/week	MSE	MSE ISE ESE									
Tutor	ial		$\frac{1}{30}$ 20 50 1										
				Cred	its: 3								
			Course	Objectives									
1	To deve	lop the fundam	ental concepts in	digital design.									
2	To make	e differences be	etween combinatio	onal and sequenti	al circuits evident	to students.							
3	To moti	vate students le	earn implementation	on of digital circu	its using HDL and	PLD.							
4	To teach	students to deve	elop digital design u	sing VHDL code									
A + +1	1 6 (1	Course	Outcomes (CO) wi	th Bloom's Taxor	nomy Level								
At the	Different	course, the stud	ents will be able to,	wantial airavita		Compara							
C01	Different Design n	nate between co	mbinational and seq	uential digital circ	nits	Construct							
CO3 Explain various issues like static and dynamic hazards with combinational logic and													
	timing is	sues like metast	ability with sequenti	ial circuits.		Analyze							
CO4	Different	iate between PA	L, PLA, PLD and t	heir architecture.		Compare							
Mada	-1-		M. J1.	Contents		TT							
Moau	lie Com	hinational Lasi	Module	Contents	Ma alualiar mathad	for							
I	logic decod	minimization, 1 ler, Parity Gene	Designs using MUZ erator and Checker,	rity 8 ate									
	buffe	rs, timing Hazar	ds,. Hazard remova	I, Code converter	NDFEIKFET	FF							
п	Conv	ersion of any Fl ters, Mod-N Co	F to any other FF, , unter,	Switch Denouncin	ng, Synchronous	8							
III	Shift shift count	register : SISC register, Johnson ers, Timing para), SIPO, PISO, PIP n counter, universal ameters. Clock Skev	O, Bidirectional s shift resistor, Rin w, Clock jitter, Me	shift resistor, univer g Counter. twisted r ta stability	sal ing 8							
IV	a) F assig (sequ b) Lo	inite state mad nment, Clocked ence detector, co ogic Families: T	chines: Mealy and Synchronous State ounters, priority reso TL,CMOS, and the	Moore machines e Machines Desig olver), decoding c ir characteristics	s, State diagram, S gn using J-K, D, T ounter state,	FF 8							
V	VProgrammable Logic Devices: Design Using PLA & PAL, CPLD architectures, Generic, Xilnx 9500 series, Altera MAX 3000A family3												
VI	VHD Dataf	L Constructs: low, Behaviour	Introduction to VH al and Structural, VI	HDL. Data types a HDL concurrent ar	and objects, Modell	ing 4							
			T	thooks									
1	"Dig	tal Design" Joh	n F Wakerly Pears	on Education Publ	ication								
$\frac{1}{2}$	"Fun	damentals of Di	gital Circuits". Ana	nd Kumar. PHI. 2n	dEdition. 2016.								
3	"Dig	tal Electronics"	Mandal S.K , 1st E	diction. Mc-Graw-	Hill								
4	<u> </u>	DL-Programmin	g by Example" Dou	Iglas Perry TMH, 4	th Edition								

Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

	References										
1	"Modern Digital Design", RP.Jain, Mc-Graw-Hill										
2	"Digital Logic and Computer Design", Morris Manno, PHI										
3											
4											
	Useful Links										
1	https://nptel.ac.in/courses/108/105/108105113										
2	https://nptel.ac.in/courses/117/106/117106086										
3											
4											

	CO-PO Mapping														
	Programme Outcomes (PO)													PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	1	1													
CO2		1	1	2										2	
CO3			1	2										2	
CO4	CO4 2 2 </td														
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															

Assessment

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		Walc	hand College (Government Aidea	of Engineering	y, Sangli						
			AY	2022-23	,						
			Course l	Information							
Progr	amme		B.Tech. (Electron	nics Engineering)							
Class,	Semester		Second Year B. T	Tech., Sem III							
Cours	e Code		6EN204								
Cours	e Name		Electronic Instrur	nentation							
Desire	d Requisi	tes:	-								
	1										
	Teaching	Scheme		Examination S	cheme (Marks)						
Lectu	re	2 Hrs/week	MSE	ISE	ESE	Total					
Tutor	ial	_	30	20	50	100					
				Cred	its: 2						
			Course	Objectives							
1	Understa	nd the required	sensor and actuator	criteria for a mech	atronic system.						
2	Understa	nd the operation	of commonly emp	loyed sensors and a	actuators.						
3	Analyse	and select the m	ost appropriate sen	sors or actuator for	an application.						
4	Understa	nd working and	applications of dig	ital storage oscillos	cope and spectrum	analyser.					
		Course	Outcomes (CO) w	ith Bloom's Taxor	nomy Level						
At the	end of the	course, the stud	ents will be able to	,							
CO1	Explain f	fundamental phy	sical and technical	base of sensors and	d actuators.	Underst	tand				
CO2	Identify t	the acquired dat	a and measured re	sults.		Apply					
<u>CO3</u>	Analyse	the applications	of digital storage of	scilloscope and spe	ectrum analyser.	Analyze	e				
Madu	la		Madula	Contonta		II.au					
Moau	Ine	montation of	Mouule on Engineering S	vetom		поu					
I	Instru Instru Senso Instru Signal Acqui Hardw	mentation of an ry System, Mech mentation Proce Modification a sition Hardware vare.	Engineering System Engineering System: Role of Sensors and Actuators,Human hatronic Engineering, Control System Architectures, ess. Component Interconnection and Signal Conditioning: 4 nd Conditioning, Impedance Matching Methods, Data e, Bridge Circuits, Linearizing Devices, Signal-Modification								
II	Perfor Perfor Specif Distor from I	rmance Specifi mance Specifi fications, Linea tion Due to Sig Measurements,	cation and Instru cation, Time-Dor urity, Instrument gnal Sampling, Ins Sensing and Estima	Iment Rating Par nain Specification Ratings, Bandwid trument Error Con ation, Least-Square	ameters as, Frequency-Dor th Analysis, Alia siderations, Estima es Estimation.	nain sing tion 4					
ш	Analo Senso: Potent Curren Senso: Senso:	g Sensors and rs and Trans iometer, Varial nt Transducers, rs, Strain Gau	Transducers aducers, Sensors ble-Inductance Tra Variable-Capacitar ges, Torque Sens	for Electromech insducers, Permane ice Transducers., P ors, Gyroscopic S	nanical Application ent-Magnet and Ec Piezoelectric Sensors, Thermo-F	ns, Idy 4 Iuid					
IV	Digita Innova Motio Optica Camer Senso	al and Innovati ative Sensor Tec n Sensing by En al Encoders, En ras, Miscellaneo r Fusion, Wirelo	ve Sensing chnologies, Shaft E coder, Encoder Da coder Error, Optic us Sensor Technol- ess Sensors	ncoders, Increment ta Acquisition and I cal Sensors, Lasers ogies, Tactile Sensi	al Optical Encoder, Processing, Absolut , and ing, MEMS Sensors	e 4					

V	Special OscilloscopesDelayed Time Base oscilloscopes, Analog storage oscilloscopes, Samplingoscilloscopes, Digital storage oscilloscopes, DSO Applications	4
VI	Waveform Analyzing Instruments Spectrum Analyzer, Digital Spectrum Analyzer	4
	Textbooks	
1	B. P. Lathi and Jeff Kennedy, "Modern Digital and Analog Communication System edition, Oxford University Press, 1998, ISBN: 12345678	s", Third
2	Straus, Joseph Nathan, "Elements of Communication", Third edition, Prentice Ha ISBN: 12345678	11, 2011,
3		
4		
	References	
1	Pawlak, Andrzej M., Sensors and actuators in mechatronics : design and application Press, Taylor & Francis Group, 2007.	ons, CRC
2	Ranganathan S.," Transducer Engineering", Allied Publishers (P) Ltd., 2003	
3		
4		
	Useful Links	
1	Onlinecourses.nptel.ac.in	
2		
3		

CO-PO Mapping														
	Programme Outcomes (PO)										PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1		3												
CO2			3											
CO3				3										
The streng	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High													
Each CO	of the c	course 1	nust m	ap to at	least o	ne PO.								

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		Wale	chand College	of Engineeri	ng, Sangli					
			(Government Aid	ed Autonomous Insti	tute)					
			AY	2022-23						
			Course	Information						
Progr	amme		B.Tech. (Electron	nics Engineering)						
Class,	ass, Semester Second Year B. Tech., Sem III									
Cours	Course Code 6EN255									
Cours	ourse Name Data Structures and Algorithms Lab									
Desire	Desired Requisites: Programming basics, C programming									
,	Teaching	Scheme		Examination	Scheme (Marks)					
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab ESE		Total			
Intera	ction	2 Hrs/ Week	30	30	40		100			
				Cre	edits: 3					
		1								
			Cours	e Objectives						
1	An abilit	y to describe ba	sic concepts of Da	ata structures						
2	To apply	knowledge of	engineering, inforr	nation technology,	mathematics, and	science	e			
3	An abilit	y to design a sy	stem or componen	t, or process to me	et stated specificat	ions				
4	An abilit	y to identify, fo	rmulate and solve	engineering proble	ems					
		Course	Outcomes (CO)	with Bloom's Tax	onomy Level					
At the	end of the	course, the stu	dents will be able t	0,						
CO1	Demonst	trate different d	ata structures and 1	need of searching a	nd sorting technique	ues.	Understand			
CO2	Impleme	ent Static and dy	namic data structu	ires stack and			Apply			
	queue, se	earching and so	rting algorithms.							
CO3	Examine	the complexity	of data structures	searching and sor	ting algorithms.		Analyze			

List of Experiments / Lab Activities/Topics

List of Topics

Introduction

Basic Concepts: Algorithm, Pseudo code, ADT, Data Structure, Algorithmic Efficiency Recursion: Direct and Indirect recursion, analysis of recursive functions.

Linked Lists

Concept of linked organization, Singly linked list, doubly linked list and dynamic storage management, circular linked list, Operations such as insertion, deletion, inversion, concatenation

Stacks and Queues

Fundamentals stack and queue as ADT, Representation and Implementation of stack and queue

Application of stack for expression evaluation and for expression conversion, Backtracking.

Trees & Graphs

Tree: Basic terminology, binary trees and its representation, binary tree traversals (recursive and non-recursive), operations such as copy, equal on binary tree, expression trees, General Trees.

Graphs: Terminology and Representation of graphs using adjacency matrix, adjacency list and adjacency Multilist, Traversals Depth First and Breadth First.

Searching & Sorting:

Search: Importance of searching, Sequential, Binary, Fibonacci search algorithms.

Sorting: Internal and External Sorts, Insertion, Shell, Heap, Quick sort, Mergesort, Radix sort,

List of Lab Activities:

- 1. Programs to revise arrays, structures and pointers
- 2. Programs to study different file operations opening files, closing files, writing a file, reading file
- 3. Program to implement algorithm and observing complexity measures
- 4. Program to implement singly linked list with all operations
- 5. Program to implement doubly linked list with all operations
- 6. Program to implement Stack
- 7. Program to implement Queue
- 8. Program to implement applications of Stack (Expression evaluation and string reversing)
- 9. Programs to Search the data with complexity
- 10. Implementation of binary search tree

	Textbooks
1	"Fundamentals of Data structures in C++", S.Sahni and D.Mehta, Galgotia BookSource
2	Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures A pseudo code approach with C".
3	
4	
	References
1	"Data Structures and Algorithm Analysis in C++" M.Weiss, Pearson Education, 2002.
2	N. B. Venkateshwarlu, E. V. Prasad, C and Data Structures, S. Chand and Company, 2010
3	
4	
	Useful Links
1	
2	
3	
4	

	CO-PO Mapping													
	Programme Outcomes (PO)											PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1			2	2	2				2					
CO2			2	2	2				2					
CO3			2	2	2				2				2	
CO4														
The stre	ngth of	mappi	ng is to	be wri	tten as	1,2,3; w	where, 1	: Low,	2: Med	lium, 3:	High			

Each CO of the course must map to at least one PO, and preferably to only one PO.

		Asses	ssment							
There are three components of lab assessment, LA1, LA2 and Lab ESE.										
IMP: Lab ESE	is a separate head	of passing.(min 40	%), LA1+LA2 should be min 40%							
Assessment	Based on	Conducted by	Typical Schedule	Marks						
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30						
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30						
		Lab Course	During Week 18 to Week 19							
Lab ESE	Lab activities, journal/ performance	Faculty and External Examiner as	Marks Submission at the end of Week 19	40						

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

applicable

Proposed Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)											
			AY	2022-23	,							
			Course	Information								
Progr	amme		B. Tech. (Electron	nics Engineering)								
Class,	Semester		Second Year B. T	Tech., Sem. III								
Cours	e Code		6EN251									
Cours	e Name		Electronic Circuit	t Analysis and Desi	ign-I Laboratory							
Desire	ed Requisi	tes:	Basic Electronics	Engineering								
	Teaching	Scheme		Examination Scheme (Marks)								
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab ESE	Total						
Intera	iction	-	30	30	40	100						
				Crea	lits: 1							
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~									
		• .1 1 •	Course	Objectives	1.6. ( 1.	1						
1	amplifier	in the working s and feedback	amplifiers using B.	ts like rectifiers, an JT, FET and MOSI	PETs.	nd current), power						
2	To illust	rate the method	ls of designing the	electronic circuits u	ising discrete comp	ponents.						
3	To <b>expla</b> amplifier	<b>in</b> the practical s for their perfo	ways of <b>measurin</b> ormance analysis.	g AC and DC para	meters of electronic	c circuits like						
4	1	1										
		Course	Outcomes (CO) v	vith Bloom's Taxo	nomy Level							
At the	end of the	course, the stud	lents will be able to	), 	Zanan diada au							
CO1	regulator	and amplifiers	built using BJT. J	FET and MOSFET	, Zener diode vo	Apply						
CO2	Test and	analyze the per	rformance of ampli	fiers built using BJ	T, JFET and MOS	FET. Analyze						
CO3	Evaluate	e the performan	ce of voltage, curre	nt, power and feed	back amplifiers.	Evaluate						
CO4	Design the compone	he electronic c ents such as BJT	vircuits (amplifiers), FET and MOSFE	) for given specif T.	fications using di	screte Create						
		Ť	ist of Exporimont	. / Lab Activities/	Foniag							
List of	f Topics(A	Dicable for I	nteraction mode )	s / Lab Activities/ .	lopics							
<b>.</b>	ет 1 А /•	··· .										
List of	t Lab Acti Analyze	the performance	<b>um 8 experiments</b> ) e rectifier circuits									
2.	Zener die	ode I-V characte	eristics and design a	a Zener diode volta	ge regulator.							
3.	Design a	nd analysis of s	single stage commo	on emitter BJT amp	olifier. Plot the free	juency response of						
	amplifier		• •	11								
4.	Design a	nd analysis of s	ingle stage commo	n collector (emitter	follower) amplifie	er.						
6.	Biasing r	methods for MC	SFET and MOSFI	ET as a switch.								
7.	Design a	nd analysis of c	common source MC	OSFET amplifier.								
8.	Design a	nd analysis of c	ommon drain (sou	ce follower) MOS	FET amplifier.							
9.	Study of Design a	performance of nd analysis of t	Darlington pair.	ifier with pagative	faadback							
11	. Design a	nd analysis of t	lass-A power ampl	ifier using BJT/MC	DSFET.							
12	. Design a	nd analysis of c	lass-AB power am	plifier.								
13	. Analyze	the performanc	e RC Phase-Shift C	Oscillator.								
			Te	xtbooks								
1	D. A.	Neamen, "Elec	ctronic Circuit Des	rign and Analysis",	3 rd Edition, McGr	aw Hill Education						
2	A. S.	Sedra and K. C	C. Smith, " <i>Microele</i>	ectronic Circuits",	5 th Edition, Oxford	d University Press,						
3	2004. 	Mottershed "	Electronic Devices	and Circuits" 2nd	Edition PHI 1979							
4	D. A	. Neamen, " <i>Mi</i>	croelectronics: Ci	rcuit Analysis and	Design", 4 th Edit	ion, McGraw Hill						
	Educa	ation (India) Pri	vate Limited, New	Delhi, 2021.								

Proposed Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

	References									
1	R. Boylestad and L. Nashelsky, " <i>Electronic Devices and Circuit Theory</i> ", 9 th Edition, PHI, 2009.									
2	Millman and Halkias, "Electronic devices and Circuits", 1st Edition, Tata McGraw Hill, 1991.									
3	Gerald E. Williams, " <i>Practical Transistor Circuit Design and Analysis</i> ", 1 st Edition, Tata McGraw Hill, New Delhi, 1973.									
4										
	Useful Links									
1	https://nptel.ac.in/courses/122106025									
2	https://nptel.ac.in/courses/108105158									
3	https://nptel.ac.in/courses/117101106									
4										

	CO-PO Mapping													
	Programme Outcomes (PO)										PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2									3				1
CO2				2										
CO3					2									
CO4				2										2
The stre	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High													
Each Co	O of the	e course	e must i	nap to a	at least	one PC	), and p	referab	ly to or	nly one	PO.			

	Assessment										
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%											
Assessment	Based on	Conducted by	Typical Schedule	Marks							
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30							
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30							
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40							

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
			AY	2022-23							
			Course	Information							
Progr	amme		B.Tech. (Electron	nics Engineering)							
Class,	Semester		Second Year B. 7	Tech., Sem III							
Cours	e Code		6EN252								
Cours	e Name		Digital Electronic	es Lab							
Desire	ed Requisi	tes:	Basic Electronic	cs Engineering							
,	Teaching	Scheme		Examination S	Scheme (Marks)						
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab ESE	Total					
Intera	ction	-	30	30	40	100					
				Cre	dits: 1						
	1 -		Cours	e Objectives							
1	To expla	in the importan	ce of the HDL for	Digital Design							
$\frac{2}{3}$	To demo	in the concente	plete flow of EDA	tool for implement	ting digital designs	ing EDA tool					
	Toexpla	in the concepts	involved in sinuta	and synthesis	of digital circuits u	sing EDA tool					
		Course	Outcomes (CO)	with Bloom's Tax	onomy Level						
At the	end of the	course, the stu	dents will be able t	0,							
CO1	Able to	write & debug t	he VHDL code			Understa	nd				
CO2	Able to i	mplement on k	its			Apply					
		T	:		· · · · · ·						
T :	e	L	list of Experiment	ts / Lab Activities/	Topics						
List of	f Topics(A f Evnorim	applicable for I	interaction mode	):							
	i Experim	ents.									
1. Exp	eriment 1:	Introduction to	Xilinx								
2. Exp	eriment 2:	1 bit full adder	using 1 bit half ad	der as a componen	t						
3. Exp	eriment 3:	4 bit full adder	using 1 bit full ad	der as a component							
4. Exp	eriment 4:	1 bit full adder	using 8:1 multiple	exer as component							
6 Exp	eriment 6	Implementatio	n of $4.1$ mux using	2.1  mux as a com	oonent						
7. Exp	eriment 7:	Implementatio	n of demultiplexer	IC 74138							
8. Exp	eriment 8:	4 bit comparate	or								
9. Exp	eriment 9:	Implementatio	n of flip flops								
10. Ex	periment	10: UP counter a	and DOWN counte	er							
11. EX	periment	12  MODN COUP	counter								
12. Ex	periment	12: OI -DOWN	rs								
14. Ex	periment	14: Universal sh	ift register								
15. Ex	periment	15: Parallel load	ling shift register								
16. Ex	periment	6: Sequence de	etector								
17. Ex	17. Experiment 17: Creation of project in Quartus-II & download										
			Т	vthooks							
1	John	F. Wakerly "D	igital Design" Per	rson Education Pu	blication. 5th editic	n. 2018.					
2	Anar	d Kumar, "Fun	damentals of Digit	al Circuits", PHI. 2	2ndEdition, 2009	, =0.10.					
3	Man	dal S.K , "Digita	al Electronics" Mc	-Graw-Hill, 1stEdi	ction., 2009						
4	Doug	glas Perry, "VH	DL-Programming	by Example" TMH	, 4th Edition, 2012						
			Re	ferences							

1	R.P.Jain, "Modern Digital Design", Mc-Graw-Hill, 4th edition, 2010
2	Morris Manno, "Digital Logic and Computer Design", Prentice-Hall India, 1st edition 2011
3	
4	
	Useful Links
1	https://nptel.ac.in/courses/108/105/108105113
2	https://nptel.ac.in/courses/117/106/117106086
3	
4	

	CO-PO Mapping													
		Programme Outcomes (PO) PSO												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2	2		2	2									1
CO2		1	1											1
The stre	ength of	mappi	ng is to	be wri	tten as	1,2,3; w	where, 1	: Low,	2: Med	ium, 3:	High			
Each C	) of the	COURSE	must	monto	at loagt	ono DC	and n	roforch	lu to or	ly one	DO			

Each CO of the course must map to at least one PO, and preferably to only one PO.

Assessment
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There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

AY 2022.3           Course Information           Programme         B. Tech. (Electronics Engineering.)         Class, Semester           Course Code         6FN253         Course Name         Python Programming of Problem Solving           Desired Requisites:         Programming for Problem Solving         Desired Requisites:         Proteinal of the Course Objectives           Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Course Objectives         Course Objectives         Course Objectives         Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer langaage constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,         CO3         Examine a given program to identify is output.         Apply           CO3         Examine a given program to identify is output.         Cast of Experiments / Lab Activities/Topics         List of Experiments / Lab Activities/Topics           List of Topics:	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
Course Information           Programme         B. Tech. (Electronics Engineering)           Class, Semester         Second Year B. Tech., Sem. III           Course Code         GEN233           Course Name         Python Programming           Desired Requisites:         Programming for Problem Solving           Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Interaction         1 Hrs/ Week         30         30         40         100           To define the significance of Python in programming.         To define of python strugge constructs and principles such as: conditional           Solve problems.         To make use of the different libraries of Python         Solve problems.           3         To make use of the different libraries of Python         Apply           CO3         Examine a given program susing Python language in a programming environment/using more applications implemented using Embedded Systems and Python.         Create           CO4         Hustrate the features of Python programming.         Apply           CO3         Examine a given program to identify its output.         Analyze					2022-23						
Course Content Figure F				Course	Information						
Togramme       D. Fech. (Jaccuments Lagneeling)         Class. Semester       Sccont/Year B. Tech., Sem. III         Course Code       6EN253         Course Name       Python Programming for Problem Solving         Teaching Scheme       Examination Scheme (Marks)         Practical       2 His/Week       LA1         LA2       Lab ESE       Total         Interaction       1 His/Week       30       30       40       100         Course Objectives       Course Objectives       1       To define the significance of Python in programming.       To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         3       To make use of the different libraries of Python       Ecourse COU with Bloom's Taxonomy Level         A the end of the course, the students will be able to.       CO3       Lamine a given program to identify its output.       Analyze         CO3       Examine a given program to identify its output.       Coal structures, enclose structures, functional statements Using Python.       Create         CO4       Demonstration applications simplemented using Embedded Systems and Python.       Create         List of Topics:       1       Installing and Using Python       Solve protones, expressions and statements Using Python.	Drogr	ommo		B. Tach (Electro	nice Engineering)						
Class. Senteter       Second rear B. rech., Sent. II         Course Code       6EX253         Course Name       Python Programming         Desired Requisites:       Programming for Problem Solving         Teaching Scheme         Examination Scheme (Marks)         Practical       2 Hrs/ Week         Lab ESE       Total         Interaction       1 Hrs/ Week       30         To define the significance of Python in programming.       To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional       branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         3       To make use of the different libraries of Python       Apply         CO1       Illustrate the features of Python Ingrugage in a programming environment/using Apply programming tool to solve problems.       Apply         CO2       Examine a given program to identify its output.       Co4       Co4         CO3       Examine a given program to identify its output.       Co4       Co4         CO4       Demonstration applications implemented using Python       3)       Coa structures in Python         3       List of Experiments / Lab Activities/Topics       List of Topics:       1)         1       Insta	Frogr			B. Tech. (Electro	The second secon						
Course Code         DelX253           Course Name         Python Programming           Desired Requisites:         Programming for Problem Solving           Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Course Objectives          Credits: 2             To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         3         To make use of the different libraries of Python Inspanning.         Apply           COI         Illustrate the features of Python programming.         Apply         Apply           CO3         Examine a given program to identify its output.         Analyze         Analyze           CO4         Demonstration applications implemented using Embedded Systems and Python.         Create           List of Topics:         1         Installing and Using Python         Sing Python           3         Coatinual statements Using Python         Sing Python         Sing Python           4         List of Topic	Class,	Semester		Second Year B. I	ech., Sem. III						
Course Name         Python Programming           Desired Requisites:         Programming for Problem Solving           Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Interaction         1 Hrs/ Week         Course Objectives             To demonstrate use of computer language constructs and principles such as: conditional transition gloops, block structures, functions, and input/output for implementing programs to Solve problems.         Apply           CO1         Illustrate the features of Python programming.         Apply         Apply           CO2         Examine a given program to identify its output.         Analyze         Apply           CO3         Examine a given program to identify its output.         Create         Create           List of Topics:         1         Installing and Using Python </td <td>Cours</td> <td>se Code</td> <td></td> <td>6EN253</td> <td></td> <td></td> <td></td>	Cours	se Code		6EN253							
Desired Requisites:         Programming for Problem Solving           Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Course Objectives           1         To define the significance of Python in programming.         Credits: 2           To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.           3         To make use of the different libraries of Python         Stannine a given programs.         Apply           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to.         Apply           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to.         Apply           CO1         Illustrate the features of Python programming.         Apply           CO2         Implement programs using Python language in a programming environment/using programming tool to solve problems.         Apply           CO3         Examine a given program to induify its output.         Analayze	Cours	se Name		Python Programn	ning						
Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.           3         To make use of the different libraries of Python         Examine a given program to identify its output.         Apply           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to.         Apply           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to.         CO1         Illustrate the features of Python language in a programming environment/using programming tool to solve problems.         Apply           CO3         Examine a given program to identify its output.         Cotal         Analyze           CO4         Demonstration applications implemented using Embedded Systems and Python.         Create           List of Topics:         1         Installing and Using Python         String and string operations Using Python <th>Desire</th> <th>ed Requisi</th> <th>tes:</th> <th>Programming for</th> <th>Problem Solving</th> <th></th> <th></th>	Desire	ed Requisi	tes:	Programming for	Problem Solving						
Teaching Scheme         Examination Scheme (Marks)           Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Interaction         1 Hrs/ Week         30         30         40         100           Interaction         1 Hrs/ Week         30         30         40         100           To define the significance of Python in programming.         Credits: 2											
Practical         2 Hrs/ Week         LA1         LA2         Lab ESE         Total           Interaction         1 Hrs/ Week         30         30         40         100           Credits: 2           Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         Solve problems.           3         To make use of the different libraries of Python         Mapply           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,         Apply           Implement programs using Python language in a programming environment/using Apply           Coorse Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,           Coorse Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,           Coorse Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,           Coorse Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the stu		Teaching	Scheme		Examination S	cheme (Marks)					
Interaction         1 Hrs/ Weck         30         30         40         100           Credits: 2           Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.         3           3         To make use of the different libraries of Python         Ecurse Outcomes (CO) with Bloom's Taxonomy Level           A tthe end of the course, the students will be able to,         COI         Illustrate the features of Python programming.         Apply           CO1         Illustrate the features of Python programming.         Apply         Apply           CO3         Examine a given program to identify its output.         Analyze           CO3         Examine a given program to identify its output.         Create           List of Experiments / Lab Activities/Topics           List of Topics:         1)         Installing and Using Python         Create           Variables, operators, expressions and statements Using Python           State of Learner of Figure Python           State of Learner of Figure Python           State of Learner of String and String operations Using Python <td cols<="" td=""><td>Practi</td><td>ical</td><td>2 Hrs/ Week</td><td>LA1</td><td>LA2</td><td>Lab ESE</td><td>Total</td></td>	<td>Practi</td> <td>ical</td> <td>2 Hrs/ Week</td> <td>LA1</td> <td>LA2</td> <td>Lab ESE</td> <td>Total</td>	Practi	ical	2 Hrs/ Week	LA1	LA2	Lab ESE	Total			
Credits: 2           Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.           3         To make use of the different libraries of Python         Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,         COI         Illustrate the features of Python programming.         Apply           CO2         Implement programs using Python language in a programming environment/using programming tool to solve problems.         Analyze           CO3         Examine a given program to identify its output.         Coreate           CO4         Demostration applications implemented using Embedded Systems and Python.         Create           List of Topics:         1         Installing and Using Python         Analyze           1         Installing using python         Solve problems.         Create           List of Topics:         1         Installing Using Python         Create           1         Distional statements Using Python         Solve problems.         Create           10         Data structure application example using Python         Solve problems.         Cod           2	Intera	ction	1 Hrs/ Week	30	30	40	100				
Course Objectives           1         To define the significance of Python in programming.         To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.           3         To make use of the different libraries of Python					Crea	lits: 2					
Course Objectives           1         To define the significance of Python in programming.           To demonstrate use of computer language constructs and principles such as: conditional branching loops, block structures, functions, and input/output for implementing programs to Solve problems.           3         To make use of the different libraries of Python           Course Outcomes (CO) with Bloom's Taxonomy Level           At the end of the course, the students will be able to,           CO1         Illustrate the features of Python programming.         Apply           CO2         Implement programs using Python language in a programming environment/using programming tool to solve problems.         Apply           CO3         Examine a given program to identify its output.         Analyze           CO4         Demonstration applications implemented using Embedded Systems and Python.         Create           List of Experiments / Lab Activities/Topics           List of Topics:           1         Installing and Using Python         Coditional statements Using Python         Coditional statements Using Python           2         Variables, operations         Using Python         String and string operations Using Python           3         Conditional statements Using Python         String and string operations         Using Python           3         Conditional st											
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<ul> <li>List of Lab Activities:</li> <li>1) Python IDE installation and first python program.</li> <li>2) Programs to implement expressions using Python.</li> <li>3) Programs to study different conditional statements using Python.</li> <li>4) Programs to study functions using Python.</li> <li>5) Programs to study loops and iterations using Python.</li> <li>6) Programs to study string and string operations using Python.</li> <li>7) Programs to study file handling using Python.</li> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	11	) Data siru	ed application d	lemonstration Using F	g Dython						
<ol> <li>Python IDE installation and first python program.</li> <li>Programs to implement expressions using Python.</li> <li>Programs to study different conditional statements using Python.</li> <li>Programs to study functions using Python.</li> <li>Programs to study loops and iterations using Python.</li> <li>Programs to study string and string operations using Python.</li> <li>Programs to study file handling using Python.</li> <li>Programs to study lists and dictionaries in Python.</li> <li>Programs to study tuples in Python.</li> <li>Programs to study tuples in Python.</li> <li>Programs to demonstrate data structure example.</li> <li>Programs to demonstrate web based application.</li> </ol>	List of	f Lah Activ	vities.		g i yuloli						
<ol> <li>Programs to implement expressions using Python.</li> <li>Programs to study different conditional statements using Python.</li> <li>Programs to study functions using Python.</li> <li>Programs to study loops and iterations using Python.</li> <li>Programs to study string and string operations using Python.</li> <li>Programs to study file handling using Python.</li> <li>Programs to study lists and dictionaries in Python.</li> <li>Programs to study tuples in Python.</li> <li>Programs to study tuples in Python.</li> <li>Programs to demonstrate data structure example.</li> <li>Programs to demonstrate web based application.</li> </ol>	1)	Python II	DE installation	and first python pro	ogram.						
<ol> <li>3) Programs to study different conditional statements using Python.</li> <li>4) Programs to study functions using Python.</li> <li>5) Programs to study loops and iterations using Python.</li> <li>6) Programs to study string and string operations using Python.</li> <li>7) Programs to study file handling using Python.</li> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs to demonstrate data structure example.</li> <li>11) Programs to demonstrate web based application.</li> </ol>	2)	Programs	s to implement	expressions using I	Python.						
<ul> <li>4) Programs to study functions using Python.</li> <li>5) Programs to study loops and iterations using Python.</li> <li>6) Programs to study string and string operations using Python.</li> <li>7) Programs to study file handling using Python.</li> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	3)	Programs	s to study differ	ent conditional stat	tements using Pythe	on.					
<ul> <li>5) Programs to study loops and iterations using Python.</li> <li>6) Programs to study string and string operations using Python.</li> <li>7) Programs to study file handling using Python.</li> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	4)	Programs	s to study funct	ions using Python.							
<ul> <li>6) Programs to study string and string operations using Python.</li> <li>7) Programs to study file handling using Python.</li> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	5)	Programs	s to study loops	and iterations usin	g Python.						
<ol> <li>Programs to study file handling using Python.</li> <li>Programs to study lists and dictionaries in Python.</li> <li>Programs to study tuples in Python.</li> <li>Programs based on NumPy library.</li> <li>Programs to demonstrate data structure example.</li> <li>Programs to demonstrate web based application.</li> </ol>	6)	Programs	s to study string	and string operation	ons using Python.						
<ul> <li>8) Programs to study lists and dictionaries in Python.</li> <li>9) Programs to study tuples in Python.</li> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	7)	Programs	s to study file h	andling using Pythe	on.						
<ul> <li>9) Programs to study tuples in Python.</li> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	8)	Programs	s to study lists a	nd dictionaries in l	Python.						
<ul> <li>10) Programs based on NumPy library.</li> <li>11) Programs to demonstrate data structure example.</li> <li>12) Programs to demonstrate web based application.</li> </ul>	9)	Programs	s to study tuples	s in Python.							
<ol> <li>Programs to demonstrate data structure example.</li> <li>Programs to demonstrate web based application.</li> </ol>	10	)) Programs	s based on Num	Py library.							
12) Programs to demonstrate web based application.		) Programs	s to demonstrate	e data structure exa	imple.						
13) Mini Project	12	) Programs	s to demonstrate	e web based applic	auon.						
	7) 8) 9) 10 11 12	Programs Programs Programs ) Programs ) Programs 2) Programs	s to study file h s to study lists a s to study tuples s based on Num s to demonstrate s to demonstrate	andling using Pytho and dictionaries in I is in Python. Py library. e data structure exa e web based applic	mple.						

	Textbooks							
1	R. Nageswara Rao, "Core Python Programming", Dreamtech Press, 2 nd Edition, 2017							
2	Eric Matthes, "Python Crash Course – A Hands-on, Project-Based Introduction to Programming", No Starch Press, 2 nd Edition, 2019							
3	Kenneth Lambert, "Fundamentals of Python: First Programs" Course Technology, Cengage							
	Learning.2nd edition, 2017							
References								
1	Barry, Paul, Head First Python, O Rielly, 2nd Edition, 2010							
2	2 Lutz, Mark, Learning Python, O Rielly, 4th Edition, 2009							
	Useful Links							
1	https://swayam.gov.in/							
2	https://in.coursera.org/							
3	https://www.tutorialspoint.com/							
4	https://www.javatpoint.com/							

	CO-PO Mapping														
		Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
CO1	2				2										
CO2	2				2										
CO3		2			2										
CO4			2		2										
					1. I	$\frac{1}{2}$	Modiur	2.Ц	ah						

### 1: Low, 2: Medium, 3: High

	Assessment										
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%											
AssessmentBased onConducted byTypical ScheduleM											
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30							
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30							
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40							

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli										
				7 2022-23	ule)					
			Counce	2022-25						
Deve eer			D Tech (Electron							
Progra	amme		B. Iech. (Electron	ics Engineering)						
Class,	Semeste	r	Second Year B. T	ech., Sem IV						
Cours	e Code		6EN221							
Cours	e Name		Electronic Circuit	t Analysis and Desi	gn - II					
Desire	ed Requi	sites:	Electronic Circuit	t Analysis and Desi	gn - I					
	Teachin	g Scheme		Examination	Scheme (M	larks)				
Lectu	re	3 Hrs/week	MSE	ISE	ESE		Tot	al		
Tutor	ial	-	30	20	50		100	)		
				Cre	dits: 3					
			Cours	e Objectives						
1	To exp	lain the working	of differential amp	plifier and operation	nal amplifi	ier.				
2	To illu	strate the metho	ds used for analysi	s of op-amp based	circuits.					
3	To exp	lain the use of op	o-amp in linear and	d non-linear indust	rial circuits	5.				
4	To exp	lain the working	of and design met	thods for voltage r	egulators.					
		Cours	e Outcomes (CO)	with Bloom's Taxo	onomy Lev	el				
At the	end of th	e course, the stud	ents will be able to	,		I				
СО	Course Outcome Statement/s Taxonomy							Bloom's Taxonomy		
						Level	De	scriptor		
<b>CO1</b>	<b>D1</b> Apply the fundamentals of OpAmp to calculate the circuit conditions,									
	and ill	ustrate functionir	ng of various linea	ar and nonlinear a	pplication	ш	A	pplving		
	circuits	, such as amplif c.	iers, waveform gei	nerators, precision	rectifiers,			FF-J8		
CO2	Analyz	e the OpAmp ba	sed circuits consid	ering ideal OpAmp	and also	IV	Ar	nalvsino		
	with ef	fect of practical li	mitations of OpAm	p on the circuit out	put.			larysning		
CO3	<b>Evalua</b> (Ampli	te the performation fiers, Waveform	ance of OpAmp generators, active fil	based electronic lters)	circuits	v	Ev	aluating		
CO4	Design	OpAmp based o	circuits considering	practical limitatio	ns and as	VI	С	reating		
	per giv	en specifications.								
Modu	ula		Mod	ula Contanta				Hours		
WIGUU		protional Amplif	ior	uie Contents				110015		
Т		plifier fundament	als, differential am	plifier, basic on-am	n configur	ation on-am	n	.5		
-	pov	vering, feedback i	n op-amp circuits, i	deal op-amp circuit	analysis.	ation, op un	P			
	Bas	ic OpAmp Circu	its							
	Inve	erting and Non-in	verting amplifiers,	adder, subtractor,	voltage to c	current conv	erters,			
II	curi	ent to voltage c	onverters, instrume	entation amplifier,	transducer	bridge amp	olifier,	8		
	Log	Antilog amplifie	r. Design process of	of opamp based cir	cuits consid	lering ideal				
	opa	IIIP.	mitations							
	Op   Sim	nlified on-amp o	innianons ircuit diagram inn	ut hias and offect	current in	nut offert w	altage			
	inn	it offset error con	pensation low inp	out bias on-amn on	en loon resi	nonse close	d loon			
Ш	rest	onse, transient r	esponse: sources o	f noise, stability in	n op-amp c	ircuits. frea	uencv	6		
	con	pensation. Desig	in of opamp circu	uits (studied) cons	idering pra	ctical limit	ations,			
	incl	uding output swir	ig and power supply	y. How to read the	data sheet.		- 1			
	Op.	Amp based filter	Circuits							
IV	Opa	amp as Integrator	and Differentiator	r, Advantage of ac	tive filter,	First order	active	4		
	filter, standard second order active filters. Design of simple active filters.									

v	<b>Comparator and Waveform Generators</b> Voltage Comparator, Schmitt triggers and applications, peak detector, sample and hold circuit, Sine wave generators, multi-vibrators, triangular wave generators, saw tooth wave generators, monolithic waveform generators, V to F and F to V converter. Design of comparator and waveform generator circuits.	8							
VI	<b>Voltage Regulator and PLL</b> Precision rectifier, Linear regulators, Linear regulator applications, . Design of OpAmp based linear voltage regulator. Principle of Switching regulator, Phase locked loop, Analog and digital phase detector, Monolithic PLLs: NE565, CD4046.	8							
	Textbooks								
1	Sergio Franco, " <i>Design with op-amp and analog integrated circuits</i> ", Tata McGraw Hi Delhi.	ill, New							
2	Robert F. Coughlin and Frederick F. Driscoll, "Operational amplifiers and linear integrated circuits", PHI.								
	References								
1	Ramakant Gaikwad, "Op-amp and Linear Integrated Circuits", Pearson Education ISBN: 9789332549913	India,							
2	Tobey and Gramme, " <i>Operational Amplifiers</i> ", McGraw-Hill; First ISBN: 978-0070649170	Edition,							
3	D. Roy Choudhury and S. B. Jain, " <i>Linear Integrated Circuits</i> ", New Age Intern Publishers, 4 th Edition, 2017, ISBN: 9788122430981	national							
	Useful Links								
1	https://www.tutorialspoint.com/semiconductor_devices/ semiconductor_devices_operational_amplifiers.htm								
2	https://www.allaboutcircuits.com/video-tutorials/ op-amp-basics-introduction-to-the-operational-amplifier/								
3	https://web.mit.edu/6.101/www/reference/op_amps_everyone.pdf								
4	https://www.ti.com/amplifier-circuit/op-amps/products.html								

	CO-PO Mapping														
		Programme Outcomes (PO)											P	PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	
C01	3												3		
CO2		3											3		
CO3		3											3	2	
CO4			3							2			3	2	
The stren	gth of r	nappin	g is to ł	be writt	en as 1	: Low,	2: Med	ium, 3:	High						

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)										
			AY2	2022-23							
			Course I	Information							
Progra	amme		B.Tech. (Electron	ics Engineering)							
Class,	Semester		Second Year B. T	Second Year B. Tech., Sem IV							
Cours	e Code		6EN222								
Cours	e Name		Signals and Syste	ems							
Desire	d Requisi	tes:	Engineering Math	nematics, Basic Ele	ctrical Engineering						
	Teaching	Scheme									
Lectur	re	3 Hrs/week	MSE	]	Fotal						
Tutori	ial	1 Hrs/week	30	20	50		100				
				Cred	its: 4						
			l								
			Course	Objectives							
	On comp	letion of the cou	rse, students shoul	d be sufficiently fa	miliar with the theo	retical	structure,				
	formal re	presentation, co	mputational metho	ds, notation, and ve	ocabulary of linear	models	to be				
1	able to apply them to the analysis and design of digital and analog communications and c										
	systems. The students will be able to perform signal analysis with reference to spectrum and										
2	of determ	inistic signals.									
$\frac{2}{3}$											
4											
	Course Outcomes (CO) with Bloom's Taxonomy Level										
At the	end of the	course, the stud	ents will be able to	,							
CO1	Demonst	rate the concept	of signals and syst		Understan						
	E	( <u>1</u>	1:	. Care de main			d				
C02	Examine	the response of	requency domains	ie time domain.			Analyze Evaluate				
C03	Use freq	uency domain	techniques to solv	e input/output pro	blems for linear t	ime	Create				
	invariant	systems.	teeninques to sorv	e input output pro	for mean t		create				
	1	•									
Modu	ıle		Module	Contents			Hours				
	Intro	duction to Sign	als and Systems –	Continuous and							
	Discr	ete									
I	Introc	luction, standard	d signals, signal re	presentation, classi	fication of signals,		8				
	syster	systems – representation, classification, Linear, Time invariant, causal, BIBO									
		Domain Analy	c. sis of Continuous	and Discrete							
	Time	Systems	sis or commutud	und Discrete			7				
	Zero	state and Zero ir	put response, Impu	ulse response, Conv	volution integral		/				
	and c	onvolution sum,	graphical represen	tation of convoluti	on.						
	Four	Fourier Domain Analysis of Continuous Time Signal									
ш	form	nometric Fourie	tions Frequency	Trigonometric Fou	rier series, Expone	ntial	6				
111	Fouri	Fourier Transform representation of aperiodic signals. Properties of CET duality									
	time	eversal, Convol	ution $-$ time and fr	equency domain, e	tc.						
	Lapla	ce Transform	Analysis of Signal	s and System							
IV	Defin	ition, Properties	, Solution of different	ential equation. Tra	insfer function,		4				
	Poles	and Zeroes, Sys	stem analysis using	g Laplace Transform	n, min-max phase						
	syster	ns									

V	<b>Fourier Domain Analysis of Discrete Time Signal</b> Representation of CT signals using Samples, Nyquist Sampling Theorem Discrete time Fourier Transform, Representation of aperiodic sequence, Properties of DTFT: time reversal, Linear Convolution – time and frequency domain, conjugate symmetry. Discrete Fourier Transform: Definition and Properties	8
VI	<b>Z Transform Analysis of Discrete Time Signals and Systems</b> Definition, Properties, Solution of difference equation. Transfer function, Poles and Zeroes, System analysis using Z-Transform, Minimum phase – maximum phase system, FIR, IIR systems, All pass systems, Zero phase systems, Chirp-Z Transform	7
	Textbooks	
1	A.V. Oppenheim, A.S. Willsky, S.H. Nawab, Signals and Systems, Prentice Hall,1	997.
2	Ashok Ambardar, Analog and Digital Signal Processing, CL Engineering, 1999	
3		
4		
	References	
1	B. P. Lathi, Linear systems and signals ,Oxford University press, 2005	
2	M. J. Roberts, Signals and Systems, Tata McGraw-Hill, 2005	
3	Simon Haykin, Barry Van Veen, Signals and systems, Wiley, 2003	
4	Hwei P Hsu, Schaum's Outline Signals and Systems, Tata McGraw-Hill, 1995	
	Useful Links	
1		
2		
3		
4		

	CO-PO Mapping													
		Programme Outcomes (PO)												50
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1	1												1
CO2		1	1											1
CO3					2									1
CO4		2	2											1
The streng	The strength of mapping is to be written as 1: Low, 2: Medium, 3: High													

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

		Walc	hand College o	f Engineering	, Sangli					
			(Government Aided A	Autonomous Institut	te)					
			AY 2	022-23						
			Course In	nformation						
Progr	amme		B.Tech. (Electroni	cs Engineering)						
Class,	Semester	•	Second Year B. Te	ech., Sem IV						
Cours	e Code		6EN223							
Cours	e Name		Communication E	ngineering I						
Desire	ed Requis	ites:	Basic Electronics I	Engineering, Engi	neering Mathematics					
	Teaching	Scheme		Examination S	cheme (Marks)					
Lectu	re	3Hrs/week	MSE	ISE	ESE	Total				
Tutor	ial	-	30	20	50	100				
				Cred	its: 3					
	Course Objectives									
	To introduce the techniques of transmitting and receiving information signals using analog carrier									
1	modulation techniques and evaluate their performance levels (SNR) in the presence of channel									
	noise.									
2	To estab	lish foundation f	or understanding the tion system.	e relationship amo	ng various technical fa	ctors useful				
3										
4										
		Course	Outcomes (CO) wit	th Bloom's Taxor	nomy Level					
At the	end of the	e course, the stud	ents will be able to,							
<u>CO1</u>	Analyze	different compo	onents of analog	communication		Analyze				
CO2	Systems domain.	such as modula	tor, demodulator, m	nixer, receiver etc.	in time and frequency	Understan d				
CO3	Compar	e analog and d	gital communicatio	on systems on th	e basis of bandwidth	Understan				
	power r	equirement and	the performance in	the presence of		d				
<b>CO4</b>										
Modu	le		Module	Contents		Hours				
	Amı DSB	<b>litude Modulat</b> -FC, DSB-SC,	ion and Demodulat SSB, VSB and ISE	tion 3 transmissions: 1	nathematical Analysis	-				
I	meth	and frequency of ods, power requ	irement of these s	ystems, Comparis	on of AM modulation	1 1 9				
	sche	mes, Quadrature	Carrier Multiplexing	g(QAM), frequence	cy division					
	sync	hronous detection	etection : envelope	e detection, Demo	Domation of DSBSC	•				
	Free	uency Modulat	ion and Demodulat	tion						
	Freq	uency Modulati	on (FM),: Single	Tone Frequency	Modulation, Spectrum	1				
п	Anal	ysis, Narrowba	nd FM, Wideband	FM, Transmissi	on Bandwidth of FN	o ا				
	Wav	es, Generation o	f FM waves: Direct	and Indirect Met	hods, Demodulation of					
	FM,	Phase Locked L	pops, Limiting of FN	M waves, comparis	son between AM &					
	FM,	Phase Modulation	n, Relation between	The PM.						
	Sam	ping theorem T	vpes of sampling In	nter symbol interf	erences Modulation &	,				
ш	Dem	odulation of PA	M. PWM. PPM. n	nerits & demerits	. Introduction to PCN	4				
	syste	m, quantization	of signals, Differen	ntial PCM, Delta	Modulation, Adaptive					
	Delt	a Modulation.			1					
	Digi	tal Data Transn	nission							
IV	Defi	nition of Line (	Coding, various line	e codes, unipolar,	bipolar RZ and NRZ	5				
	lecm	nques, spin phas	e manchester format	15						

V	Digital Modulation TechniquesCoherent Quadrature Modulation Techniques, Non Coherent BinaryModulation Techniques, Comparison of Binary and Quaternary ModulationTechniques; M array modulation Techniques, Power spectra, Bandwidthefficiency, M array Modulation formats Viewed in the light of channel Capacitytheorem, Effect of inters symbol interference.	6
VI	Noise Classification and sources of noise, signal to noise ratio (SNR), noise analysis and measurements, equivalent noise bandwidth, noise figure, noise temperature, AWGN.	6
	Textbooks	
1	T.L. Singal, "Analog and Digital Communication",6th Edition, Mc Graw Hill, 2012	
2	Roy Blake, "Electronic Communication System", Thomson Publications, 2 nd Editi	on,2002
3	Taub Schilling, "Principle of communication system", TMH publication, 4th Edition	, 2013
4		
	References	
1	Simon Hykin, "Communication System", 4 th Edition, John Wiley & Sons, 2000	
2	B. P. Lathi, "Modern Digital and Analog Communication Systems", Oxford Public Edition, 1998	ications, 3 rd
3	George Kennedy, "Electronic Communication System", McGraw Hill, 4th Edition, 2	009
4		
	Useful Links	
1		
2		
3		
4		

						CO-PC	) Mapp	ping							
		Programme Outcomes (PO)												PSO	
	1	2         3         4         5         6         7         8         9         10         11         12         1         2													
CO1		3											2		
CO2		2	2										3		
CO3			2										2		
CO4															
The strength of mapping is to be written as 1: Low, 2: Medium, 3: High															

### Assessment

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		Walc	hand College	of Engineering	g, Sangli							
			(Government Alded	$\frac{1}{2022}$	te)							
			AI .	2022-23								
Deve eer	ramme     B. Tech. (Electronics Engineering)       Second Year B. Tech., Sem, IV											
Progra	amn	ne	B. Iech. (Electro	nics Engineering)								
Class,	Sen	nester	Second Year B. T	Tech., Sem. IV								
Cours	e Co	ode	6EN224									
Cours	e Na	ame	Microcontroller a	and Peripheral Inter	facing							
Desire	ed R	equisites:	Digital Electronic	es								
	Tea	ching Scheme		Examination S	cheme (Marks)							
Lectu	re	3 Hrs./week	MSE	ISE	ESE	Total						
Tutor	ial	-	30	20	50	100						
				Cred	lits: 3							
			Course	Objectives								
1	To	explain the difference	between Intel 808	5 microprocessor a	nd Intel 8051 micro	controller.						
$\frac{2}{2}$		explain Intel 8051 microcontroller and its programming in assembly and 8051 C lang										
		explain interfacing of external devices with Intel 8051 and 8051 C programming.										
	10		Outcomes (CO) w	ith Bloom's Taxo	nomy Level							
At the	end	of the course, the stud	lents will be able to									
CO1	Ill	ustrate the architect	ure of 8051 Mic	rocontroller in co	omparison with 8	085						
	Mi	croprocessor.			1	Apply						
CO2	De	monstrate situation-b	ased interfacing of	external devices w	vith Intel 8085.	Apply						
CO3	W	rite assembly and C	language program	ns for Intel 8051	to meet given sys	stem Analyze						
	rec	juirements.										
<u>CO4</u>	De	sign 8051 microcontro	oller based system.			Create						
Modu	ıle		Module	e Contents		Hours						
		Microprocessor vs.	Microcontroller									
T		Introduction of Micr	oprocessor and Mi	crocontroller; Bloc	k diagram of 8085	and 4						
		8051; function of ea	ch pin of 8085 an	d 8051; Architectu	ural difference bety	veen						
		8085 and 8051; featu	res and application	s of 8085 and 8051	•							
		Microcontroller Pro	gramming basies:	8051 accombly h	anguaga programm	ning.						
п		Instruction set: Inst	ruction types. Ad	dressing modes.	anguage programm 8051 C programm	ning,						
		Features and advant	ages of 8051 C p	rogramming: Prog	ramming examples	for						
		both; Use of Develop	ment tools for Inte	1 8051.	0 1							
		<b>External Peripheral</b>	Interfacing									
		Port structure of 805	1; Interfacing led	and switch with 80	051; Interfacing dev	vices						
		like relay, DC moto	or, Stepper motor,	seven segment d	isplay, character I	.CD, 8						
		DAC0808, digital set	sors, analogue sen	isors through ADC	0808; External mer	nory						
		Internal Perinheral		ram for interfaces.								
		8051 Timer and its w	, orking. Timer mod	les. Programming t	imer as timer in C.							
		Programming timer	as counter in C; 8	051 UART and its	working, Serial							
IV		communication mod	es, Programming U	JART in C; 8051	Interrupts sources,	8						
		Interrupt flags, Ve	ector addresses,	Interrupt structur	e, Interrupt block	ing						
		conditions, Interrupt	priorities, Interrup	t latency, Interrupt	configuration, Wr	ting						
		Microcontrollor Dec	Couline in C.									
		System requirements	· Selection of com	nonents: Interface	design: Flow chart							
		design; Writing Algo	rithm; Writing C r	program for system	: Design examples	like 8						
		Temperature controll	er etc.	<i></i>								

Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

VI	<b>RISC Microcontrollers</b> Introduction to RISC architecture; Block diagram of PIC microcontroller; Architectural difference between PIC controller and 8051; PIC microcontroller features.	3
	Textbooks	
1	Kenneth J. Ayala, The 8051 Microcontroller Architecture, Programming and Applicati Edition, Penram International Publication, revised edition 2009	ions, 2nd
2	Mohammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, Education, 2nd edition, 2010.	Pearson
3	John B. Peatman, Design with PIC microcontrollers, Pearson Education, 1st edition, 20	003
4	Ramesh Gaonkar, Fundamentals of Microcontrollers and Applications in Embedded Penram International Publication(India), 2010	Systems,
	References	
1	Intel 8085 and 8051 datasheet (www.intel.com)	
2	Keil A51 and C51 manuals	
3	PIC16F877A datasheet (www.microchip.com)	
4	Hi-Tech C Compiler manual	
	Useful Links	
1	https://nptel.ac.in/	
2	https://in.coursera.org/	
3	https://www.tutorialspoint.com/	
4	https://www.javatpoint.com/	

	CO-PO Mapping													
		Programme Outcomes (PO)												50
	1	2 3 4 5 6 7 8 9 10 11 12 1 2												
CO1	3													
CO2	3													
CO3		3			3									
CO4			3											1
1: Low, 2: Medium, 3: High														

### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

		Walc	hand College	of Engineering	<b>g, Sangli</b>				
			AY	2022-23					
			Course	Information					
Progra	amme		B.Tech. (Electron	nics Engineering)					
Class.	Semester		Second Year B	Tech Sem IV					
Cours	e Code		6EN225						
Cours	e Name		Control Systems						
Desire	d Requisi	tes:	Basic Electronics	2					
	u Requisi		Dusie Electronics	,					
	Teaching	Scheme		Examination S	cheme (Marks)				
Lectur	re	3Hrs/week	MSE	ISE	ESE	Total			
Tutori	ial	-	30	20	50	100			
				Cred	lits: 3				
			Course	Objectives					
1	To provi	de fundamentals	of Control system	s such as open loop	o and closed loop syste	ems,Block			
1	diagram,	Signal flow gra	ph etc.						
2	To introd	luce fundamenta	lls of time and freq	uency domain analy	ysis.				
3	To devel	op concept of sta	ability in time and	frequency domain.					
4		Course	Outcomes (CO) y	vith Bloom's Taxo	nomy I aval				
At the	end of the	course the stud	ents will be able to						
CO1	Compare	e open and close	ed loop systems, fir	rst, second and high	ner order systems.	Understand			
CO2	Apply Blo	ock diagram and	l signal flow graph	techniques and cor	npensating networks	Applying			
CO3	Draw an	d Examine sys	tems using Routh-	Hurwitz criteria, R	oot locus, Bode plots,	Analyzing			
	and state	space model.	C		•				
Modu	le		Module	Contents		Hours			
Ι	Intro Math regen techn syster	duction: ematical model erative feedba- iques, signal flo m components	s of physical sys ck, Transfer fun ow graph, Transfe	tem , Open and 0 action, Block dia er function of phys	Closed loop systems, gram and reduction sical systems, control	6			
П	Time Stand and e desig comp	response Anal ard test signals, rror constants, d n consideration ensations, lag co	ysis time response of s lesign specification is of Compensa ompensation, lag-le	econd order system as of second order s ators need of ead compensation.	n, steady state errors ystem. Preliminary compensation, lead	7			
III	Stabi Conc stabil	<b>lity Analysis in</b> ept of stability, o ity, Routh-Hurw	<b>Time Domain</b> condition of stability vitz criterion, specia	ty, characteristic eq al cases for determi	uation, relative ning relative stability.	7			
IV	Root Basic system	locus technique concept, rules ons.	es of root locus, applie	cation of root locus	technique for control	7			
V	VFrequency Response AnalysisVPolar plots, Bode plots, Nyquist stability criterion, gain margin, phase margin, effect of addition of poles and zeros on bode plots.7								
VI	Anal Basic Contr	ysis of Control concepts of star collability, obser	Systems in State - te, state variable ar vability, obtaining	- <b>Space</b> nd state models, transtate space equation	nsfer matrix, ns in canonical form.	6			

Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

1	"Modern Control Engineering", Katsuhiko Ogata, 5 th Edition, Prentice Hall, 2015.
2	"Control System Engineering", I.J. Nagrath, M. Gopal, 5th Edition, New Age
	International Publications, 2008.
3	"Modern Control System", Dorf, Bishop, 12th Edition, Prentice Hall, 2013.
4	
	References
1	"Electronic Measurement and Instrumentation", Oliver Cage, Tata McGraw Hill Publication.
2	"Modern Control System", Dorf, Bishop, 12th Edition, Prentice Hall, 2013
3	"Feedback and Control Systems", Schaum's Outlines Series book, 2nd Edition, McGrawHill
5	Education, 2012.
4	
	Useful Links
1	https://swayam.gov.in/
2	https://in.coursera.org/
3	
4	

	CO-PO Mapping													
		Programme Outcomes (PO)											PSO	
	1	1         2         3         4         5         6         7         8         9         10         11         12												2
CO1	3													2
CO2		3												
CO3		3	3											2
CO4														
The stron	ath of m		a ia ta l			Larre	2. M. J	····· 2.	IL: ale					

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

#### Assessment

The assessment is based on MSE, ISE and ESE.

MSE shall be typically on modules 1 to 3.

ISE shall be taken throughout the semester in the form of teacher's assessment. Mode of assessment can be field visit, assignments etc. and is expected to map at least one higher order PO.

ESE shall be on all modules with around 40% weightage on modules 1 to 3 and 60% weightage on modules 4 to 6.

		Wal	chand College	e of Engineerii	ng, Sang	gli						
	(Government Aided Autonomous Institute) AY 2022-23											
			Course	e Information								
Progra	amme		B.Tech. (Electror	nics Engineering)								
Class.	Semester		Second Year B. 7	Fech., Sem IV								
Cours	e Code		6EN271									
Cours	e Name		Electronic Circui	t Analysis and Des	ign – II La	b						
Desire	d Requisi	tes:	Electronic Circui	t Analysis and Des	ign – I Lab	)						
	u nequisi		Liceu onie eneur	t i inalysis and Des.	igni i Duc	, 						
,	Teaching	Scheme		Examination	Scheme (	Marks)						
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab I	ESE	Total					
Intera	ction		30	30	40	)	100					
				Cre	edits: 1							
			Cours	se Objectives								
1	To illust	rate demonstra	te, proper use of in	nstruments and sim	ulator soft	ware.						
-	To expla	in the process o	f constructing a cir	rcuit and verifying	working o	f circuits n	nentioned in the					
2	experime	ent list.	C	2	C							
3	To illust	rate the method	s used for analysis	and design of OpA	mp based	circuits.						
4	To Illust	rate how to per	form the experiment	nt and how to docu	ment the r	esults.						
At the	and of the	Course the stud	e Outcomes (CO)	with Bloom's Tax	onomy Le	evel						
At the		course, the stuc	ients will be able to	5,		Bloom'	s Bloom's					
со		Cou	rse Outcome State	ement/s		Taxonon	ny Taxonom	y				
						Level	Descripto	or				
CO1	Use the r	equired instrum	ents, with proper t	heoretical understa	nding of	TTT	Applying					
	(Skills of	f using Convent	ional as well as Mo	odern Tools)	onware.	111	Apprying	5				
CO2	Examine	e practically th	e performance of	f a given OpAm	b based							
	circuit, c	lo correct calcu	lations, draw corr	ect inference and	properly	IV	Analysing	g				
	write the	conclusions. (e	xperiential learning	g)								
CO3	Design s	imple OpAmp b	based applications	using the circuits s	tudied in							
	related 1	theory course,	and as per give	en problems. (inde	ependent	VI	Creating					
<u> </u>	Prenare	the document	tation of proper	observations neat	graphs							
0.04	writing c	onclusion in gra	ammatically and te	chnically correct la	anguage.							
	explain	orally the circu	it operation and	process of perform	ning the	VI	Creating					
	experime	ents in correct t	echnical language	e. (Present and def	end,							
	measure,	assess, interpre	t and conclude, con	mmunication skills	)							
			List of Experimen	its / Lab Activities	/Topics							
List of Activit perform lab), do 1. 2. 3. 4. 5. 6	ties 1 to 10 mance praco coumentin Course I Analysis Analysis Designin How to r	b shall involve p ctically using ac g the results and nfo, Analysis an and Design of 1 and Design of 2 and Design of 5 g with Practical ead Datasheet of	erforming the anal tual hardware (in p l performing relate d Design of Trans nverting, Non-invo Adder Circuits Subtractor and Inst Limitations of Op	ysis and design var person lab) or using od activities (as give istorized difference erting amplifier, rumentation Ampli Amp	ious circu simulatio en in lab m amplifier fier	its and ver n tools (in aanual, as ł	ifying the case of online nome-work)					

- 7. Analysis and Design of Active Filters
- 8. Analysis and Design of Schmitt trigger and Square-Triangular Generator
- 9. Analysis and Design of Precision rectifier
- 10. Analysis and Design of Linear Regulated Power Supply
- 11. Demonstration of Phase Locked Loop

	Textbooks									
1	Sergio Franco, "Design with op-amp and analog integrated circuits", Tata McGraw Hill, New Delhi.									
2	Robert F. Coughlin and Frederick F. Driscoll, "Operational amplifiers and linear integrated circuits", PHI.									
3	Lab Manual of this course									
	References									
1	Ramakant Gaikwad," <i>Op-amp and Linear Integrated Circuits</i> ", Pearson Education India, ISBN: 9789332549913, Fourth Edition, 2015.									
2	Tobey and Gramme, " <i>Operational Amplifiers</i> ", McGraw-Hill; First Edition, ISBN: 978-0070649170, 1971 (Classic book)									
3	D. Roy Choudhury and S. B. Jain, " <i>Linear Integrated Circuits</i> ", New Age International Publishers, 4 th Edition, 2017, ISBN: 9788122430981, 2017.									
4										
	Useful Links									
1	https://www.allaboutcircuits.com/video-tutorials/op-amp-basics-introduction-to-the-operational- amplifier/									
2	https://web.mit.edu/6.101/www/reference/op_amps_everyone.pdf									
3	https://www.ti.com/amplifier-circuit/op-amps/products.html									

	CO-PO Mapping													
		Programme Outcomes (PO)											PS	50
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1					3								3	
CO2		3											3	
CO3			3											3
CO4										3				3
The stre	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High													
Each Co	O of the	e course	e must r	nap to a	at least	one PC	), and p	referab	ly to or	nly one	PO.			

	Assessment									
There are three components of lab assessment, LA1, LA2 and Lab ESE.										
IMP: Lab ESE	is a separate head	of passing.(min 40 %), LA	1+LA2 should be min 40%							
Assessment	ent         Based on         Conducted by         Typical Schedule									
	Lab activities,		During Week 1 to Week 8							
LA1	attendance,	Lab Course Faculty	Marks Submission at the end of	30						
	journal		Week 8							
	Lab activities,		During Week 9 to Week 16							
LA2	attendance,	Lab Course Faculty	Marks Submission at the end of	30						
	journal		Week 16							
	Lab activities,	Lab Course Faculty and	During Week 18 to Week 19							
Lab ESE	journal/	External Examiner as	Marks Submission at the end of	40						
	performance	applicable	Week 19							
Week 1 indicate	es starting week o	f a semester. Lab activities/	Lab performance shall include performance	rming						
experiments m	ini-project preser	ntations drawings program	ming and other suitable activities as	s per the						

experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli										
	AY 2022-23									
Course Information										
Progr	amme		B.Tech. (Electro	nics Engineering)						
Class.	Semeste	er	Second Year B.	Tech., Sem IV						
Cours	e Code	-	6EN273	· · · · · · · ·						
Cours	e Name		Communication	Engineering I Lab						
Desire	ed Requi	isites:	Basic Electronic	s Engineering. En	gineering Mathematics					
	1			6 6 6,	6 6 6					
7	Teachin	g Scheme		Examination	Scheme (Marks)					
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab ESE	Total				
Intera	ction	- Hrs/ Week	30	30	40	100				
				Cre	edits: 1					
		1	I							
			Cours	se Objectives						
1	To illu	strate different	components of a	nalog communic	ation systems such as 1	nodulation,				
I	demod	lulation, sampli	ng, antenna etc	-						
2	To ena system	able the students	s for design and c	levelopment of a	pplications of commur	nication				
3										
4										
	1 6 1	Course	e Outcomes (CO)	with Bloom's Tax	xonomy Level					
At the end of the course, the students will be able to,										
CO1	<b>CO1</b> Analyze the performance of different modulation and demodulation Analyze schemes in terms of bandwidth, power requirement presence of noise.									
CO2	Comp	are the perform	ance of different	sampling method	ls, antenna.	Understand				
CO3	Demo (MAT	onstrate a smal LAB. Emona D	l communication (atex board)	system using so	oftware packages	Apply				
CO4	<u>`</u>	,	,							
		1	List of Experimen	ts / Lab Activities	s/Topics					
List of	f Topics	(Applicable for ]	Interaction mode	):-						
I ist of	f I ah Ac	tivities.								
1.	Spectr	um analyzer								
2.	AM Tra	ansmitter/ Receiv	/er							
a.	DSB-FC	Csystem								
b.	DSB – S	SC system								
3.	FM Tra	insmitter/ Receiv	rer							
a.	Reacta	ince and varactor	modulator							
р. И	PLL, qu Sampli	ladrature, Foster	- Seeley and detur	ned resonance det	ectors					
4. 5	Dulse N	Modulation and c	lemodulation							
a.	PAM. F	PWM.PPM techn	iques							
6.	PCM N	lodulation and D	emodulation							
7.	Digital	Data Transmissio	on Techniques							
8.	Digital	Modulation Tech	nniques							
9.	Experi	ments on MATLA	В							
10.	Experi	ments on Nation	al Instrument's Em	iona Datex Board						
			т	avthaoka						
1	Ge	orge Kennedy	, "Electronic Co	ommunication S	ystem", McGraw Hill	, 4 th Edition,				
	200   Ro	)9 y Blake , "E	lectronic Comn	nunication Syste	em", Thomson Publ	ications, 2 nd				
2	Ed	ition,2002		2		,				

Proposed Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

3	Taub Schilling, "Principle of communication system", TMH publication, 4 th Edition, 2013
4	
	References
1	Wayne Tomasi ,"Adavneed Electronic Communications Systems", Pearson education, 5 th Edition,2014
2	Simon Hykin, "Communication System", 4 th Edition, John Wiley & Sons, 2000
3	B. P. Lathi, "Modern Digital and Analog Communication Systems", Oxford Publications, 3rd Edition, 1998
4	
	Useful Links
1	
2	
3	
4	

	CO-PO Mapping													
	Programme Outcomes (PO)										PS	50		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1					2								2	
CO2					2									2
CO3					3				2				2	
CO4														
The stre	The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High													
Each CO	O of the	e course	e must i	map to a	at least	one PC	), and p	referab	ly to or	nly one	PO.			

#### Assessment

There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

Walchand College of Engineering, Sangli									
(Government Aldea Autonomous Institute)									
Course Information									
Progr	amme		B. Tech. (Electro	nics Engineering)					
Class.	Semester		Second Year B. 7	Tech., Sem. IV					
Cours	e Code		6EN274						
Course Name Microcontroller and Peripheral Interfacing Lab									
Desire	ed Requisi	tes:	Digital Electronic	cs Lab, Data Structu	ures and Algorithm	ı Lab			
	Teaching	Scheme		Examination S	cheme (Marks)				
Practi	ical	2 Hrs/ Week	LA1	LA2	Lab ESE	Total			
Intera	ction	-	30	30	40	100			
				Cred	lits: 1				
	1		Course	e Objectives					
1	To expla vision C	in debugging of 51IDE	an assembly and 8	3051 C program for	8051 microcontro	ller in keil micro-			
2	To show board.	downloading a	nd testing of 8051	C program for 8051	microcontroller u	sing development			
3	To explain 8051 mic	in development crocontroller	of 8051 C program	n for implementing	given system requ	irements using			
		Course	Outcomes (CO) y	vith Bloom's Taxo	nomy Level				
At the	At the end of the course, the students will be able to.								
CO1	CO1 Use keil micro-vision C51 IDE to debug an assembly and C programs for 8051 Apply								
CO2	Write a interfacin	program for	on chip peripher	al configuration a	and external perip	pheral Apply			
CO3	Test C p	rograms written	for 8051 microcon	ntroller using devel	opment board.	Analyze			
CO4	Design o	f an 8051 micro	ocontroller based ap	oplication.		Create			
		т	ist of Exponiment	a / I ab A ativitiag/	Fonios				
Listof	f I ab Acti	L vitios:	ast of Experiment	s / Lad Activities/	ropics				
1.	Introduct	tion to software	tool and hardware	of 8051					
2.	Assembl	y language prog	grams to perform d	ifferent operations,	implement if else,	for loop, while			
	loop, log	ic gates and to a	study block transfe	r 					
3. 4	8051 C p	program for LEI	D blinking and oper	rating LED using S	WIICH				
5.	Interfaci	ng 4 digits Mult	iplexed Display wi	th 8051 microcont	roller				
6.	Interfaci	ng 16x2 charact	ters LCD with 8051	microcontroller					
7.	Interfaci	ng 4x4 Matrix F	Keyboard with 805	l microcontroller					
8.	Interfaci	ng DAC $0800$ w	ith 8051 microcont	roller					
9.	). Using Ti	mer as Timer a	nd Timer as Counter	er					
11	. Interrupt	s configuration	and handling	-					
12	2. Serial co	mmunication pr	rogramming						
13	6. Multipro	cessor commun	ication (Using Pro	teus)	<b>n</b>				
14	. Design a		on or microcontroll	er based application	115				
			Те	xtbooks					
1	Kenn	eth J. Ayala,Th	e 8051 Microcontr	oller Architecture,	Programming and 2009	Applications, 2nd			
2	Moha	ammad Ali Maz	idi, The 8051 Micr	ocontroller and Em	ibedded Systems, I	Pearson Education,			
3	John	B. Peatman. De	sign with PIC mici	ocontrollers. Pears	on Education. 1st	edition, 2003			
4	Rame	esh Gaonkar, Fu	undamentals of Mi	crocontrollers and	Applications in E	mbedded Systems,			
	Penra	International	Publication(India)	, 2010		-			

Course Contents for BTech Programme, Department of Electronics Engineering, AY2022-23

References								
1	Intel 8085 and 8051 datasheet (www.intel.com)							
2	Keil A51 and C51 manuals							
3	PIC16F877A datasheet (www.microchip.com)							
4	Hi-Tech C Compiler manual							
	Useful Links							
1	https://nptel.ac.in/							
2	https://in.coursera.org/							
3	https://www.tutorialspoint.com/							
4	https://www.javatpoint.com/							

	CO-PO Mapping													
	Programme Outcomes (PO)										PSO			
	1     2     3     4     5     6     7     8     9     10     11     12     1     2													
CO1	3													
CO2	3	3												
CO3		3			3									
CO4			3											1
					1: L	ow, 2: 1	Mediun	n, 3: Hi	gh					

	Assessment									
There are three components of lab assessment, LA1, LA2 and Lab ESE. IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%										
AssessmentBased onConducted byTypical ScheduleN										
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30						
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30						
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40						
Week 1 indicate	es starting week o	f a semester. Lab act	tivities/Lab performance shall include perfor	ming						

experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.

	Walchand College of Engineering, Sangli (Government Aided Autonomous Institute)								
	AY 2022-23								
			Course	Information					
Progra	amme		B.Tech. (Electron	ics Engineering)					
Class,	Class, Semester Second Year B. Tech., Sem IV								
Cours	e Code		6EN275						
Cours	e Name		Control Systems	Lab					
Desire	ed Requisi	tes:							
,	Teaching	Scheme		Examination	Scheme (Marks)				
Practi	cal	2 Hrs/ Week	LA1	LA2	Lab ESE	Total			
Intera	teraction - 30 30 40 1								
Credits: 1									
Course Objectives									
1	To intro	duce open and	closed loop syste	ems.					
2	To prov	ide the concep	t of compensating	g networks	<u> </u>				
3	To provi	ide fundament	als of time and fr	equency domain	n analysis.				
4		Course		with Dlaams?a Ta	non omer Torrol				
At the	end of the	course the stur	lents will be able to	vith Bloom's Ta	xonomy Level				
CO1	Analyze	Open and close	ed loop DC Motor	control system an	d its response	Analyzing			
CO2	Solve P	D, PI and PID	controllers using	Matlab		Applying			
CO3	Analyze Matlab	systems using	g Routh-Hurwitz	criteria, Root le	ocus, Bode plots u	sing Analyzing			
CO4									
		L	ist of Experiment	s / Lab Activities	s/Topics				
List of	f Topics(A	pplicable for I	nteraction mode )	:-					

## List of Lab Activities:

- 1. Potentiometer as transducer and error detector.
- 2. Synchros as transmitter and error detector.
- 3. Effect of negative feedback and Speed control of DC motor.
- 4. DC position Control system ( P, PI controller)
- 5. Time response of second order system.
- 6. Selection of kp, ki and kd in PID controller
- 7. To draw Root locus and comment on stability.
- 8. To draw Bode plots and comment on stability.
- 9. Conversion of TF model to state space model

Textbooks									
1	"Control System Engineering", I.J. Nagrath, M. Gopal, 5th Edition, New Age								
	International Publications, 2008.								
2	"Modern Control Engineering", Katsuhiko Ogata, 5 th Edition, Prentice Hall, 2015.								
3	"Modern Control System", Dorf, Bishop, 12th Edition, Prentice Hall, 2013.								
4									
	· · · · ·								
References									
1	"Feedback and Control Systems", Schaum's Outlines Series book, 2nd Edition, McGraw								
1	Hill Education, 2012.								
2	"Automatic Control Systems", Bejamin C. Kuo, 7th Edition, Wiley Publications, 1995.								
3									
4									

Useful Links						
1						
2						
3						
4						

CO-PO Mapping														
	Programme Outcomes (PO)									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1				3										2
CO2				3	2									2
CO3				3	2									2
CO4														
The strength of mapping is to be written as 1,2,3; where, 1: Low, 2: Medium, 3: High														
Each CO of the course must map to at least one PO, and preferably to only one PO.														

AssessmentThere are three components of lab assessment, LA1, LA2 and Lab ESE.IMP: Lab ESE is a separate head of passing.(min 40 %), LA1+LA2 should be min 40%

Assessment	Based on	Conducted by	Typical Schedule	Marks
LA1	Lab activities, attendance, journal	Lab Course Faculty	During Week 1 to Week 8 Marks Submission at the end of Week 8	30
LA2	Lab activities, attendance, journal	Lab Course Faculty	During Week 9 to Week 16 Marks Submission at the end of Week 16	30
Lab ESE	Lab activities, journal/ performance	Lab Course Faculty and External Examiner as applicable	During Week 18 to Week 19 Marks Submission at the end of Week 19	40

Week 1 indicates starting week of a semester. Lab activities/Lab performance shall include performing experiments, mini-project, presentations, drawings, programming, and other suitable activities, as per the nature and requirement of the lab course. The experimental lab shall have typically 8-10 experiments and related activities if any.