PUDUCHERRY TECHNOLOGICAL UNIVERSITY

PUDUCHERRY-605014

(A Technological University of Government of Puducherry)



NOTES ON AGENDA of the fifth meeting of BOARD OF STUDIES In ELECTRONICS AND COMMUNICATION ENGINEERING (Both offline and virtual mode) Held on Thursday, 24th August 2023 Venue: Department of Electronics and Communication Engineering Puducherry Technological University Time: 02:00 pm

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AGENDA FOR THE FIFTH MEETING OF BOARD OF STUDIES IN ELECTRONICS AND COMMUNICATION ENGINEERING								
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1	For Approval
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	Curriculum and Syllabi for B.Tech – Electronics and
	Communication Engineering offered in Constituent and
ltem 1.1	Affiliated Colleges under Puducherry Technological
	University (Effective from the Academic
	Year 2022 – 23)

The curriculum and syllabi of B.Tech. (Electronics and Communication Engineering) programme offered in Constituent and Affiliated Colleges under Puducherry Technological University have been prepared and placed for approval of BoS. The same is enclosed in Annexure I.

	Course Outcomes (COs) and CO-PO Articulation Matrix
ltem 1.2	revised for all subjects in the B.Tech- ECE Syllabi of
	both PTU and Constituent / Affiliated Colleges

The course outcomes(COs) and course outcome - program outcome (CO-PO) articulation matrix have been revised for all courses in the B.Tech –ECE syllabi of both PTU and Constituent/affiliated Colleges according to modified Bloom's taxonomy and placed for approval of BoS. The same is enclosed in Annexure I.

2	Annexure

Curriculum	and	Syllabi	of	B.Tech	-	Electronics	and
Communicati	on En	gineering	g offe	ered in	Const	ituent / Affil	iated
Colleges unc 2022 – 23)	ler P	TU (Effec	tive	from	the	Academic	Year
	Communicati Colleges unc 2022 – 23)	Communication En Colleges under PT 2022 – 23)	Communication Engineering Colleges under PTU <i>(Effec</i> 2022 – 23)	Communication Engineering offective Colleges under PTU <i>(Effective</i> 2022–23)	Communication Engineering offered in Colleges under PTU <i>(Effective from</i> 2022–23)	Communication Engineering offered in Const Colleges under PTU <i>(Effective from the</i> 2022–23)	Communication Engineering offered in Constituent / Affil Colleges under PTU <i>(Effective from the Academic</i> 2022–23)

<u>Annexure I</u>

Curriculum and Syllabi of B.Tech – Electronics and Communication Engineering offered in Constituent / Affiliated Colleges under PTU (Effective from the Academic Year 2022 – 23)

PUDUCHERRY TECHNOLOGICAL UNIVERSITY

Applicable to the Constituent and Affiliated Colleges of Puducherry Technological University

REGULATIONS 2022-2023

B.TECH. ELECTRONICS AND COMMUNICATION

ENGINEERINGCURRICULUM

The Curriculum of B.Tech. (Electronics and Communication Engineering) is designed to fulfil the Program Educational Objectives (PEO) and the Program Outcomes (PO) listed below.

PROGRAM EDUCATIONAL OBJECTIVES (PEO)

	Producing knowledgeable and contributive Engineering graduates in the twin core areas of
PEO1	Electronics Engineering and Communication Engineering by grooming the students to be
	practitioners of concepts and designers.
PEO2	Preparing the students to function as successful professionals as well as public spirited
	human beings serving the society/working for the welfare of society.
PEO3	Developing interpretation skills, life skills, ethical spirit, and sensitivity to safety issues in the
	minds of students.
PEO4	Training the students to be adaptive portable human resource through contemporary
	curriculum and co-curricular programmes.
PEO5	Nurturing the intellectual potential of the students towards pursuing their higher studies and
	research in the frontier areas of the domain both in India and abroad.
PEO6	Inculcating the spirit of innovation, creativity, independent thinking, risk taking ability,
	entrepreneurship and attitude to approach challenges with confidence.

PROGRAM OUTCOMES (PO)

PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering
	fundamentals, and an engineering specialization to the solution of complex engineering
	problems.
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex
	engineering problems reaching substantiated conclusions using first principles of
	mathematics, natural sciences, and engineering sciences.
PO2	Problem analysis : Identify, formulate, review research literature, and analyze complengineering problems reaching substantiated conclusions using first principles mathematics, natural sciences, and engineering sciences.

	Design/development of solutions: Design solutions for complex engineering problems
	and design system components or processes that meet the specified needs with
PO3	appropriate consideration for the public health and safety, and the cultural, societal, and
	environmental considerations.
	Conduct investigations of complex problems: Use research-based knowledge and
PO4	research methods including design of experiments, analysis and interpretation of data,
	and synthesis of the information to provide valid conclusions.
	Modern tool usage: Create, select, and apply appropriate techniques, resources, and
PO5	modern engineering and IT tools including prediction and modeling to complex
	engineering activities with an understanding of the limitations.
	The engineer and society: Apply reasoning informed by the contextual knowledge to
PO6	responsibilities relevant to the professional engineering practice.
	Environment and sustainability: Understand the impact of the professional
PO7	engineering solutions in societal and environmental contexts, and demonstrate the
	knowledge of, and need for sustainable development.
DOG	Ethics: Apply ethical principles and commit to professional ethics and responsibilities
P08	and norms of the engineering practice.
PO9	Individual and team work : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
	Communication: Communicate effectively on complex engineering activities with the
	engineering community and with society at large, such as, being able to comprehend
PO10	and write effective reports and design documentation, make effective presentations, and
	give and receive clear instructions.
	Project management and finance: Demonstrate knowledge and understanding of the
2011	engineering and management principles and apply these to one's own work, as a
PO11	member and leader in a team, to manage projects and in multidisciplinary
	environments.
	Life-long learning: Recognize the need for, and have the preparation and ability to
PO12	engage in independent and life-long learning in the broadest context of technological
	change.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Competency in using electronic design automation tools for the design and analysis of complex electronic systems in furtherance to research activities.
PSO2	Ability to apply embedded systems knowledge for real time applications in various fields.

Distribution of credits among the subjects grouped under various categories:

Courses are grouped under various categories and the credits to be earned in each category of courses are asfollows:

SI. No.	Category	Credits	Course Category Code (CCC)
1	Humanities, Social Sciences and Management Courses	6+2/3*	HSM
2	Basic Science Courses (Mathematics, Physics, Chemistry and Biology)	25	BSC
3	Engineering Science Courses (Workshop, Drawing, Basics of Electrical/Mechanical/Computer etc.,)	23.5	ESC
4	Professional Core Courses	66.5	PCC
5	Professional Elective Courses (from chosen discipline)	15	PEC
6	Open Elective Courses (from other technical/ emerging disciplines)	10	OEC
7	Professional Activity Courses (Project Work, Entrepreneurship, Seminar, Internship, Comprehensive Test)	14	PAC
8	Mandatory non-Credit Courses (Environmental Sciences, Induction, Indian Constitution, Essence of Indian Traditional Knowledge, Professional Ethics)	Non- credit	МСС
	Total	160	

*included in the 10 credits under open elective category

Semester-wise Courses and Credits

Semester I

Course	Course	000	SET	P	Periods		Crodite
Code	Course		361	L	Т	Р	Creans
FYA101	Induction Programme	MCC	-	-	-	-	0
MAA101	Mathematics I	BSC	ΤY	3	1	0	4
EEA101	Basic Electrical Engineering	ESC	ΤY	3	1	0	4
CSA101	Programming for problem Solving	ESC	ΤY	3	0	0	3
MEA102	Engineering Graphics And Computer Aided Drawing	ESC	ΤY	2	0	4	3
CEA101	Environmental Science	MCC	-	3	0	0	0
EEA102	Electrical Engineering Laboratory	ESC	LB	0	0	3	1.5
CSA102	Programming Laboratory	ESC	LB	0	0	3	1.5
Total 14 2 10				17			
	Total				26		17

Semester II

Course	Course	CCC SET		F	ds	Credits		
Code	Course		361	L	Т	Р	Greats	
MAA102	Mathematics II	BSC	ΤY	3	1	0	4	
PHA101	Physics	BSC	TY	3	1	0	4	
CYA101	Chemistry	BSC	TY	3	1	0	4	
HSA101	English for Communication	HSM	TY	2	0	2	3	
MEA101	Workshop and Manufacturing Practice	ESC	LB	0	0	3	1.5	
PHA102	Physics Laboratory	BSC	LB	0	0	3	1.5	
CYA102	Chemistry Laboratory	BSC	LB	0	0	3	1.5	
	Total			11	3	11		
	Iotal				25			

CCC - Course Category Code, SET - Semester Exam Type, TY - Theory, LB - Laboratory, PR - Project

Semester III

Course	Courso	000	SET		Perio	ds	Cradite
Code	Course		361	L	Т	Р	Cieuits
MAA105	Linear Algebra, Numerical Methods and Random Processes	BSC	ΤY	3	1	0	4
ECA101	Circuits and Networks	PCC	ΤY	3	0	0	3
ECA102	Electronic Devices and Circuits	PCC	ΤY	3	0	0	3
ECA103	Electromagnetic Waves and Fields	PCC	ΤY	3	0	0	3
ECA104	Digital System Design	PCC	ΤY	3	0	0	3
CSA134	Data Structures and Object- Oriented Programming	ESC	ΤY	3	0	0	3
ECA105	Electronic Devices and Networks Laboratory	PCC	LB	0	0	3	1.5
CSA135	Data Structures and Object- Oriented Programming Laboratory	ESC	LB	0	0	3	1.5
SHA102	Indian Constitution	MCC	-	3	0	0	0
Total				21	1 28	6	22

Course	Open Elective	000	SET	F	Cradite		
Code	Open Liective			L	Т	Р	Cieuns
ZZA3XX*	Open Elective	OEC	ΤY	3	0	0	3

Semester IV

Course	Course	000	SET	I	Period	ls	Cradite
Code	Course		SET	L	Т	Р	Credits
ECA106	Transmission Lines and Waveguides	PCC	ΤY	3	0	0	3
ECA107	Electronic Circuit Design	PCC	ΤY	3	0	0	3
ECA108	Signals and Systems	PCC	ΤY	3	1	0	4
ECA109	Analog Communication	PCC	ΤY	3	0	0	3
ECA2XX	Professional Elective – I	PEC	ΤY	3	0	0	3
SHA101	Biology for Engineers	BSC	ΤY	3	0	0	2
ECA110	Digital System Design Laboratory	PCC	LB	0	0	3	1.5
ECA111	Electronic Circuit Design Laboratory	PCC	LB	0	0	3	1.5
ECA112	Analog Communication Laboratory	PCC	LB	0	0	3	1.5
Total			18	1	9	22.5	
	I Otal				28		22.J

Course	Open Elective	000	SET	F	Credits		
Code	Open Liective	000		L	Т	Р	Cieuns
ZZA3XX*	Open Elective	OEC	ΤY	3	0	0	3

*ZZ in ZZA3XX is the Department Code of the department offering Open Elective

Semester V

Course	Course	CCC SET			Perio	ds	Cradits
Code	Course	000	5L1	L	Т	Ρ	Ciedits
ECA113	Digital Signal processing and DSP Processors	PCC	ΤY	3	1	0	4
ECA114	Digital Communication	PCC	ΤY	3	0	0	3
ECA2XX	Professional Elective – II	PEC	ΤY	3	0	0	3
CSA136	Microprocessors and Microcontrollers	ESC	ΤY	3	0	0	3
EPA101	Entrepreneurship	PAC	ΤY	3	0	0	2
ECA115	Digital Signal Processing Laboratory	PCC	LB	0	0	3	1.5
ECA116	Digital Communication Laboratory	PCC	LB	0	0	3	1.5
CSA137	Microprocessors and Microcontrollers Laboratory	ESC	LB	0	0	3	1.5
Total			15	1	9	19 5	
	Total				25		13.5

Course	Open Elective	000	SET	Periods			Credits
Code	Open Liective	000	SEI	L	Т	Ρ	Cieuits
ZZA3XX	Open Elective	OEC	ΤY	3	0	0	3

Semester VI

Course	Courso	CCC SET			Perio	ds	Credits
Code	Course		3L1	L	Т	Ρ	Cieuits
ECA117	Microwave and Optical Engineering	PCC	ΤY	3	0	0	3
ECA118	Data Communication Networks	PCC	ΤY	3	0	0	3
ECA119	VLSI Design	PCC	ΤY	3	0	0	3
ECA2XX	Professional Elective - III	PEC	ΤY	3	0	0	3
HSA102	Industrial Economics and Management	HSM	ΤY	3	0	0	3
ECA120	Microwave and Optical Engineering Laboratory	PCC	LB	0	0	3	1.5
ECA121	Data Communication Networks Laboratory	PCC	LB	0	0	3	1.5
ECA122	VLSI Design Laboratory	PCC	LB	0	0	3	1.5
SHA103	Essence of Indian Traditional Knowledge	MCC	-	3	0	0	0
	Total			18	0	9	19.5
	iotai			27			13.5

Course	Open Elective	CCC SET			Perio	ds	Credits	
Code	Open Liective		SEI	L	Т	Ρ	Credits	
ZZA3XX	Open Elective	OEC	ΤY	3	0	0	3	

Semester VII

Course	Course	CCC SET		F	Period	ls	Cradite
Code	Course		SLI	L	Т	Р	oreand
ECA123	Wireless Communication	PCC	ΤY	3	0	0	3
ECA124	Information Theory and Coding	PCC	ΤY	3	0	0	3
ECA125	Embedded System	PCC	ΤY	3	0	0	3
ECA2XX	Professional Elective - IV	PEC	ΤY	3	0	0	3
ECA2XX	Professional Elective - V	PEC	ΤY	3	0	0	3
ECA126	Wireless Communication Laboratory	PCC	LB	0	0	3	1.5
ECA127	Embedded System Laboratory	PCC	LB	0	0	3	1.5
ECA128	Mini Project	PAC	-	0	0	2	1
ECA129	Professional Ethics	MCC	-	2	0	0	0
Total		17	0	8	19		
	lotal				25		

Course	e Open Elective CCC	CCC SE	SET		Perio	ds	Credite
Code	Open Liective		3L1	L	Т	Ρ	Credits
ZZA3XX	Open Elective	OEC	ΤY	3	0	0	3

Semester VIII

Course	Courso	000	SET	F	Period	S	Credits	
Code	Course		SLI	L	Т	Ρ	Cieuits	
SWA3XX	Open Elective through SWAYAM	OEC	-	-	-	-	2	
SWA3XX	Open Elective through SWAYAM	OEC	-	-	-	-	2	
ECA130	Comprehensive Test	PAC	-	-	-	2	1	
ECA131	Internship	PAC	-	-	-	-	2	
ECA132	Project Work	PAC	PR	-	-	8	8	
Total				-	-	10	15	
	lotal					10		

List of Professional Elective Courses (PEC)

Professional Electives	Course Code	Course	Semester
Drofossional Elective	ECA201	Random Variable and Random Processes	11/
Professional Elective – I	ECA202	Computer Architecture and Organization	IV
Professional Elective – II	ECA203	Antennas and Wave Propagation	V
	ECA204	v	
	ECA205	Control Systems Engineering	
Professional Elective – III	ECA206	Digital Image and Video Processing	M
	ECA207	Wavelet Transforms and its Applications	VI
	ECA208	Satellite Communication Systems	
	ECA209	Microwave Integrated Circuit Design	
	ECA210	Intelligent Networks	
	ECA211	Cellular Mobile Communication	
	ECA212	Mobile Adhoc and Wireless Sensor Networks	
Professional Elective – IV / V	ECA213	Optical Networks	
	ECA214	Cryptography and Network Security	VII
	ECA215	LTE Technology and Network Design	
	ECA216	Cognitive Radio Networks	
	ECA217	Multimedia Compression	
	ECA218	Radar and Navigational Aids	
	ECA219	Internet of Everything	
	ECA220	Advanced Mobile Communication	

List of Open Elective Courses (OEC)

Course Code	Course
ECA301	Consumer Electronics
ECA302	Communication Engineering
ECA303	CMOS VLSI Design
ECA304	Internet of Things
ECA305	Wireless Communication Networks
ECA306	Cyber Security

Courses offered under various categories:

ссс	Course Code	Course	Semester	Credit	Total Credit
	MAA101	Mathematics – I	I	4	
	PHA101	Physics	П	4	
	CYA101	Chemistry	П	4	
	PHA102	Physics laboratory	П	1.5	
	CYA102	Chemistry Laboratory	II	1.5	
BSC	MAA102	Mathematics – II	П	4	25
bse	MAA105	Linear Algebra, Numerical Methods and Random Processes	Ш	4	23
	SHA101	Biology for Engineers	IV	2	
	EEA101	Basic Electrical Engineering	I	4	
	CSA101	Programming for Problem Solving	I	3	
	MEA102	Engineering Graphics & Computer Aided Drawing	I	3	
	MEA101	Workshop and Manufacturing Practice	П	1.5	
	EEA102	Electrical Engineering Laboratory	I	1.5	
	CSA102	Programming Laboratory	I	1.5	
	CSA134	Data Structures and Object – OrientedProgramming	ш	3	
ESC	CSA135	Data Structures and Object - OrientedProgramming Laboratory	ш	1.5	23.5
	CSA136	Microprocessors and Microcontrollers	V	3	
	CSA137	Microprocessors and MicrocontrollersLaboratory	v	1.5	
	ECA101	Circuits and Networks		3	
	ECA102	Electronic Devices and Circuits		3	
	ECA103	Electromagnetic Waves and Fields		3	
	ECA104	Digital System Design		3	
	ECA105	Electronic Devices and	111	1.5	
	FCA106	Transmission Lines and Waveguides	IV	3	
	FCA107	Flectronic Circuit Design	IV	3	
	ECA108	Signals and Systems	IV	4	
	FCA109	Analog Communication	IV	3	
РСС	ECA110	Digital System Design Laboratory	IV	1.5	66.5
	ECA111	Electronic Circuit Design Laboratory	IV	1.5	
	ECA112	Analog Communication Laboratory	IV	1.5	
	ECA113	Digital Signal processing and DSP Processors	v	4	
	ECA114	Digital Communication	V	3	
	ECA115	Digital Signal Processing Laboratory	v	1.5	
	ECA116	Digital Communication Laboratory	V	1.5	
	ECA117	Microwave and Optical Engineering	VI	3	
	ECA118	Data Communication Networks	VI	3	
	ECA119	VLSI Design	VI	3	
	ECA120	Microwave and Optical Engineering Laboratory	VI	1.5	
	ECA121	Data Communication Networks Laboratory	VI	1.5	
	ECA122	VLSI Design Laboratory	VI	1.5	
	ECA123	Wireless Communication	VII	3	

		Total			160
	SWA3XX	Humanities Open Elective offered under SWAYAM	-	2*	
HSM	HSA3XX	Humanities Open Elective offered by HSS Department	-	3*	6+3*/2*
	HSA102	Industrial Economics and Management	VI	3	
	HSA101	English for Communication	П	3	
	ECA132	Project Work	VIII	8	
PAC	ECA131	Internship	VIII	2	14
	ECA130	Comprehensive Test	VIII	1	
	ECA128	Mini Project	VII	1	
	EPA101	Entrepreneurship	V	2	
OEC	SWA3XX	Open Electives offered under SWAYAM	-	4	10
	ZZA3XX	Open Electives offered by other Departments	III -VII	6	
	ECA2XX	Professional Elective – V	VII	3	
PEC	ECA2XX	Professional Elective – IV	VII	3	15
	ECA2XX	Professional Elective – III	VI	3	
	ECA2XX	Professional Elective – II	V	3	
	ECA2XX	Professional Elective – I	IV	3	
	ECA127	Embedded System Laboratory	VII	1.5	
	ECA126	Wireless Communication Laboratory	VII	1.5	
	ECA125	Embedded System	VII	3	
	ECA124	Information Theory and Coding	VII	3	

*Included in the 10 credits under Open Elective

Department : Fi	rst year	•			P	Programme: B.	Tech		
Semester : F	irst		Cours	e Categ	gory Co	de: MCC	Semes	ter Exam Ty	ре: -
Course Code		Course	Per	iods / ۱	Neek	Credit	1	Maximum N	/larks
			L	Т	Р	С	CA	SE	TM
FYA101	 	Induction Programme	_	-	-	Non-Credit	-	-	-
Prerequisite				-					
	The	course will enable the student to							
	CO1	Acquire social awareness & knowl	ledge for s	self-dev	velopm	ent			
Course	CO2	Be aware of nature & environmen	nt conscio	us and	of Inno	vative nature.			
Outcome	CO3	Develop holistic attitude and harn	nony in th	e indiv	idual, fa	amily, and soci	ety		
	CO4	Know about the art and culture, la	anguage a	nd liter	ature c	of this vast sec	ular nat	ion	
	CO5	Integrating technical Education fo	r betterm	ent of s	society				
UNIT-I Proficiency in English Periods: 12									
Communication skills – Diagnostic test on Grammar – Synonyms, Antonyms, Tenses, Sentence Completion,									
Idioms & P	hrases,	One word substitution, Homopho	ones, Hon	nonyms	s, Use o	of Preposition	s, Subje	ct-verb	CO1
agreement – Writing – Paragraph writing, Letter writing, Essay writing, Story Development.									
UNIT-II Bridge course in Mathematics Periods: 12								T	
derivative- Slop Derivatives of ir functions-Differ functions-Methe integrals. Simple Area and volum	e of a c nverse f entiatic od of in e defini e- Leng	curve-Differentiation Techniques- E unctions-Logarithmic differentiation on of implicit functions- Higher or tegration (Decomposition method, te integrals- Properties of Definite th of curve- surface area of a solid.	Derivative n- Metho der deriva method c e integral	s of ele d of sub atives. I of subst s- Redu	ementa ostitutio Integral itution Iction f	ry functions fr on- Differentia ls of functions , integration b ormulae-	om firs tion of contai y parts)	t principle- parametric ning linear) - Definite	CO2
UNIT-III		Universal human val	ues				Period	s: 12	
UNIT-IIIUniversal human valuesPeriods: 12Current Status of the society (Sources of fear)-Reformation through education-Sanskar-What is success (getting good marks, college admission, Job etc)-What is aim of life (happiness, Prosperity and continuity of happiness and prosperity)-What is required for happiness (relationship, physical facilities)-Relationship involves all emotions and feelings-Physical facility-material things required for life-Difference between animal and human consciousness- Animal consciousness-depending on money, accumulating money by wrong means etcHuman consciousness- right thinking, right understanding, right feeling-Happiness through Harmony in the individual, family, society and nature, leading to fearlessness in the society is the purpose of holistic education or valueCO								CO3	
UNIT-IV		Literary activities	5				Period	s: 12	·
Team b	ouilding	activities – Quiz – Oral Exercises – O	Group dis	cussion	, Debat	e, Extempore,	Role pl	ay.	CO4
UNIT-V		Creative arts					Period	s: 12	
Introduction to	o painti	ng & renowned artworks – Docun Dance – Classical, Cinem	nentary 8 atic – Mir	Short –	films – Mime.	- Music – Voc	al, Instr	umental –	CO5
Lecture Po	eriods:	60 Tutorial Periods: -	Pr	actical	Period	s: -	Tota	l Periods: 6	0
		Refer	ence Boo	kS					
			-						

Semester : First Course Category Code: BSC Semester Exam Type: The end of / Week Credit Maximum Mark Course Code Course Name Periods / Week Credit Maximum Mark MAA101 Mathematics-I 3 1 - 4 40 60 10 Prerequisite: - - 4 40 60 10 Course Code CO1 Apply differential calculus to notions of curvature, evolutes and utilize Beta and Gam functions to solve improper integrals. - - 4 40 60 10 Course CO2 Make use of mathematical tools in evaluating multiple integrals and their applications. CO2 Estimate gradient, divergence, curl and use Gauss, Stokes and Green's theorem to simp evaluation of integration. Exit and Gamma functions and their applications. CO3 UNIT-I Multiple integration of outro of integration in double integratis, Applications: Pane areas (double integration, Change of variables (Cartesian to polar), Double and triple integrations. Volumes by triple integration, Change of variables (Cartesian to polar), Double and triple integrations, Volumes by triple integration - Mass, Center of mass and Gravity (constant and variable densities). CO4 UNIT-II Multi variable calculus <th>Departme</th> <th>nt : Mathema</th> <th>atics</th> <th colspan="6">Programme: B.Tech.</th> <th></th>	Departme	nt : Mathem a	atics	Programme: B.Tech.						
Course Code Course Name Periods / Week Credit Maximum Mark MAA101 Mathematics-I 3 1 - 4 40 60 1 Prerequisite: - 4 40 60 1 - Course Col Apply differential calculus to notions of curvature, evolutes and utilize Beta and Gam functions to solve improper integrals. - 4 60 1 Course Co2 Make use of mathematical tools in evaluating multiple integrals and their applications. -	Semester	: First		Cour	se Cate	gory Co	de: BSC	Semester Exam Type: TY		
Image: Control of the second secon	Course (Code	Course Name	Pe	riods /	Week	Credit	N	/laximum N	Marks
MAA101 Mathematics-I 3 1 - 4 40 60 11 Prerequisite: - - 4 40 60 11 Course Coll Apply differential calculus to notions of curvature, evolutes and utilize Beta and Gam functions to solve improper integrals. CO2 Make use of mathematical tools in evaluating multiple integrals and their applications. Course CO3 Solve problems of first order differential equations of various types. CO4 Determine solution of higher order ODE and simultaneous differential equations. Corrature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties. CO UNIT-I Periods: 12 Multiple Integrals, change of order of integration in double integrals, Applications: Plane areas (double integration, Change of variables (Cartesian to polar). Double and triple integrations, Volumes by triple (Cartesian to polar). Double and triple integrations, Volumes by triple (Cartesian to polar). Double and triple integrations, Volumes by triple (Cartesian to polar). Double and triple integrations, Volumes by triple (Cartesian to polar). Double and triple integrations, Volumes by triple (Cartesian to solvable for x - Clairaut's type - simple applications of theorem ordinary Differential Equation Periods: 12 Evact equations, First order linear equations, Bernoulli's equation, solution solvable for y - equations of higher order - with constant coefficients, the operator D, Euler's linear equation of higher order - wi				L	T	Р	C	CA	SE	TM
Prerequisite:	MAA1	01	Mathematics-I	3	1	-	4	40	60	100
Course Apply differential calculus to notions of curvature, evolutes and utilize Beta and Gam functions to solve improper integrals. Outcome CO2 Make use of mathematical tools in evaluating multiple integrals and their applications. CO4 Solve problems of first order differential equations of various types. CO4 Determine solution of higher order ODE and simultaneous differential equations. CO4 Determine solution of higher order ODE and simultaneous differential equations. CV04 Determine solution of higher order ODE and simultaneous differential equations. CV11-11 Differential Calculus Periods: 12 Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties. CO Multiple Integrals, change of order of integration in double integrals, Applications: Plane areas (double integration , Change of variables (Cartesian to polar), Double and triple integrations, Volumes by triple Co CO Exact equations, First order linear equations, Bernoulli's equation, Equations not of first degree, equations, solvable for y, equations solvable for y, equations solvable for y. equations solvable for x - Clairaut's type - simple applications, orthogonal trajectories, growth and decay. CO UNIT-V Higher Order - with constant coefficients, the operator D, Euler's linear equation of parameters method. CO UNIT-V Vector Calculus <td< td=""><td>Prerequi</td><td>site:</td><td>-</td><td></td><td>-</td><td>•</td><td></td><td></td><td></td><td></td></td<>	Prerequi	site:	-		-	•				
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Course Outcome CO3 Solve problems of first order differential equations of various types. C04 Determine solution of higher order ODE and simultaneous differential equations. C05 Estimate gradient, divergence, curl and use Gauss, Stokes and Green's theorem to simp evaluation of integrals. UNIT-I Differential Calculus Periods: 12 Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties. CC UNIT-II Multi variable calculus Periods: 12 Multiple Integrals, change of order of integration in double integrals, Applications: Plane areas (double integration – Mass, Center of mass and Gravity (constant and variable densities). VINT-II First order Ordinary Differential Equation Periods: 12 Exact equations, First order Ordinary Differential Equation Periods: 12 UNIT-II Higher Order ordinary Differential Equation Periods: 12 Gradient, divergence and curl, their properties and relations. Scalar line integrals, solution by variation of higher order with variable coefficients, simu	6	CO2	Make use of mathematical too	ols in eva	luating	multipl	e integrals an	d their ap	plications	•
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 Venkataranian M.N., Engineering Mathematics, Vol. Ran, The National Publishing Company, Chemia, 2008. Erwin Kreyszig, Advanced Engineering Mathematics (9 th Ed), John Wiley & Sons, New Delhi, 2011. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, Eleventh Reprint, 2010. Bali N. and Goyal M., Advanced Engineering Mathematics, Laxmi Publications Pvt. Ltd., New Delhi, 9thEditio 2011. 	2. V 2 V	eerarajan 1, Ionkataramar	A K Engineering Mathematics II , Mich			lational	Dubliching Co	mnany (LJ Channai 21	200
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 Bali N. and Goyal M., Advanced Engineering Mathematics, Laxmi Publications Pvt. Ltd., New Delhi, 9thEditio 2011. 	5. R	amana B.V.	Higher Engineering Mathematics	. Tata M	cGraw	Hill New	Delhi. Elever	nth Reprir	1. 2010.	
2011.	6. B	ali N. and Go	val M Advanced Engineering M	lathemat	ics. Lax	mi Publ	ications Pvt. I	td New	Delhi. 9 th E	dition.
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Course: MAA101 Mathematics-I

	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2							2			
CO2	3	3	3	3	2							2			
CO3	3	3	3	3	2							2			
CO4	3	3	3	3	2							2			
CO5	3	3	3	2	2							2			

Department :	Electrica	l and Electronics Engineering	g Programme : B.Tech							
Se	emester	: First/Second	Οοι	irse Ca	tegory	Code: ESC	Semest	er Exam ⁻	Гуре: ТҮ	
Course Code		Course	Pe	riods /	Week	Credit		Maximu	m Marks	
			L	T	Р	С	CA	SE	TM	
EEA101	Ва	sic Electrical Engineering	3	1	-	4	40	60	100	
Prerequisite					-					
	CO1	To understand the basic con	cepts	of DC c	ircuits a	ind theorems	•			
	CO2	To explain the concepts of A	C circu	its and	l resona	ince.				
Course	CO3	To understand the basic con	cepts	of mag	netic ci	rcuits and trar	nsformer.			
Outcome	CO4	To explain the working princ	ciple, co	onstru	ction, a	oplications of	electrical n	nachines	•	
	CO5	To Gain knowledge of wor earthing.	king o	f pow	er plant	ts and funda	mentals of	f switch	gear and	
UNIT-I DC Circuits Periods: 12										
Electrical circuit elements (R, L and C) - Definition of Voltage, Current, Power and Energy – Ohm's law, Kirchoff current and voltage laws, analysis of simple circuits with DC voltage – Division of current in series and parallel circuits – Star-delta conversion – Node and mesh method of analysis of DC circuits – Network Theorems: CO1 Thevenin, Norton and Superposition Theorems.									hoff allel ms: CO1	
UNIT-II		AC Circuits					Period	s: 12		
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive										
power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel). Resonance: Series and parallel resonance. Three-phase balanced circuits: voltage and current relations in star and delta connections – Power measurement by two Wattmeter method.										
UNIT-III		Transformers					Period	s: 12		
Laws of Electro materials, B-H regulation and	magnet characto efficienc	ic induction – Ampere's circuit eristics. Single phase transforr y. Auto-transformer and three-	al law, ner: C phase	Farad onstru transfo	ay's law ction a ormer co	v and Lenz lav nd working, l onnections.	w – Dot ru osses in t	ile. Magn ransform	etic ers, CO3	
UNIT-IV		Electrical Machines	5				Period	s: 12		
Elementary co Construction an emf of DC mot phase & three p	ncept o nd worki or –chai ohase ind	f rotating machines – Flemm ing of DC Machines - Generato racteristics - Types of DC Mach duction motors and synchronou	ning's or and nines. Is gene	right Motor AC Ma rator (nand ar s – Emf chines: qualitat	nd left hand equation of Construction ive approach	rule – D DC genera and work only).	C Machin tor and b ing of Sin	nes: back ngle CO4	
UNIT-V		Power Plants and LT Swit	ch gea	r			Period	s: 12		
Power Plants: Components of Switch Fuse Ur energy consum	Layout f AC trai nit (SFU) ption.	of thermal, hydro and nucle nsmission and distribution syst , MCB, ELCB, MCCB, Types of	ear po ems – Wires	ower g One-l and (enerati ine diag Cables.	on (block di gram. Compo Earthing. Eler	agram ap nents of L mentary ca	proach c T Switch alculation	only). gear: s for	
Lecture Periods: 45 Tutorial Periods: 15 Practical Periods: - Total Periods: 60										
		Ref	erence	Book	5					
 D. P. Kothari and L. J. Nagrath, "Basic Electrical Engineering", 3rd Edition, Tata McGraw Hill, 2017. D. C. Kulshreshtha, "Basic Electrical Engineering", Tata McGraw Hill, 2011. Rajendra Prasad, "Fundamentals of Electrical Engineering", 3rd Edition, PHI Learning Private Limited, 2014. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989. 										

Department : Computer Science and Engineering Programme : B.Tech														
Se	mester	: First/Second	Cou	rse Cat	egory C	Code: ESC	Semester Exam Type: TY							
Course Code		Course	Pe	riods /	Week	Credit		Maximur	n Marks					
course coue		Course	L	Т	P	С	CA	SE	TM					
CSA101	Prog	ramming for Problem Solving	3	-	-	3	40	60	100					
Prerequisite					-									
	CO1	Understood the phases of pro	oblem s	olving	techniq	ues for simple	problems	i.						
-	CO2	Able to write programs using	the bas	sic lang	uage co	onstructs.								
Course	CO3	Able to build a larger program	ns using	g functi	on orie	nted approach	es.							
Outcome	CO4	Could write efficient program	ns using	advan	ced con	cepts to optim	nize the m	emory.						
	CO5	Could write programs to acce	ess data	from t	he seco	ndary storage	efficiently	/.						
UNIT-I		Algorithmic Problem So	lving				Period	ls: 9						
History and Cla	ssificatio	ons of Computers – Compone	nts of	Compu	uter –	Working Prin	ciple of (Compute	r –					
Hardware – Sof	tware a	nd its Types – Applications of	Compu	iters. G	Generat	ions of Progra	amming L	.anguage	s –					
Introduction to I	Number	System. Problem solving techn	iques: I	Prograr	n deve	lopment life-c	ycle – Alg	orithms ·	– CO1					
building blocks o	f algoritl	hms - Algorithmic problem solvir	ng-Flow	chart–	Pseudo	code.								
UNIT-II		Data, Expressions, State			Period	ls: 9								
Introduction to C – C Program Structure – C Tokens: Keyword, Identifiers, Constants, Variables and Data types														
(simple and user-defined) – Operators and its types – Operator Precedence – Expression Evaluation – Type CO2														
Conversion – Mai	naging Ir	nput/output operations-Branchir	ng State	ments	– Loopi	ng Statements	Conversion – Managing Input/output operations-Branching Statements – Looping Statements.							
UNIT-III Arrays and Functions Periods: 9														
UNIT-III		Arrays and Function	IS				Period	ls: 9						
UNIT-III Arrays – Two dim	nensiona	Arrays and Function	is s. Chara	acter ar	rays.		Period	ls: 9						
UNIT-III Arrays – Two dim Functions: Funct	iensiona ion Prot	Arrays and Function I arrays, Multidimensional array totype, Passing Arguments to F	s. Chara unction	acter ar n – Call	rays. by Va	lue and Call b	Period by Referer	ls: 9 nce – Ne	sted CO3					
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4. Ashok N Kamthane, "Computer Programming", Pearson education, Second Edition, 2012.

Department : Mechanical Engineering Programme : B.Tech											
S	emeste	er : F	irst/Second	Cou	rse Cat	egory C	ode: ESC	Semest	er Exam Ty	Гуре: ТҮ	
Course Code			Course	Pe	riods /	Week	Credit		Maximum	n Marks	
				L	Т	Р	С	CA	SE	TM	
MEA102	Engir	eering A	Graphics and Computer ided Drawing	2	-	4	3	40	60	100	
Prerequisite						-					
	CO1	Studer	nts learn to properly dime eering drawing practice.	ension a	and anr	notate e	engineering d	rawings as	s per stand	dards of	
Course	CO2	Stude solids.	nts are made to follow and	d under	stand t	he basio	cs of engineer	ing drawir	ng with sin	nple	
Outcome	CO3	Stude	nts can properly apply and	l produc	ce secti	onal vie	ews.				
	CO4	Stude diagra	nts are able to properly cr ms. Students are able to p	eate mu present	ulti-viev a draw	w ortho ing in or	graphic drawi rthographic a	ngs from t nd isometi	hree dime ric projecti	ensional ions.	
	CO5	Stude	nts learn the application o	fengine	eering g	graphics	through com	puter-aid	ed drafting	ξ.	
UNIT-I								Period	s: 18		
Introduction to Engineering graphics, Standards for Engineering Drawing practice, Lettering, Line work and											
Dimensioning, I	Projecti	on of L	ines, Projection of Planes							CO1	
UNIT-II				-				Period	s: 18		
Projections of simple solids								CO2			
UNIT-III								Period	s: 18		
	•		Sections of solids and I	Develop	ment o	of surfac	es			CO3	
UNIT-IV								Period	s: 18		
			Isometric Projections and	Orthog	graphic	Project	ions			CO4	
UNIT-V								Period	s: 18		
Introduction to CAD script.	Comp	uter Gr	aphics and Drafting, Auto) CAD, 2	2-D dia	grams c	of simple geo	metries us	sing Auto-	CO5	
Lecture Pe	eriods:	30	Tutorial Periods: -	Р	ractica	l Period	ls: 60	Tota	l Periods:	90	
			Ref	erence	Books						
 K.R. Gopala K.Venugopa BIS, Engined 	krishna al, Engi ering D	i and Su neering rawing	Idhir Gopalakrishna, Engin Drawing & Graphics + Aut practices for Schools & Co	to CAD, Ilege, SI	Graphic 4 th edit P 46: 20	tion, Ne 003.	c Publishers, 2 w Age Int'lPu	2007. blication L	td., 2004.		

Department : Civil Engineering Programme : B.Tech									
Sem	ester	: First/Second	Course Category Code: MCC Semester Exam Type: -						
Course Code		Courso	Pei	riods /	Week	Credit	: N	Maximum	Marks
Course Coue		course	L	Т	Р	С	CA	SE	TM
CEA101		Environmental Science	3	-		Non-Cred	it -	-	-
Prerequisite		-		-	-	-			
	CO1	Relate to the environment an	d learn a	bout a	vailable	natural res	ources.		
	CO2	Designing methods for rainwa	ater harv	esting	and recy	cling and re	eusing of d	omestic v	vater
Course Outcome	CO3	Address environmental issue ecosystem	s like po	llution	, deplet	ion of natu	iral resour	ces and c	degrading
course outcome	CO4	Develop environment friendl sustainable development.	y models	s for re	esource	and energy	/ managem	nent, and	work for
	CO5	Participate in energy conserva	ation, tre	e plant	ation an	d other gre	en initiativ	es.	
	CO6	Segregate solid waste and particular terms of the second	rticipate	in ever	nts relate	ed to enviro	onmental is	sues.	
Activity – 1							Periods: 9		
Water resources- V and effects, Water	Water C Act (19	Cycle, Distribution, Groundwate 974).	er flow, D)eman	d for wa	ter, Water	pollution- (causes	CO1
Activity – 2						Periods: 9			
Rainwater Harvest	ing-Me	thodology, components, desig	n of rain	water	harvesti	ng system	for a single	house (a	IS
per IS:15797-2008)						_		CO2
Activity – 3	Periods: 9								
Domestic waste w	ste water- Definition, Characteristics, Recycling and Reuse of domestic waste water.								
Activity – 4						Periods: 9			
Air Pollution- defir	nition, c	lassification, causes, Sources, e	effects ar	nd con	trol mea	sures, Air A	ct (1981)		
Activity – 5						Periods: 9			CO3
Solid Waste manag	gement	- Causes- effects and control	measure	s of Ur	ban and	industrial	waste, Was	ste	
management initia	atives in	India for human well-being.							
Activity – 6			C 12			Periods: 9			CO 4
Renewable and no	n–rene	wable energy resources– use o	of alterna	ting er	iergy sou	urces – Enei	rgy manage	ement.	
Activity – 7			D la			Periods: 9	F	- • -	
Green Buildings- D	efinitio	n, importance, building envelo	pe, Prop	iems ir	1 existin	g bullaings,	Energy use	e in wa kuildia	~
assessment system	ouse ga	study	onution,	green	constru	ICTION MALE	enais, Gree		B
Activity – 8		study				Periods: 9			CO5
Importance of Tree	e Planta	ation Display of usefulness of t	rees Me	thod c	of tree n	lanting Ide	ntify the tr		
available in the PT	U cam	ous. Mass Plantation inside/ou	utside the	e camp	ous in as	sociation w	vith the H2	EC /NSS o	of
PTU, Store the tree	es to th	e planted by the dignitaries wi	th the he	lp of h	orticultu	ure of PTU.		-,	-
Activity – 9						Periods: 9			
Collection and seg	regatio	n of solid waste in the PTU can	npus in a	ssociat	ion with	the H2EC /	NSS of PTU	J	
Activity – 10						Periods: 9			
Invite guest Lectu	res fro	m the Environmental experts	of DSTE	(for e	environn	nental issue	es)/REAP (1	for energ	у СО6
efficient buildings)/Town	and Country Planning/PWD of	of Puducl	herry,	conduct	ing compet	titions to s	tudents i	n
the topics of sloga	n makir	ng, poster and seminar present	ations, d	ebate	and obs	erving the i	mportant r	national	
and international of	days on	environmental issues to bring	awarene	ess am	ong the	students ar	nd public.		4-
Activity Per	10ds: 45	b I utorial Periods: -	Fonce R-	ractic	al Period	15: -	ľota	Periods:	45
1 D Vugananth	D Vum	Refe	rence BO		ing Coit		tions (Inid		
Delhi,2017.	R.KUM	aravelari, Environmental Scienc	te and Er	igineel	ing, scit			a) P.L(0.,	
 John Pichtel, ' V.S.K.V.Harish 	Waste I n, Arunk	vianagement Practices: Munic kumar, Green Building Energy S	ipai, Haza Simulatio	ardous n and	and Ind Modelin	ustrial, CRC g, Elsevier S	. Press,201 Science & T	4 Technolog	y,2018
			17						

Departmen	t : Electri	cal and Electronics Engineering	Programme : B.Tech.							
	Semeste	r : First/Second	Cou	rse Cat	egory (Code: ESC	Semes	ster Exam	n Type: LB	
Course Code		Course	Per	iods /	Week	Credit		Maximur	n Marks	
Course coue		Course	L	Т	Р	C	CA	SE	TM	
EEA102	Basic	Electrical Engineering Laboratory	-	-	3	1.5	40	60	100	
Prerequisite				-						
	CO1	To understand the principles of c	lomes	tic wiri	ng and	electrical c	ompone	nts.		
Course	CO2	To illustrate handling of measuri theorems	ng inst	rumer	nts and	demonstra	te the co	oncepts c	of network	
Outcome	CO3	To analyze RL,RC,RLC circuits								
	CO4	To introduce concepts of single/t	hree p	ohase o	circuits					
CO5 To demonstrate the working principle of electrical machines										
		Any 10 exp	erime	nts						
 Study of: Basic safety precautions. Concepts of domestic wiring- wires, switches, plugs, sockets, fuses and lamp holders. Study of fan and tube light connections and earthing Stair case wiring. Bedroom wiring. 									nd CO1	
 Use of mea Verification Verification 	suring in: of Theve n of Supe	struments. Verification of Kirchoff's enin and Norton theorems rposition Theorem.	voltag	e and o	current	law			CO2	
 8. Impedance 9. Measurement 10. Resonance 	calculati ent of po : Series a	on of R-L, R-C & R-L-C circuits and ve wer & power factor in a single phase nd parallel.	erificat AC cii	ion. rcuit us	sing thr	ee Ammete	er Metho	od	CO3	
 11. Measurement of various line and phase quantities for a three phase star/delta ac circuit. 12. Measurement of three phase power using two wattmeter method. 13. Energy measurement using single phase energy meter. 									CO4	
14. Load test on a single phase transformer.CC15. Load test on a single phase induction motor.CC									CO5	
Lecture P	Periods:	Tutorial Periods:	Practic	al Peri	iods: 4	5	Tota	l Periods	: 45	
		Reference	e Book	S			_			
 Laborator 	y Manua	I, Department of Electrical and Electi	ronics	Engine	ering, I	Puducherry	Technol	logical Ur	niversity.	

Department :	Comput	ter Science and Engineering				Programm	e : B.Tech	1	
Se	emester	: First/Second	Co	urse Ca	ategory	Code: ESC	Seme	ester Exam Type	: LB
Course Code		Course	Per	iods /	Week	Credit		Maximum Ma	arks
Course Coue		Course	L	Т	Р	С	CA	SE T	М
CSA102	Р	rogramming Laboratory	-	-	3	1.5	40	60 1	00
Prerequisite					-				
	CO1	Understood the program e	diting a	nd con	npilatio	on environmen	t.		
_	CO2	Able to write simple C prog	rams us	sing m	ost frec	quently used co	ontrol stru	uctures.	
Course	CO3	Apply the methods problen	ns using	g array	s and fu	unctions.			
Outcome	CO4	Learnt to handle data proce	essing u	ising st	ructure	es for simple a	oplication	IS.	
	CO5	Write programs that could	handle	file i/o	and no	pinters		-	
		Prog	rammi	ng llsi	ng (
1. Study of Com	nilation	and execution of simple C pro	grams						
2. Basic C Progr	ams		8						
a. Arith	metic Op	perations							
b. Area	and Circ	umference of a circle							CO1
c. Swapı	oing with	and without Temporary Varia	ables						
3. Programs usi	ng Branc	ching statements							
a. To ch	neck the	number as Odd or Even							
b. Grea	test of T	hree Numbers							
c. Coun	ting Vow	/els							
0. Grad	ing base								
4. Programs usi	ng Contr nuting Ea	of structures							CO2
b. Fibor	nacci Ser	ies generation							
c. Prime	e Numbe	er Checking							
d. Comp	uting Su	m of Digit							
5. Programs usi	ng Array	S							
a. Sum	of 'n' nu	mbers							
b. Sorti	ng an Ar	ray							
c. Matr	ix Additi	on, Subtraction, Multiplication	and Tr	anspo	se				CO3
6. Programs usi	ng Funct	ions							
a. Com	puting no	Lr g Decursion							
D. Facil c. Call by	v Value a	g Recursion and Call by Reference							
7 Programs usi	ng String	Operations							
a. Palin	drome C	hecking							
b. Sear	ching and	d Sorting Names							
8. Programs usi	ng Struc	ture							CO4
a. Stude	ent Infor	mation System							
b. Emp	oyee Pa	y Slip Generation							
c. Electricity Bill Generation									
9. Programs usi	ng Point	ers							
a. Point	ter and A	rray							
D. POIN c. Point	ers as di	tructure							
10 Programs up	sing File	Operation							CO5
a. Coun	ting No.	of Lines. Characters and Black	Spaces	5					
b. Cont	ent copy	from one file to another	- 1						
c. Read	ing and N	Writing Data in File							
Lecture P	eriods: -	Tutorial Periods: -	Pr	actica	l Perioc	ls: 45	Tot	al Periods: 45	
		Re	eferenc	e Bool	ks				
			19	-					

Department : Mathematics Programme : B. Tech. Semester : Second Course Category Code: BSC Semester Exam Type: TY												
Department : Mathematics Semester : Second Course Category Code: BSC Semester Exam Type: TY Periods / Week Credit Maximum Marks												
Semester . Se	conu		Derior		y COU ok	e. DSC	adit		avimum	Marks		
Course Code	Course	e Name	1	лз / VVC Т	D	CI						
MAA102	Mathe	matics-II	3	1	-		4	40	60	100		
Prerequisite:	-			_						200		
•		Define and explain t	he basic c	oncept	s of N	latrices a	ind make i	use of it	to solve	svstem o		
	CO1	equations								-,		
	603	Analyze the continue	aus and di	iscroto	functi	ons in to	rms of Fou	irior cor	ios ovna	nsion		
	CO2	Explain the concent		Trancf	functi	nd make			nto Into	role		
Course	03		or Fourier				use of it t	.0 evalua				
Outcome	CO4	To develop an under	rstanding	of the	stand	ard techi	niques of a	complex	variabl	e theory in		
		particular analytic fu	inction an	d its m	appin	g proper	ty.					
	CO5	Explain the concep	its of co	mplex	integ	ration te	echniques	and co	ontour	ntegratio		
	COS	techniques which ca	n be used	in real	integ	rals.						
UNIT-I	Matric	es				Periods	5: 12					
Inverse and rar	nk of a i	matrix, System of linea	r equatio	ns, Syn	nmetr	ic, Skew	Symmetri	ic and O	Orthogo	nal		
matrices, Eigen	alues a	nd Eigenvectors of a rea	l matrix, C	Charact	eristic	equatio	n, Propert	ies of Ei	genvalu	es. CO1		
Cayley-Hamilton	n Theore	em (statement only), Dia	agonalizat	ion of r	natric	es.						
UNIT-II	Fou	rier Series				Periods	5: 12					
Dirichlet's conditions - Expansion of periodic functions into Fourier series- Change of interval- Half-range												
Fourier series. Complex form of Fourier series - Root mean square value - Parseval's theorem on Fourier CO2												
coefficients - Harmonic analysis.												
UNIT-III	Fou	rier Transform				Peri	ods: 12					
Fourier Integral	Theore	m(statement only)- For	urier tran	storm,	Inver	se Fourie	er transfoi	rm, defi	nition a	nd		
properties - Ev	aluation	of integrals- Fourier (cosine an	d sine	trans	form, de	efinitions	and eva	aluation	of CO3		
	cosine ar	nd sine transforms.					<u> </u>					
	Con	nplex Valued function a	nd Conto	rmal IV	appin	g Peri	ods: 12			c		
Definition of a C	omplex	valued function f(z) and	d its derivation	ative -	Analyi		ons -Nece	ssary co	ndition	for		
form sufficient	o De alla	ion for f(z) to be ana	lutic(state	ann ey mont		harmor	ient or C-r	Nequati	on in po	nd		
orthogonal pro	nerties	of analytic function -1	Construct	ion of	analy	tic funct	ions Cont	formal i	manning	CO4		
Simple and star	ndard tra	ansformations like w =	7^2 . e^2 . 7+0	. cz. si	nz. 1/	z. Bilinea	ar transfor	mation	(exclud	ing		
Schwarz- Christe	offel trai	nsformation).	_, _, _, _,	,, e_, e.	, _,	_,			(0/10/0/0/0			
UNIT-V	Con	nplex Integration				Peri	ods:12					
Cauchy's Integra	al theore	em, Cauchy's integral fo	rmula (wi	thout p	roof)	and prob	olems, Tay	lor's and	d Laurer	ıt's		
theorem (witho	ut proo	f), Classification of sing	gularities.	Residu	ies an	d evalua	tion of re	sidues ·	– Cauch	y's cor		
Residue theore	n, Conto	our integration – Evalua	tion of re	al integ	grals –	unit circ	le and ser	ni-circul	ar conte	our		
(excluding poles	on bou	ndaries).										
Lecture Periods	: 45	Tutorial Periods: 1	5 Prac	tical Po	eriods	: 00	Тс	otal Peri	ods: 60			
Reference Book	s:											
1. Veerarajan T.	, Engine	ering Mathematics II, N	/IcGraw-H	ill Educ	ation(India) Pr	ivate Limit	ted, 201	8			
2. Veerarajan T.	, Transfo	orms and Partial Differe	ntial Equa	tions ,	McGra	aw-Hill E	ducation(l	ndia) Pr	ivate			
Limited, 2016			\ <i>t</i> -1 -!		Th . •·			C a 100				
3. venkatarama	n IVI.K., ~ ^ d	Engineering Mathematic	cs, Vol. II a	and III,	ine N		ublishing (Lompan	iy, 2008	11		
4. Erwin Kreyszig, Advanced Engineering Mathematics (Ninth Edition), John Wiley & Sons, New Deini, 2011												
6 Bali N and G	, nigher Mal M	Advanced Engineering	Nathemat		mi Du	iew Dein Iblication	ו, בופעפוונר הכ Ωע+ +1		u, 2010. Jolhi Nii	th		
Edition, 2011			incinat			Silcution		, 140.00				

Course: MAA102 Mathematics-II

	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	3							2			
CO2	3	3	3	3	3							2			
CO3	3	3	3	3	2							2			
CO4	3	3	3	3	3							2			
CO5	3	3	3	3	3							2			

Department: Physics Programme: B.Tech. Semester : First/Second Subject Category: BSC													
Semester : Fi	emester : First/Second Subject Category: BSC Hours / Week Credit Maximum Marks												
Course Code	Hours / Week Credit Maximum Marks Course Name I T P C CA SE TM												
			L	Т	Р	С	CA	SE	TM				
PHA101	Physic	S	3	1	-	4	40	60	100				
Prerequisite:	-												
		At the end of the course, the st	udents	should	be able	e to:							
	CO1	Illustrate the concepts of elec	tromagi	netic tl	heory, d	dielectric prop	erties, wa	ve mech	nanics,				
	COI	optical phenomena, lasers and	d fiber c	ptics.									
		Develop the skills to identify a	nd solv	e the l	oroblen	ns related to fi	ield theor	y of elec	tricity				
	CO2	and magnetism, mechanism	of pola	arizatio	on, mat	tter waves, o	ptics and	laser &	fiber				
Outcome:		optics.											
outcome.		Classify the electrostatics and	magnet	tostati	cs, type	es of polarization	on, time c	lepende	nt and				
	CO3	independent Schrodinger way	ve equa	ition, d	optical	phenomena, t	types of I	aser and	fiber				
		optics.											
	CO4	Explain the acquired informat	ion on t	he res	pective	topics.							
	CO5	Compile the basic concepts of	physics	in var	ious fie	ld for differen	t applicat	ions.					
UNIT-I	Electro	omagnetic theory				Hours: 12							
Brief review of	electro	statics, electric field and poter	ntial – d	diverge	ence an	nd curl of elec	trostatic	CO1,	CO2,				
field – Gauss lav	w and its	s applications, Laplace's equations	on in on	e, two	and th	ree dimension	•	CO3,	CO4,				
Brief review of magnetostatics, Biot-Savart law – divergence and curl of static magnetic field – C													
Ampere's law – magnetic vector potential – comparison of electrostatics and magnetostatics.													
UNIT-II	Dielect	trics				Hours: 12							
Dielectric polar	ization a	and its mechanisms – dielectric	loss – d	ielectr	ic brea	kdown – calcu	lation of	CO1,	CO2,				
electronic pola	rizabiliti	es and ionic polarizabilities – t	empera	ture a	nd freq	uency depend	dence of	CO3,	CO4,				
polarization – i	nternal	field in solids – Clausius-Mosso	tti relat	ion – i	ferroele	ectricity – ferro	oelectric	CO5					
hysteresis.	_					· · · · ·							
UNIT-III	Quant	um mechanics				Hours: 12	- •						
Matter Waves	– de Br	oglie hypothesis – uncertainty	princip	le – So	chrödin	ger wave equ	ations –	CO1,	CO2,				
time dependen	it – tim	e independent – physical signi	ficance	of wa	ave fun	ction – applic	ation to	CO3, C	04				
particle in a one	e-dimen	isional potential box – concept	of quar	itum n	nechani	ical tunneling (without						
derivation) – a	аррисаті	ons of tunneling (qualitative)	to alp	na de	cay, tu	innel diode, s	scanning						
	scope.	antia				Hours 17							
	wave	optics	aan/a in	f	~ ~~ ~ + ~ ~	Hours: 12		<u> </u>	<u> </u>				
determination	ni wedg	se - Newton's Tings - Michel Angth of a light source	SULLS IN	nerier	ometer	- types of t	mges –	CO1,	CO2,				
Diffraction: co	ocent of	f resolution of spectral lines -	Ravlai	ah's cr	itorion	- resolving n	ower of	CO5,	CO4,				
grating prism 8	telesco		Rayici	511.5 CI	iterion	resolving p		005					
Polarisation: B	asic con	cents of double refraction – c	ircular :	and ell	lintical	nolarization –	quarter						
and half wave	plates	– optical rotation – specific	rotato	orv po	wer –	Laurent's hal	If shade						
polarimeter.	protect			., 60									
UNIT-V	Lasers	and Fiber optics				Hours: 12							
Lasers: Principl	es of las	ser – spontaneous and stimulat	ed emi	ssions	– Einst	ein's theory o	f matter	CO1,	CO2,				
radiation intera	action –	A and B coefficients – popul	ation ir	nversio	n and	laser action -	- optical	CO3,	CO4,				
resonators(qua	litative)	- types of lasers -Nd: YAG, Co	O₂ laser	, GaAs	s laser -	– industrial &	medical	CO5					
applications of	lasers (a	ny two).											
Fiber optics: F	Principle	and propagation of light in	optica	l fiber	- nu	merical apert	ure and						
acceptance ang	le – ste	p index and graded index fiber2	2qualit	ative i	deas of	attenuation in	n optical						

fibe	ers – fiber optic communica	ation (schematic), active	e and passive fiber optic sensors, end	loscope.
Tot	al contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -	Total Hours:
				60
Ref	erence Books:			
1.	David Griffiths, Introduct	ion to Electrodynamics,	3 rd Edition, Eastern Economy Edition	n. , 2011
2.	A.S. Vasudeva, Modern E	ngineering Physics, S. C	hand & Co, 2006.	
3.	D. J. Griffiths, "Quantum	mechanics", Pearson Eo	ducation, 2014.	
4.	V. Rajendran, Engineerin	g Physics, 2 nd Edition, TI	VIH, New Delhi 2011	
5.	Avadhanulu M. N. , Engir	eering Physics, S. Chan	d & Co, 2007	
6.	David Halliday, Robert Re	snick and Jearl Walker,	Fundamentals of Physics, Wiley pub	lications, 2013
7.	H.J. Pain, The physics of v	vibrations and waves, W	/iley publications, 2005	
8.	Ajoy Ghatak, Optics, 5th	Edition TMH, New Delh	i, 2012	
9.	Orazio Svelto,2 nd Edition,	plenum Press, Principle	es of Lasers, 1982.	
10	. K. Thyagarajan and Ajoy	Ghatak, Lasers Fundam	entals and Applications, 2 nd Edition, S	Springer 2010.

[Departm	ent : Chemistry				Programme	: B.Tech				
Se	mester	: First/Second	Cou	rse Ca	tegory C	Code: BSC	Semes	ter Exam	Type:	ΤY	
Course Code		Course	Pei	riods /	Week	Credit		Maximu	um Ma	nrks	
		course	L	Т	Р	С	CA	SE	T	M	
CYA101		Chemistry	3	1	-	4	40	60	1	00	
Prerequisite:					-						
	The co	urse will enable the student to:									
	CO1	Analyse chemical structur	es in te	erms o	of chem	ical bonding	and ison	nerism			
Course Outcome	CO2	Examine the properties ar kinetic behaviour	nd proc	cessin	g of bul	k materials i	n the cor	ntent of	adsor	ption,	
	CO3	Discover the fundament applications	al con	cepts	of ele	ectrode pote	ential in	verw	of pra	actical	
	CO4	Illustrate the organic reac	tion me	echan	isms wi	th respect to	the synt	thesis of	fdrug	S	
	CO5	Interpret the fundamenta	al prin	ciple (of spec	troscopy an	d electro	ochemis	try to	wards	
		appropriate applications									
UNIT-I		Chemical bonding and isc	omerisn	n			Perio	ds: 12	· · · ·		
Chemical bondir	ng-valen	ce bond theory, overlapping of	orbital	s. Hyb	ridizatio	n in carbon c	ompound	ds-sp, sp	f and		
sp [*] . Electron pai	r repuisi	on. Hybridization and shape of	water a	and am	imonia	molecules. Nie	olecular c	is males	eory-		
(bydrogen to per	atomic	orbitals. Bond order. Molecula	r orbita	n diagi	rams to	r nomonuciea	ar diatom	ic molec	ules-		
Structural and	stereo i	somerism-geometrical isomeris	m in a	is. Ikeneg	ontic	al isomerism	ontical a	ctivity (hiral	CO1	
carbon. Optical	arbon. Optical isomerism in lactic acid and tartaric acid. Enantiomers, diastereomers and meso compounds.										
Resolution of rac	esolution of racemic mixtures, racemization, asymmetric synthesis, Walden inversion.										
UNIT-II		Water chemistry and reaction	on kine	tics			Perio	ds: 12			
Water chemistry	-hard ar	nd soft water, removal of hardne	ess by i	on exc	hange a	nd zeolite pr	ocesses. D	Determin	ation		
of hardness by E	DTA met	thod. Desalination-Reverse osmo	osis.								
Adsorption-adso	rption of	of gases on solids-Freundlich	and La	angmu	ir adso	rption isothe	rms. Fact	tors affe	cting	CO2	
adsorption of ga	ases on	solids. Chemical kinetics-rate o	of a rea	ction,	factors	affecting rate	e of react	ion, first	t and		
second order rat	e equati	ons. Half-life of reactions.	•								
UNIT-III		Electrode potential and c	orrosio	n · ·		/	Perio	ds: 12			
Nernst equation cell, alkaline bat Corrosion-dry ar	and ap tery, Ni-(nd wet c	plications. Electrolyte concentra Cd battery and lead-acid battery corrosion, mechanism of electro	trodes- ation ce . Fuel co ochemic	ell. Bat ell-Hyc al cori	gen, Ag teries-P Irogen-c rosion, {	rimary and se pxygen fuel ce galvanic, pitti	er and grad condary II. ng and co	batteries	odes. . Dry :ion	CO3	
	ICLOIS IN	Intending corrosion. Corrosion co		iy cath	oulc pro	ntection. Anoo	Derior.	Ja. 17			
Introduction to	reaction	n mechanism-factors influenci		action	home	lutic and he	torolytic	hond fir	cion		
Reaction interm Mechanism of bromination of bromide. Elimina paracetamol, sul	ediates- free ra- benzene ation rea fanilami	carbonium ion, carbanion, free dical substitution-chlorination e. Nucleophilic substitution-S _N 2 actions-E1 and E2. Addition reac de and chloroquine.	e radica of me -hydroly tions-nu	thane. ysis of ucleop	d carber Mecha methy hilic and	hes. Electrophanism of ele bromide, S_N d electrophilic	niles and ctrophlic 1-hydroly Synthes	nucleop substitu vsis of t- is of aspi	hiles. ition- butyl rin,	CO4	
UNIT-V		Analytical techniqu	es				Perio	ds: 12			
Absorption and e instrumentation Conductivity-equ titrations. Poten	emission Basic p Jivalent tiometry	of radiation. Beer-Lamberts law principles and instrumentation of and molar conductance, cell con y-principle of acid base titration	v. Ultrav of atomi nstant. n. Chror	violet a ic abso Condu matog	and visit orption ictomet raphy- F	ble spectrosco spectrometry, ric titration-ty Principles and	py-basic hollow c pes of co	principle athode l nductom	s and amp. netric	CO5	
Lecture Pe	riods: 4	5 Tutorial Periods: 15	P	ractic	al Perio	ds: -	Tota	al Period	s: 60		
		Refe	erence	Books							

- 1. P.C. Jain and Monika Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 2016.
- 2. S.S. Dara and S.S Umare, A Textbook of Engineering Chemistry, S. Chand & Co., Ltd. New Delhi, 2013.
- 3. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S. Chand and Company Ltd, New Delhi, 2016
- 4. Arun Bahl and B.S. Bahl, A Text Book of Organic Chemistry, S. Chand and Company Ltd, New Delhi, 2011
- 5. B.R. Puri, L.R. Sharma and K.C Kalia, Principles of Inorganic Chemistry, Milestone Publishers, New Delhi, 2007
- 6. G.R. Chatwal and S.K. Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House Pvt Ltd, New Delhi, 2005
- 7. D.A. Skoog, F.J. Holler and T.A. Nieman, Principles of Instrumental Analysis, Thomson Asia Pvt. Ltd, Singapore, 2004.

Course: CYA101 Chemistry

006								POs				
cos	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2		2	2	1	3					1
CO2	3	2		2	2	1	3					1
CO3	3	2		2	2	1	3					1
CO4	3	2		2	2	1	3					1
CO5	3	2		2	2	1	3					1
Average	3	2		2	2	1	3					1

Department : H	lumanit	ies ar	nd Social Sciences	Prog	gramme	e : B.T	ech						
Semester : F	irst/Sec	ond		Subj	ect Cat	egory	: HSM	Semester	Exam Typ	ວe: TY			
Course Code	Hours / Week Credit Maximum Marks L T P C CA SE TN												
Course Coue	Course	: INdii	IE	L	Т	Р	C	CA	SE	TM			
HSA101	Englisł	n for (Communication	2	-	2	3	40	60	100			
Prerequisite:	-												
	CO1	Арр	ly various strategies to	o foste	er adva	nced	technical	communica	tion skills	j.			
		Inte	rpret reading mater	ials. t	hereby	enh	ancing co	omprehensi	on and	critical			
	CO2	thin	king skills.	,	,								
Outcome:	CO3	Illus	trate ideas in diverse	writin	g forms	s, thro	ugh well	developed	writing sk	ills.			
	CO4	Den	nonstrate effective spe	eaking	g skills t	hroug	h clear ar	nd coherent	articulat	ion.			
		Арр	ly advanced vocabu	lary a	and gr	amma	atical stru	uctures for	- accurat	e and			
	CO5	effe	ctive communication		•								
UNIT-I	TECHN	IICAL	COMMUNICATION				Hours:	12					
Nature of tech	nical cor	mmui	nication – Forms of te	echnic	al comi	munic	ation – G	eneral and	technical				
communicatior	n(differe	nces)	– Importance and ne	eed –C	Organiz	ation	in technic	al commur	nication –	CO1			
Style – ABC of t	echnica	l com	munication – Technica	al com	imunica	ation	skills.						
UNIT-II	COMP	REHE	NSION AND ANALYSI	S			Hours:	12					
Technical and I	Non-Tec	hnica	I passages – Reading	metho	ods – Sl	kimm	ing – Scan	ining– Exte	nsive and				
Intensive read	ng – Pr	edict	ing, Inferring – Conte	extual	meani	ng –	summariz	ing – Note	making/	CO2			
Note taking.													
UNIT-III	PRACT	ICE II	N WRITING				Hours:	12		I			
Sentence struc	tures – l	Jse o	f phrases and clauses	in sen	tences	– Coh	ierence in	writing – H	lints				
development- Principles of paragraph writing – Essay writing – Describing – Defining – Classifying													
-Formal letters	– Mem	orand	dum – Instructions -	Recor	nmena	ations	5 – E- maii	-Reports(f	easibility				
	CDEAK						Hourse	10					
Dronunciation -	Short		versations and Dialogu	ως _Ε	ormali	araca	ntations -	IZ Group disc	ussions -				
Extemnore sne	aking – I	Deha	tes- Role plays– Interv	view sl	kills	510301	intations	Group disc		CO4			
	GRAM	MAR			NG		Hours	12					
Word formatic	n - Roc		ords from foreign lan		is and	thoir	use in Fn	σlish — Pro	fives and				
suffixes – Subie	ect-verb	agree	ement – Articles – Vo	bice –	Prepos	ition-	Importa	nce of punc	tuation –	· CO5			
Error correction	n– Svno	nvms	s. Antonyms and stand	ard a	bbrevia	tions							
Total contact F	, lours: 3(, D	, Total Tutorials: -	Tota	l Prac	tical	Classes:	Total Hou	ırs: 60				
		-		30			0.000001						
Reference Boo	ks:		<u>.</u>					<u>i</u>					
1. Sudarsha	ana, N.P	and	C. Savitha. English for	Techn	ical Co	mmur	nication. N	loida: CUP	, 2016.				
2. Shoba, K	N and L	ourd	es JoavaniRaven. Com	munio	cative E	nglish	n. Chennai	: CUP, 2017	7.				
3. Rizvi. As	hraf. M.	Effe	ctive Technical Comm	nunica	ation. N	lew D	elhi: McC	Graw. 2017.					
4 Michael	Swan	Dra	ctical English Usage	Ovfo	rd. OII	D 201	1/1	,					
4. WIICHAEI	Swan.	and	Cootha Baigovan Basi			r,201	L 4 Skille Nov	v Dalhis Cu	0 2012				
5. Dutt, Kiranniar Pand Geetria Rajeevan. Basic Communication Skins. New Denn. COP,2015													
6. Sanjay K	umar an	a Pus	shpalata. Communicat	:ion Sk	(IIIS. Ne	w Dei		2011.		~			
7. Mohan, Macmilla	Krishna an, 2012	and	ivieera Banerji. Dev	velopi	ng Cor	nmun	ication S	Kills. 2nd (edition.	Delhi:			
8. Relevant	materia	al froi	m newspapers, magaz	ines a	nd jour	nals v	vill be use	d for integr	ated prac	ctice.			
9. Website	es												
i) www.	onestop	engli	sh.com										
ii) www	. learne	nglisl	h.com										
iii) www	.english	forev	/eryone.com										
iv) www. esllounge.com													

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	1	-	1	2	-	2	2	1	2
CO2	-	1	-	1	-	1	-	-	-	2	-	2
CO3	-	-	-	-	-	1	2	-	2	2	-	2
CO4	-	-	-	1	-	-	2	-	2	2	1	2
CO5	-	-	-	1	-	-	-	-	-	2	1	2

Course: HSA101 English for Communication

Depa	rtment	: Mechanical Engineering				P	rogramm	e : B.Te	ch			
	Semester : First/Second Course Category Code: ESC Semester Exam Type: urse Code Course Periods / Week Credit Maximum Marks											
Course Code		Course		Pe	riods /	Week	Credit		Maxim	um Ma	arks	
				L	Т	Р	С	CA	SE	Т	М	
MEA101	Wor	kshop and Manufacturing P	Practice	0	0	3	1.5	40	60	10	00	
Prerequisite			-		-						-	
	CO1	To convey the basics of experience in making the	mechan differen	ical tool t carpen	s used try join	in carpe ts	entry sec	tion and	d establis	h han	ds on	
Courso	CO2	To gain knowledge on ty some exercises	pes of t	tools an	d mach	ines us	ed in she	eet meta	al shop a	nd pei	rform	
Outcome	CO3	To develop basic welding of joints and fitting in eng	and fitt	ing joint applica	s using tions	the har	nd tools a	and esta	blish the	impor	tance	
	CO4	To gain knowledge of th commonly employed in the	ne differ ne indust	ent mac try, to fa	chines bricate	used in compoi	manufa nents usi	cturing ng differ	processes ent mate	whic rials	h are	
	CO5	To carry out simple manu	facturing	g operat	ions in l	lathe, dr	drilling and shaping machine					
UNIT-I	Carpe	entry					_	P	eriods: 9			
Study of tools a	nd mach	nines in carpentry										
Practice on :1.H	alf Lap j	oint 2.Corner Mortise joint	and 3.D	ovetail j	oint		*****				CO1	
UNIT-II	Sheet	Metal					Periods: 9					
Study of tools a	nd mach	nineries in sheet metal shop									CO2	
1.Frustum of co	ne 2.Wa	aste collection tray and 3.Re	ctangula	r box								
UNIT-III	Welding and Fitting										1	
Lectures/demoi	nstrations/videos on Welding and fitting operations with simple exercise. 1.									Job	CO3	
preparation 2. V		and 3. Simple lap joint							orioda. C			
CINIT-IV	Study	on tools and machines					Periods: 6					
1 Lathe machin	e 2 Dril	lling machine and 3 Shaning	machin	P							CO4	
UNIT-V	Simpl	e Exercises in Lathe/Drilling	z machin	e/Shape	٩r		Periods: 12					
Simple operatio	ns in lat	he. drilling and shaping	,									
1.Facing and Tu	urning	2.Step Turning 3.Drilling	in a flat	plate v	vith dif	ferent o	drill dime	ensions	and 4.Cu	be in	CO5	
Shaping		• • • • • • • • • •	1	.				-				
Lecture P	erioas:	3 Iutorial Period	JS: -	Pra		erioas:	42	10	otal Perio	as: 45		
 Hajra Chouc and Vol. II 2 Kalpakjian S India Edition H N Gupta 	Reference Books Idhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop technology", Vol. I 2008 2010, Media promoters and publishers private limited, Mumbai. S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education on, 2002.									ion		
Department : P	hysics		Prog	ramme :	B.Tech		mations	, 2001.				
Semester : Fi	rst/Seco	ond	Subje	ect Cate	gory: BS	6C						
	-	• • •	Ho	urs / We	ek	Credi	t	Maxin	num Mar	٢S		
Course Code	Course	e Name	L	Т	Р	С	(CA	SE	ТМ		
PHA102	Physics	s Laboratory	-	-	3	1.5	4	10	60	100		
Prerequisite:	-											
	At th	ne end of the course, the s	students	s should	l be ab	le to:						
0	CO1	Recall the physical parame	ters rela	ted to P	hysics t	heory.						
outcome:	CO2	 1 Recall the physical parameters related to Physics theory. 2 Extend the concepts and executing Re experimental setup. 										

		CO3	Expe	riment with optics, th	ermal conductivity, magnetic f	ield and laser.					
		CO4	Analy	vze and interpret the	measured values through calcu	ulations.					
		CO5	Conc	lude the experimenta	Il findings.						
Choic	ce of 10-12	experi	nents	from the following:							
1.	Radius of	curvatı	ire of a	a Lens - Newton's ring	zs		CO1, CO2,				
2.	Thickness	s of a th	in obje	ect by air – wedge			CO3, CO4,				
3.	Spectrom	neter – r	esolvi	ng power of a prism			CO5				
4.	Spectrom	neter – r	esolvi	ng power of a transm	ission grating						
5.	Spectrom	neter - h	ollow	prism / ordinary & ex	traordinary rays by calcite pris	m*					
6.	Lorent's l	Half sha	de pol	arimeter – determina	tion of specific rotatory power						
7.	Determir	nation of	wave	length of a laser sour	ce using transmission grating, I	reflection grating					
	(vernier calipers) & particle size determination										
8.	8. Determination of numerical aperture & acceptance angle of an optical fiber										
9.	 Determination of optical absorption coefficient of materials using laser* 										
10.	Michelso	n's inter	ferom	eter*							
11.	Coefficie	nt of the	ermal o	conductivity - radial fl	ow method		CO1, CO2,				
12.	Coefficie	nt of the	ermal o	conductivity – Lee's d	isc method		CO3, CO4,				
13.	Jolly's bu	lb appai	atus e	xperiment – determi	nation of α^*		CO5				
14.	Magnetis	sm: I – H	curve				CO1, CO2,				
15.	Field alor	ng the a	kis of a	coil carrying current			CO3, CO4,				
16.	Vibration	magnet	omete	er – calculation of mag	gnetic moment & pole strength	ו	CO5				
17.	Electrical	conduc	tivity c	of semiconductor – tw	vo probe / four probe method*	،					
18.1	Hall effect	in a sem	icond	uctor*							
19.	Determi	nation o	f Your	g's modulus and rigio	lity modulus		CO1, CO2,				
20.	Accelera	tion due	e to gra	avity - compound per	idulum		CO3, CO4,				
*De	emonstrati	on expe	rimen	ts			CO5				
Total	contact H	ours: 45		Total Tutorials: -	Total Practical Classes: -	Total Hours: 45	*				
Refer	ence Bool	ks:									
Physi	ysics Practical Observation Manual Book issued by Dept. of Physics, Pondicherry Engineering College.										

Semester : First/Second Course Code: BC Semester Exam Type: LB Course Code Course Periods / Week Credit Maximum Marks CYA102 Chemistry Laboratory - 3 1.5 40 60 100 Prerequisite The students will learn to: - - 3 1.5 40 60 100 Course CO2 Coefficient, hardness of water, adsorption, saponification value and acid value L5 Course CO2 Test for the quality parameters by Titrimetry methods. L4 L4 CO3 Test for the quality parameters by Conductometry, potentiometry and L5 Corinoratography L4 CO4 Estimate the quality parameters by Conductometry, potentiometry and L5 Corinoratography C05 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO1 Determination of surface tension and viscosity . Partition of benzica acid by drave benzice and water C01 C02 Cosit Analyse the inorganic salt in terms of appropriate cations and anions L4 C Dotice of 10-12 experiments from the following: C01 C02	Dep	artment : Chemist	try				Programme :	B.Tech.					
Course Code Course Periods / Week Credit Maximum Marks CVA102 Chemistry Laboratory I T P C. CA SE TM CVA102 Chemistry Laboratory - 3 1.5 40 60 100 Prerequisite The students will learn to: C01 Determine the rate constants and order of chemical reactions L5 Course C02 Examine the molecular/system properties such as surface tension, viscosity, partition L4 C03 Test for the quality parameters by Trimmetry methods. L4 C03 Test for the quality parameters by conductometry, potentiometry and L5 chromatography L4 C04 Estimate the quality parameters by conductometry, potentiometry and L5 choice of 10-12 experiments from the following: L4 C05 Analyse the inorganic sait in terms of appropriate cations and anions L4 C04 Estimate the quality parameters by conductometry, potentiometry and L5 . Kinetic study of acid hydrolysis of ethyl acetate C01 C02 C02 C03 Test for the quality on the following: C02 . Freundlich adsor	Semester : First/Second Course Category Code: BSC Semester Exam Type: LB Course Code Course Periods / Week Credit Maximum Marks												
CVA102 Chemistry Laboratory - - 3 1.5 40 60 100 Prerequisite - - - 3 1.5 40 60 100 Course C01 Determine the rate constants and order of chemical reactions L5 5 Course C02 Examine the molecular/system properties such as surface tension, viscosity, partition L4 C03 Test for the quality parameters by Thrimetry methods. L4 L4 C04 Estimate the quality parameters by Thrimetry methods. L4 C03 Fast for the quality parameters by Thrimetry methods. L4 C04 Estimate the quality parameters by Thrimetry methods. L4 C05 Analyse the inorganic sait in terms of appropriate cations and anions L4 C04 Estimate the quality parameters by Thrimetry methods. C01 C05 Analyse the inorganic sait in terms of appropriate cations and anions L4 C04 Estimate the quality parameters by Thrimetry methods. C01 2 Determination of surface tension and viscosity 3 Analyse the inorganic sait in terms of appropriate cations and anions C02 2 </td <td>Course Code</td> <th>Cour</th> <th><u>م.</u></th> <td>Pe</td> <td>riods / \</td> <td>Neek</td> <td>Credit</td> <td></td> <td>Maximu</td> <td>ım Mar</td> <td>'ks</td>	Course Code	Cour	<u>م.</u>	Pe	riods / \	Neek	Credit		Maximu	ım Mar	'ks		
CVA102 Chemistry Laboratory - - 3 1.5 40 60 100 Prerequisite The students will learn to: Course Outcome CO1 Determine the rate constants and order of chemical reactions L5 Course CO1 Determine the rate constants and order of chemical reactions L4 Course CO2 Estimate the quality parameters by conductometry, potentiometry and L5 Chromatography CO3 Test for the quality parameters by conductometry, potentiometry and L5 Chromatography CO4 Estimate the quality parameters by conductometry, potentiometry and L5 Chromatography CO3 Test for the quality parameters by conductometry, potentiometry and L5 Co1 Estimate the quality parameters by conductometry, potentiometry and L5 Co1 Estimate the quality parameters by conductometry, potentiometry and L5 Co1 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co1 Determination of surface tension and viscosity		Cour	-	L	Т	Р	C	CA	SE	TM	l		
Prerequisite - Course Outcome The students will learn to: CO1 Determine the rate constants and order of chemical reactions L5 Course Outcome CO2 Examine the molecular/system properties such as surface tension, viscosity, partition L4 CO3 Test for the quality parameters by Titrimetry methods. L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 L4 CO4 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO6 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO6 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO7 Co8 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO8 Extermination of surface tension and viscosity Spanification value and acid value of an oil CO2 Co1 Determ	CYA102	Chemistry L	aboratory	-	-	3	1.5	40	60	100)		
Course Outcome CO1 Determine the rate constants and order of chemical reactions L5 Course Outcome CO2 Examine the molecular/system properties such as surface tension, viscosity, partition L4 CO3 Test for the quality parameters by Titrimetry methods. L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 Choice of 10-12 experiments from the following: C01 1. Kinetic study of acid hydrolysis of ethyl acetate C01 2. Determination of surface tension and viscosity 3. 3. Partition of benzoic acid between benzene and water C02 4. Total hardness of water - Determination by EDTA method C02 5. Freundlich adsorption isotherm - Adsorption by Mohr's method C03 6. Saponification value and acid value of an oil C03 7. Chloride content of water - Determination by KDhr's method Soponification value and acid value of an oil 8. Determination of ferrous by permanganometry Determinatio	Prerequisite					-							
Course Outcome CO1 Determine the rate constants and order of chemical reactions L5 Course Outcome CO2 Examine the molecular/system properties such as surface tension, viscosity, partition L4 CO3 Test for the quality parameters by Titrimetry methods. L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co6 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co7 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co7 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co7 Analyse the inorganic salt in terms of appropriate cations and anions L4 Co7 Externine the addition of surface tension and viscosity Saponification value and acid value of an oil C01 2 Determination of surface tension and viscosity Saponification value and acid value of an oil C02 3 Apacity and acid by permanganometry Determination of ferrous and ferric by di		The students wil	l learn to:								Ι		
Course Outcome CO2 Examine the molecular/system properties such as surface tension, viscosity, partition 14 Co1 Test for the quality parameters by Titrimetry methods. L4 Co2 Test for the quality parameters by conductometry, potentiometry and L5 chromatography L4 Co3 Test for the quality parameters by conductometry, potentiometry and L5 chromatography L4 Co4 Estimate the quality parameters from the following: C01 1. Kinetic study of acid hydrolysis of ethyl acetate C02 2. Determination of surface tension and viscosity 3. Partition of benzoic acid between benzene and water 4. Total hardness of water - Determination by EDTA method 5. C02 3. Saponification value and acid value of an oil C02 C03 C03 7. Chloride content of water - Determination by Mohr's method 8. Determination of carbonate and bicarbonate in a mixture 10. C03 10. Determination of ferrous by permanganometry 10. Determination of ferrous by colorimetry 11. C03 13. Magnesium content in water - Determination by Winkler's method. C03 14. Acetic acid content in water - Determination by Winkler's method. C04 14		CO1 Determi	ne the rate co	nstants a	and orde	er of che	mical reactions	•	• • •		L5		
Outcome CO3 Test for the quality parameters by Titchin, supprint additivation and additivation L4 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO6 Analyse the inorganic salt in terms of appropriate cations and anions L4 CO7 Test for the quality parameters by Titchin, supprint additive and additive anditive anditive and additive anditive and additive anditive and	Course	CO2 Examine	the molecul	ar/syste	m prope	erties su	ch as surface to	ension, v	iscosity, pa id value	artition	L4		
CO3 Estimate the quality parameters by conductometry, potentiometry and L5 CO4 Estimate the quality parameters by conductometry, potentiometry and L5 L4 CO5 Analyse the inorganic salt in terms of appropriate cations and anions L4 Chicce of 10-12 experiments from the following: C01 3. Partition of barzic acid between benzene and water C02 4. Total hardness of water - Determination by EDTA method C02 5. Freundlich adsorption isotherm - Adsorption of acetic acid on charcoal C02 6. Saponification value and acid value of an oil C02 7. Choirde content of water - Determination by Mohr's method C02 8. Determination of coxalic acid by permanganometry Determination of ferrous by permanganometry C03 10. Determination of ferrous and ferric by dichrometry C03 C03 11. Beer-Lamberts law - Determination by EDTA method C03 C03 12. Beer-Lamberts law - Determination by EDTA method C03 C03 13. Magnesium content in water - Determination by Winkler's method. C04 C04 C04	Outcome	CO3 Test for	the quality par	rameter	s hy Titri	metry n	nethods	e anu au			14		
Cost Analyse the inorganic salt in terms of appropriate cations and anions L4 Cost Analyse the inorganic salt in terms of appropriate cations and anions L4 Choice of 10-12 experiments from the following: CO1 1. Kinetic study of acid hydrolysis of ethyl acetate CO1 2. Determination of surface tension and viscosity CO2 3. Partition of benzoic acid between benzene and water CO2 4. Total hardness of water - Determination by EDTA method CO2 5. Freundlich adsorption is otherm - Adsorption of acetic acid on charcoal CO2 6. Saponification value and acid value of an oil CO2 7. Chloride content of water - Determination by Mohr's method CO3 8. Determination of ferrous by permanganometry Determination of ferrous by permanganometry 10. Determination of ferrous and ferric by dichrometry CO3 11. Determination of carbonate and bicarbonate in a mixture CO3 12. Beer-Lamberts law - Determination by EDTA method CO3 13. Magnesium content in water - Determination by Winkler's method. CO4 14. Acetic acid content in water - Determination by Winkler's method. CO4 15. Dissolved oxygen content in water - Determination by Winkler's method. CO4 16. Determination		CO4 Estimate	the gual	itv pa	rameter	s by	conductometr	v. pot	entiometry	/ and	15		
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Reference Books 1. Lab Manual, Department of Chemistry, Puducherry Technological University, Puducherry, 2018. 2. V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delbi, 2001	Lecture F	Periods:	Tutorial Perio	ods: -	Pra	actical P	eriods: 45	•	Total Perio	ds: 45	.1		
 Lab Manual, Department of Chemistry, Puducherry Technological University, Puducherry, 2018. V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delbi, 2001. 				Refe	rence B	ooks							
2. V. Venkateswaran, R. Veeraswamy and A.R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delbi, 2001	1. Lab Manual, I	Department of Che	emistry, Puduo	cherry Te	echnolog	gical Uni	versity, Puduch	erry, 20	18.	-			
	2. V. Venkates	varan, R. Veerasw	vamy and A.R	. Kuland	aivelu, I	Basic Pri	nciples of Prac	tical Che	emistry, Su	ltan Ch	and		
2 Mandham B.C. Dannay I.D. Darnas and M. Thamas Maral's Taut Dark of Quantitative Chamber I And view	&Sons, New												
5. J. Wienunam, K.C. Denney, J.D. Barnes and Wi. Thomas, Vogel's Text Book of Quantitative Chemical Analysis, PearsonEducation, New Delhi, 2002	3. J. IVIENDNAM, PearsonEduc	R.C. Denney, J.D.	Barries and M	i. i noma	is, vogel	STEXTE	SOOK OF QUANTIE	ative Ch	emical Ana	iysis,			

Course: CYA102 Chemistry Laboratory

COs		POs												
	1	2	3	4	5	6	7	8	9	10	11	12		
CO1	3	2	1	3	3	1	3					1		
CO2	3	2	1	3	3	1	3					1		
CO3	3	2	1	3	3	1	3					1		
CO4	3	2	1	3	3	1	3					1		
CO5	3	2	1	3	3	1	3					1		
Average	3	2	1	3	3	1	3					1		

Department : N	Programme : B.Tech(EC)											
Semester : Third				Course Category Code: BSC			Semester Exam Type: TY					
	Periods / Week			Credit	Maximum Marks							
Course Code	Course	e Name	L	Т	Р	С	CA	SE	TM			
MAA105	Linear Metho	Algebra, Numerical ods and Random Processes	3	1	-	4	25	75	100			
Prerequisite	Basic I	ntegration and probability										
	Upon	completion of the course, the	studen	ts will	be able to							
A	CO1	1 Apply Linear Algebra concepts										
Course	CO2	Solve integrals and ordinary differential equations numerically.										
Outcome	CO3	Construct sample spaces of r	andom	experi	ments and	l identify t	he distrib	outions.				
	CO4	Make use of Markov chains t	o obtaiı	n boun	ds on prot	oability of	events.					
	CO5	Apply Stochastic processes a	nd solv	e Quei	uing theory	, problem	s.					
UNIT-I Linear Algebra Periods: 10												
Vector space, subspace, span of a set, linear independence and dependence, Dimension and Bases, inner												
product space - Gram-Schmidt orthogonalization.												
UNIT-II	Nume	rical Integration and Solution	of ODEs	5		Period	5: 10					
Numerical inter	gration	in one variable by Trapezoida	l and Sii	mpson	's 1/3 and	3/8 rules	. Single st	tep methods:				
Taylor series m	nethod,	Picard's method of successiv	e appr	oximat	ion, Euler	, Modifie	d Euler a	nd Improved	CO 2			
Euler methods,	Runge	 Kutta method of fourth orde 	er only.	Multis	tep metho	ods: Milne	e and Ada	ms -	COL			
Bashforth Predi	ctor –Co	orrector methods.										
UNIT-III Discrete Distributions Periods: 10												
Random Variab	les - Pro	bability mass function, Distrib	oution fu	unctior	ns, Special	discrete	distributio	ons:				
Bernoulli, Bino	mial, Pc	bisson, Geometric, Negative E	Binomia	I, Hyp	er geomet	ric, Discr	ete Unifo	rm, Constant	CO3			
and Indicator - I	Probabi	lity Generating function-Chara	cteristi	c funct	ion.		_					
UNIT-IV	Contin	nuous Distributions and Stocha	astic Pro	ocesse	5	Period	s: 9					
Reliability, Fail	ure den	sity and Hazard function - S	ome in	nporta	nt Continu	Jous disti	ibutions:	Exponential,				
Hypo exponent	ial, Erla	ng, Gamma, Hyper exponentia	al, Weik	oull, Ga	aussian, Ui	nitorm an	d Pareto	distributions.	CO4			
Stochastic Proc	cesses: I	Definition, Classification of Si	tochast	IC Proc	cesses - St	rictly Sta	tionary P	rocess, Wide				
Sense Stationary, Bernoulli Process, Poisson process, Markov Process, Markov Chain.												
	UNIT-V Poisson Queueing Models Periods: 9											
The Birth and Death process: $M/M/1$, $M/M/c$, $M/M/1/N$, $M/M/c/N$ (c < N), $M/M/c/c$, $M/M/\infty$ models only -												
case of Birth and Death model - Dure Birth and Dure Death Processos												
Lastura Pariode	u Death	Tutorial Poriode: 12	Bracti		iode:	Т.	tal Paria	dc: 60				
Reference Books												
1 // Krishna Murthy at al. "An Introduction to Lingar Algebra" Affiliated East Most Press 2012												
 V.Krisinia W P. Kandasan 2014. Kishore S. Ti 	ny, K. G	unavathy and K. Thilagavathy	, "Num	lity. O	Methods"	, S. Chan	d & Com	pany Ltd, New	v Delhi, ". John			
Wiley & Son	s Inc. Se	cond Edition, 2012.		<i>,,</i> ~	0	1						

D.Gross and C.M.Harris, "Fundamentals of Queuing Theory", Wiley Students Edition, Third Edition, 2012.
 J. Medhi, "Stochastic Processes", New Age International (P) Ltd., Second Edition, 2012.

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Regu	lation:	2022-23	,
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со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3	Ι	Ι	Ι	Ι	I	I	2	2	Ι
CO2	3	3	3	3	3	-	Ι	-	Ι	-	-	2	2	1
CO3	3	3	3	3	3	-	-	-	-	-	-	2	3	-
CO4	3	3	3	3	3	-	-	-	-	-	-	2	3	-
CO5	3	3	3	3	3	-	-	-	-	-	-	2	3	-
MAA105	3	3	3	3	3	_	_	_	_	-	-	2	2.6	1

Note:The correlation level 1, 2 or 3 entered are as defined below:1. Slight (low)2. Moderate (Medium)3. Substantial (High)If there is no correlation "-" is entered.
Department :	Electron Engine	nics and Communication	Progr	amme	e : B.Te	ch. (EC)					
Semester : T	hird	.	Cours	e Cate	egory C	ode: PCC	Semest	er Exam Typ	be: TY		
Course Code	C	- Nama	Perio	ds / ۱	Neek	Credit	N	1aximum M	arks		
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	ТМ		
ECA101	Circui	ts and Networks	3	0	-	3	25	75	100		
Prerequisite	-										
	Upon	completion of the course, the	studen	ts wil	be abl	e to					
	CO1	Demonstrate the understan	ding of	circui	t theor	ems.					
Course Outcome	CO2	Apply circuit theorems to ob magnetic circuits.	otain tra	ansier	nt and s	steady state t	ime respo	nse of elect	ric &		
	CO3	Apply circuit theorems to ob	otain fre	equen	cy resp	onse of elect	ric & magr	netic circuit	s.		
	CO4	Analyze two port networks of	of differ	ent a	rchitec	ture.					
	CO5	Evaluate characteristic impe	dance	and p	ropaga	tion constant	for differe	ent architec	ture of two		
		port networks.		•	1 0						
CO6 Design the different types of two port filters, attenuators and equalizers. UNIT I Circuit Analysis and Pasanance											
UNIT-I Circuit Analysis and Resonance Periods: 9											
Analysis of DC and AC circuits using Superposition, Thevenin's, Norton's, Reciprocity and Maximum power CO1											
transfer theore	ems. Sou	rce and Wye Delta transforma	ation. R	esona	nce-Se	ries resonanc	e - Paralle	l resonance	- CO2		
Variation of in	npedano	ce with frequency - Variation	n in cur	rent	throug	h and voltage	e across l	and C wit	th CO3		
frequency – Ba	ndwidth	n – Q factor -Selectivity.									
UNIT-II	Trans	ient Analysis					Perio	ds: 9			
Natural respon - Complete resp	se-Force ponse of	ed response - Transient respon f RC, RL and RLC Circuits to sinu	se of RC Isoidal (C, RL a excita	nd RLC tion.	circuits to ex	citation by	y DC source	s CO2		
UNIT-III	Magn	etically Coupled Circuits					Perio	ds: 9			
Self-inductanc	e - Muti	ual inductance - Dot rule - Coe	efficien	t of co	oupling	- Analysis of	multi win	ding couple	ed cos		
circuits - Series	, Paralle	l connection of coupled induct	ors - Sir	ngle ti	uned ar	nd double tun	ed couple	d circuits.			
UNIT-IV	Netw	ork Parameters					Perio	ds: 9			
Open circuit i	mpedan	ice (Z) parameters - short cir	cuit ad	mitta	nce (Y)	parameters	- transmi	ssion (ABCI	D)		
parameters an	d invers	se transmission parameters	lybrid (h) pa	ramete	rs and invers	e hybrid j	parameters	- CO4		
Conversion bet	ween pa	arameters - Interconnection of	two-po	ort ne	tworks	•	D • •				
	Filter	s and Equalizers					Perio	ds: 9	~~~		
Classification (6 - characteristic impedance in	n the pa	ass ba	nd and	stop band, (constant K	C Tilters - m			
section filters –	– BPF al - Twin T	networks Bridged Tand lattic	ection e netwo	actor	- Aller	iuators – Equ					
Lecture Period	s: 45	Tutorial Periods: -	Practi	ical Pe	riods:	- Т	otal Period	ls: 45			
Reference Boo	ks:										
1. William H. H	lavt. Jr.	Jack E. Kemmerly and Steven	M. Dur	bin. "	Engine	ering Circuit A	Analysis".	McGraw Hi	l Science		
Engineering,	8th Edi	tion, 2013.		-,	0	0	.,,				
2. Umesh Sinha Publishing C	a, "Tran: ompany	smission Lines and Networks: , New Delhi 2010.	Networ	rks, Fi	ters &	Transmission	Lines", Sa	tya Prakasł	ian		
3. Joseph Edm Outline Serie	inister a	and Mahmood Nahvi, "Electri th Edition New Delhi. 2003.	ic Circu	its", 1	ata M	cGraw Hill Pu	ublishing (Company, S	chaum's		
4. John. D. Ryde	er, "Net	work lines and fields", PHI Lear	ning, Se	econd	Editior	n, 2005.					

5. M.E. Van Valkenburg, "Network Analysis", PHI, Third Edition, 2008.

Course: ECA101 Circuits and Networks

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	-	-	-	-	-	-	-	-	1	-	-	2	-
CO2	2	3	-	-	1	-	-	-	-	1	-	-	2	2
CO3	2	3	-	-	1	-	-	-	-	1	-	-	3	2
CO4	2	3	1	1	-	-	-	-	-	1	-	-	3	2
CO5	2	2	1	1	2	-	-	-	-	1	-	-	2	1
CO6	2	2	3	3	2	-	_	-	-	1	-	-	2	1
ECA101	2	2.6	1.67	1.67	1.5	-	_	-	-	1	-	-	2.33	1.6

Department : I	Electronics a Engineering	nd Communication	Progra	amme:	B.Tec	h. (EC)							
Semester : T	hird		Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Type:	TY				
Course Code		<u>.</u>	Peric	ods / W	/eek	Credit	N	1aximum Marl	٢S				
Course Code	Course Nam	le	L	Т	Р	С	CA	SE	ТМ				
ECA102	Electronic D	evices and Circuits	3	0	-	3	25	75	100				
Prerequisite	-												
	Upon comp	letion of the course, the	studen	ts will	be able	e to							
	CO1 Dem	nonstrate the understan	ding of t	he cha	aracter	istics and a	pplications	of diodes					
Course	CO2 Dem	nonstrate the understan	ding of t	he cha	racteri	istics of BJT,	JFET & MO	SFET devices					
Outcome	CO3 Desi	ign transistor biasing circ	uits for	the giv	ven spe	cification							
	CO4 Ana	lyze the small signal, low	, freque	ncy cha	aracter	istics of BJT	and FET am	plifiers					
	CO5 Ana	lyze the small signal, hig	h freque	ncy ch	aracte	ristics of BJT	and FET ar	nplifiers					
UNIT-I	Semicondu	ctor Diodes and Applica	tions			Periods: 9		•					
Introduction to	ntroduction to semiconductors - PN junction diode- construction and working –Capacitance effects in diodes Applications - Half Wave Postifier Control												
diode- current equation –VI characteristics- Breakdown in diodes-Applications : Half Wave Rectifier, Centre													
tapped and Bridge rectifiers – Ripple factor derivation with and without capacitance filter – Rectifier													
tapped and Bridge rectifiers – Ripple factor derivation with and without capacitance filter – Rectifier efficiency and PIV- Zener diode – Regulator – LED – Phototransistor – Varactor Diode													
UNIT-II	BJT and FET	Characteristics				Periods: 9							
Construction, v	vorking and cl	haracteristics of CE, CB a	and CC c	configu	iration	s –Early effe	ect- Therma	al runaway–					
Transistor as a	n amplifier. C	Construction, working a	nd chara	acteris	tics of	JFET and N	/IOSFET (er	hancement	CO2				
mode and depl	etion mode).												
UNIT-III	Bias Stabiliz	zation and Compensatio	on Circui	ts		Periods: 9							
BJT biasing an	d Stabilisation	n: Operating point –DC	load lin	e -Bias	s Stabi	lisation circ	uits: Fixed l	bias, collector					
to base bias	and potentia	l divider bias. Bias co	mpensa	ation of	circuits	s: Diode co	mpensatio	n, thermistor	CO3				
compensation	and sensistor	compensation.											
Biasing of JFEI:	Fixed blas, Se		• •										
UNII-IV	Low Freque	ncy Analysis of Small Si	gnal Am	plifier	S	Periods: 9		· · ·					
Transistor hybr	id model- h-p	arameters- Analysis of (CE, CB a	nd CC	amplif	iers using h	-parameter	model. FET	CO4				
small signal mo	del-Low frequ	iency analysis of Commo	on Sourc	e and	Comm	on drain am	iplifiers.						
UNII-V	High Freque	ency Analysis of Small S	ignal Am	nplifiei	rs	Periods: 9	_						
Hybrid pi mode	el- Analysis of	CE transistor amplifier	using h	ybrid	pi moc	lel. Commo	n Source ar	nd Common	CO5				
Drain FET ampl	ifiers at high f	requencies.		• -				• • •					
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -	•	Total Period	ds: 45					
Reference Boo	ks:	• • - •	-										
1. J.Millman ,.C	.Halkias and S	atyabrata ,"Electronic de	evices ar	nd Circ	uits", T	Third edition	,McGraw H	lill, 2010.					
2. Robert L. Bo	ylestead and	Louis Nasheresky, "Ele	ctron De	evices	and Ci	ircuits Theo	ry", Prentic	e Hall of India	a, 11th				
Edition,2013	δ. 	Devices and Circuits" D		all - f i	ndi- F	нь Га¦+: ^	000						
3. David A. Bell	, Electronic L	venices and Circuits", Pro		all OT I	naia, 5	un Eaition, 2	2008.						
4.1 neodore F. E	bogari, Electr		s, rears	SOLIFO	ucation	n inula ,201	L.						
5. https://nptel	.ac.m/courses	/11/103063/											

Course: ECA102 Electronic Devices and Circuits

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	-	-	-	-	-	-	-	3	2
CO2	3	3	3	3	2	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	2	-	-	-		-	Ι	Ι	3	2
CO4	3	3	3	3	2	-	Ι	-	-	-	-	-	3	2
CO5	3	3	3	3	2	-	-	-	I	-	-	-	3	2
ECA102	3	2.8	2.8	2.6	2	-	_	-	-	_	-	-	3	2

Department :	Electror Engine	nics and Communication	Progr	amme	: B.Te	ch. (EC)									
Semester · 1	[hird	2.cmg	Cours	e Cate	gory C	ode: PCC	Semest	er Fxam ⁻	Tyne: TY						
Jemester .			Perio	ods / V	Veek	Credit	N	laximum	Marks						
Course Code	Course	e Name	L	Т	Р	C	CA	SE	TM						
ECA103	Electro	omagnetic Waves and Fields	3	-	-	3	25	75	100						
Prerequisite	-				1			1	1						
	Upon co	ompletion of the course, the s	student	s will k	be able	e to									
	CO1	Demonstrate the understa	nding o	of laws	and b	asic terms in	electrom	agnetics							
6	<u> </u>	Solve static electric poten	tial for	the g	iven sv	ystem of disc	rete and	continuo	ous charge						
Course	COZ	distribution		-		-			_						
Outcome	CO3	Derive expression for t	he cap	acitan	ice of	different s	tructures	involvir	ng perfect						
		dielectricsusing boundary	conditi	ons											
	CO4	Solve for static magnetic	c field	intens	sity by	y applying Bi	ot-Savart	law or	Ampere's						
	COF	Circuital law	+ dua +	o +imo o	vonir	a magnatic fi	alde in eir								
	COS	Determine induced curren	it due t		varyi	ig magnetic n									
	CO6	Demonstrate the understa	inding (ns and l	of the	princij arv co	pie of electro nditions	magnetic	wave Pi	ropagation						
UNIT-I	Static	Flectric Fields		Journa		Periods: 9									
Coulomb's Lay	N – Flect	tric Field due to a System of D	iscrete	Charg	es and	Continuous I	Distributi	on of Cha	arge						
-Electric Flux o	density -	- Energy expended in moving	a poin	t charg	ze in e	lectric field- E	lectric Po	otential	CO1						
difference- Ele	ectric Po	otential due to discrete and	contin	uous (Charge	Distribution	s – Poter	ntial	CO2						
gradient- Dipo	le -Energ	gy density in electrostatic field	I.		0										
UNIT-II	Stead	y Electric Currents and Capac	itance				Perio	ods: 9							
Current density—Continuity of current- Metallic conductors-Conductor properties and Boundary CO1															
Current density—Continuity of current- Metallic conductors-Conductor properties and Boundary Conditions-Method of Images. Dielectric materials- Boundary conditions for perfect dielectric															
materials.Capa	citance	s- capacitance of parallel plate	e capac	itor, co	oaxial o	able, two-wir	e line.								
UNIT-III	Static	Magnetic Field and Magnetic	materials.Capacitances- capacitance of parallel plate capacitor, coaxial cable, two-wire line.												
-		wiagnetic rielu anu wiagnetic	c Forces	5			Peri	ods: 9							
Biot-Savart La	w-Ampe	ere's Circuital law-Stokes' the	orem-N	s Magne	tic Flu	x and Magne	Perio etic Flux	ods: 9 density-S	calar						
Biot-Savart La and vector ma	w-Ampe ignetic p	ere's Circuital law-Stokes' the potentials-Force on moving cl	orem-N harge a	s Magne Ind dif	tic Flu ferent	x and Magne	Perio etic Flux ement, Fo	ods: 9 density-S orce bety	icalar ween						
Biot-Savart La and vector ma differential cu	w-Ampe ignetic p rrent ele	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque of	c Forces corem-N harge a n a clos	s Magne and dif sed cir	tic Flu ferent cuit- N	x and Magne ial current el Nature of ma	Perio etic Flux ement, Fo gnetic ma	ods: 9 density-S orce betv aterials-	calar ween CO1						
Biot-Savart La and vector ma differential cu Magnetization	w-Ampe ignetic p rrent ele and Pe	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda	c Forces orem-N harge a n a clos ry Cond	s Magne Ind dif sed cir ditions	tic Flu ferent cuit- N -Magr	x and Magne ial current el Nature of ma netic circuit—	Perio etic Flux ement, Fo gnetic ma • Potentia	ods: 9 density-S orce betv aterials- Il energy	icalar ween and CO1						
Biot-Savart La and vector ma differential cu Magnetization forces on magr	w-Ampe ignetic p rrent ele and Pe netic ma	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua	c Forces corem-N harge a n a clos ry Cond il Induct	s Magne and dif sed cir ditions tance.	tic Flu ferent cuit- N -Magr	x and Magne ial current el- Nature of ma netic circuit—	Perio etic Flux ement, Fo gnetic ma • Potentia	ods: 9 density-S orce betw aterials- Il energy	icalar ween and CO1						
Biot-Savart La and vector ma differential cu Magnetization forces on magr UNIT-IV	w-Ampe agnetic p rrent ele and Pe netic ma Time -	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's	c Forces orem-N harge a n a clos ry Cond I Induct Equation	Magne and dif sed cir ditions tance. ons	tic Flu ferent cuit- N -Magr	x and Magne ial current el Nature of ma netic circuit—	Perio etic Flux ement, Fo gnetic ma • Potentia Perio	ods: 9 density-S orce betw aterials- Il energy ods: 9	and CO1						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law	w-Ampe agnetic p rrent ele and Pe netic ma Time - of EM ir	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's nduction-Stationary circuit in t	c Forces orem-N harge a n a clos ry Cond I Induct Equation time va	s Magne and dif sed cir ditions tance. ons rying r	tic Flu ferent cuit- N -Magr magne	x and Magne ial current el Nature of man netic circuit— tic field, Mov	Perio etic Flux ement, Fo gnetic ma • Potentia • Potentia • Potentia	ods: 9 density-S orce betw aterials- il energy ods: 9 ictor in a	and CO1						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field	w-Ampe ognetic p rrent ele and Pe netic ma Time- of EM ir , Moving	Pre's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in g circuit in time varying magne	c Forces corem-N harge a n a clos ry Cono il Induct Equation time va etic fiel	s Magne and dif sed cir ditions tance. ons rying r d, Disp	tic Flu ferent cuit- Magr magne placem	x and Magne ial current el- Nature of ma netic circuit— etic field, Mov	Perio etic Flux ement, Fo gnetic ma • Potentia Perio ing condu Maxwell's	ods: 9 density-S orce betw aterials- il energy ods: 9 uctor in a equatior	and CO1						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field point form and equations: Tim	w-Ampering and Perinetic mand and Perinetic mand time- of EM in , Moving integra	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in f g circuit in time varying magnet form, Electromagnetic bound	c Forces corem-N harge a n a clos ry Cond il Induct Equation time va etic fiel dary con	s Magne and dif sed cir ditions tance. ons rying r d, Disp ndition	tic Flu ferent cuit- N -Magr magne blacem s, Pote	x and Magne ial current ele Nature of ma netic circuit— etic field, Mov nent current, N ential functior	Perio etic Flux ement, Fo gnetic ma · Potentia · Potentia ing condu Maxwell's ns-Solutio	ods: 9 density-S orce betw aterials- il energy ods: 9 uctor in a equatior	and CO1 CO4						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field point form and equations; Tim	w-Ampe agnetic p rrent ele and Pe netic ma Time- of EM ir , Moving lintegra e harmo	Previous Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in g circuit in time varying magnet form, Electromagnetic bound poinc fields-Time-harmonic elect	c Forces corem-N harge a n a clos ry Cond il Induct il Induct Equation time va etic fiel dary con ctromag	s Magne and dif sed cir ditions tance. ons rying r d, Disp ndition gnetics	tic Flu ferent cuit- N -Magr magne blacem s, Pote	x and Magne ial current el- Nature of man netic circuit— etic field, Mov nent current, M ential function	Perio etic Flux ement, Fo gnetic ma · Potentia · Potentia ing condu Maxwell's ns-Solutio	ods: 9 density-S orce betw aterials- il energy ods: 9 actor in a equatior ons of way	and CO1 CO4						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field point form and equations; Tim UNIT-V	w-Ampe agnetic p rrent ele and Pe netic ma Time- of EM ir , Moving integra e harmo Plane	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in fi g circuit in time varying magnet l form, Electromagnetic bound onic fields-Time-harmonic elect Electromagnetic Waves	c Forces corem-N harge a n a clos ry Cond il Induct Equati time va etic fiel dary con ctromag	s Magne ind dif sed cir ditions tance. ons rying r d, Disp ndition gnetics	tic Flu ferent cuit- N -Magr magne blacem s, Pote	x and Magne ial current el Nature of ma netic circuit— etic field, Mov nent current, N ential function	Perio etic Flux ement, Fo gnetic ma · Potentia · Potentia ing condu Maxwell's ns-Solutio Perio	ods: 9 density-S orce betw aterials- Il energy ods: 9 actor in a equation ons of way ods: 9	and CO1 CO4						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field point form and equations; Tim UNIT-V Plane Waves waves: Plane	w-Ampe ognetic p rrent ele and Pe netic ma of EM ir , Moving integra e harmo Plane in Lossle	ere's Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in f g circuit in time varying magnet form, Electromagnetic bound onic fields-Time-harmonic elect Electromagnetic Waves ess media-Doppler effect-Tra	c Forces corem-N harge a n a clos ry Cond il Induct Equation time va etic fiel dary con ctromage	s Magne and dif sed cir ditions tance. ons rying r d, Disp ndition gnetics	tic Flu ferent cuit- N -Magr magne placem s, Pote s,	x and Magne ial current elevatore of magnetic circuit— etic field, Mov eent current, Nential function	Perio etic Flux ement, Fo gnetic ma · Potentia · Potentia ing condu Maxwell's ns-Solutio Perio -Polariza	ods: 9 density-S orce betw aterials- il energy ods: 9 ictor in a equation ons of wav ods: 9 ation of p	and CO1 CO4 CO4 CO4						
Biot-Savart La and vector ma differential cur Magnetization forces on magr UNIT-IV Faraday's law magnetic field point form and equations; Tim UNIT-V Plane Waves waves; Plane electromagnet	w-Ampe ognetic p rrent ele and Penetic ma Time- of EM ir , Moving integra e harmo Plane in Lossle waves	Previous Circuital law-Stokes' the potentials-Force on moving cl ements- Force and Torque or rmeability- Magnetic Bounda terials-Inductance and Mutua Varying Fields and Maxwell's induction-Stationary circuit in t g circuit in time varying magnet l form, Electromagnetic bound onic fields-Time-harmonic elect Electromagnetic Waves ess media-Doppler effect-Tra in lossy media-Low loss di er and the Poynting vector	c Forces corem-N harge a n a clos ry Cond il Induct Equation time va etic fiel dary con ctromage electric -Instan	s Magne ind dif sed cir ditions tance. ons rying r d, Disp ndition gnetics e Elect cs, Goo	tic Flu ferent cuit- N -Magr magne blacem s, Pote c. romag od co	x and Magne ial current el- Nature of man netic circuit— etic field, Mov nent current, M ential function gnetic Waves nductors; Gro	Perio etic Flux ement, Fo gnetic ma · Potentia · Potentia · Potentia · ng condu //axwell's ns-Solutio Perio · Polariza oup velo	ods: 9 density-S orce betw aterials- il energy ods: 9 ictor in a equatior ons of wav ods: 9 ation of p city; Flor	and CO1 CO4 CO4 CO4						
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Course: ECA103 Electromagnetic Waves and Fields

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	2	1	1					2	2	1
CO2	3	3	2	2	2	1	1	-	-	-	-	2	2	1
CO3	3	3	2	2	2	1	1	-	-	-	-	2	2	1
CO4	3	3	2	2	2	1	1	-	-	-	-	2	2	1
CO5	3	3	2	2	2	1	1					2	2	1
CO6	3	3	2	2	2	1	1					2	2	1
ECA103	3	3	2	2	2	1	1	-	-	-	-	2	2	1

Department: El	ectronio	cs and O	Communi	cation Engi	neering	Prog	ramm	e : B.T	ech. (EC)			
Semester : T	hird			-	-	Cour	se Cat	egory	Code	PCC	Semeste	r Exam Ty	pe: TY
Course Code	Cours	e Name	د			Per	iods /	Week	C	Credit	Maxi	mum Ma	rks
FCA104	Digita		- Design			L	T	P		C	CA 25	SE	TM
ECA104	Digita	l Syster	n Design			3	-	-		3	25	/5	100
Prerequisite	-	comple	tion of th		ha studan	+~ill	ha ah	la +a					
	opon			le course, t	ne studen								
	CO1	Trans	slate a sin	ple techni	cal challer	nge to a	a digita	al circu	uit.				
	CO2	Demo demo	onstrate t	the unders he role of F	tanding o PLDs inimp	f the plemer	desigr Itatior	n of b n of lar	asic o ge sca	combin ale log	national cir	rcuits and s	1
Course Outcome	CO3	Analy synch	/ze the ironousse	basic syr quential ci	nchronous rcuits bas	s sequed sequences sequences sequences sequences sequences and sequences sequenc	uentia Mealy	l circ and M	uits Ioore	and mode	design si Is.	mple	
	CO4	Analy digita	/ze asyno alcircuits.	chronous s	sequential	circu	its ar	nd des	sign s	simple	hazard-fr	ee	
	CO5	Analy	ze and co	mpare the	various lo	ogic far	nilies.						
CO6 Demonstrate the understanding of the organization and operation of semiconductomemory. LINIT-I Number Systems Periods: 9												nductor	
COO memory. UNIT-I Number Systems Periods: 9 Decimal, Binary, Octal, Hexadecimal; Signed binary numbers-Addition and Subtraction; Fixed point numbers,													
Decimal, Binary, Octal, Hexadecimal; Signed binary numbers-Addition and Subtraction; Fixed point numbers, Floating point numbers Codes —BCD codes, Biquinary, Gray, ASCII code; Boolean Algebra—Basic theorems- Postulates- Duality – Boolean Function - Canonical form-Standard form. Simplification of 3,4 and5- variable Boolean Function: Karnaugh map method – Quine-McCluskey method - Simplification of Incompletely specified functions. Implementation of logic functions using basic gates, NAND gates and NOR											CO1 CO2		
gates.	Comb									! l -	- 0		
UNIT-II Arithmotic cire				ill Addore	Dinnlo Co	rni Ac	Idor	Addar	P /cubti	erioas	:9	k Abood	
Adder: BCD A	dder.	Binary	multinlie	n Auuer, er. Magnit	ude Con	nny Au	or. Fr	ncoder	Pri	ority	Encoder.	Decoder/	CO1
Demultiplexers	s, multip	plexers	- implem	entation of	f combina	tional	circuit	ts usin	g mu	ltiplex	ers, Demul	tiplexers,	CO2
Code-converte	rs, ROM	, EPROI	M and EEI	PROM, PLA	and PAL.				-				
UNIT-III	Synch	ronous	Sequenti	al Circuits					P	eriods	:9		
Basic Latch-Ga preset, FF Timi clocked seque Mooremodels Begisters and (ted SR I ng para ntial cir of FSMs	atch, G meters, cuits – s, State	ated D la , JK FF, T I State equination reduction	tch, Maste F, Charact uations, St , State assi serial add	r-Slave D eristic tab ate table ignment, I er Ring C	Flip-flc les and , State Design	p, Edg Char diagi of clo	ge trig acteris ram, F cked s	gered stic ec F inp equer	D FF, quation out eq ntial ci r Univ	D FF with ns of FFs. A uations, M rcuits. versal Shift	clear and nalysis of lealy and Register-	CO1
PN sequence g	enerato	or. Asvr	ichronous	Counters.	Synchron	ious Co	ounter	s. Cou	nters	with	parallel loa	d. Timing	CO2
diagrams– Tim	ing anal	ysis of F	F circuits		•,			0,000			pului el 10 u		
UNIT-IV	Async	, hronou	is Sequen	tial Circuits	5				P	eriods	:9		
Transition tabl table, Transiti combinational	e, Flow on tabl and seq	table, le. Rec uential	Race co luction c circuits, D	nditions, S of state a vesigning ha	tability co nd flow azard-free	onsider tables, circuit	rations Race s, Esse	s Circu e-free ential H	iits w state lazaro	rith lat e assi ds.	tches, Prim gnment, H	nitive flov Iazards in	CO1 CO2 CO3 CO4
UNIT-V Digital IC Technology and Semiconductor Memories Periods: 9													
Logic families-	Charac		s; TTL- C	pen Colleo	tor outp	ut, Tot	em-po	ole ou	itput	and t	ri-state ou	tput, ECL	, CO5
Lecture Pariod		en, KAI		Porioda	5, Statit di	Drac		orioda		Total	Dorioda: 45		LUP
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Reterence Roo	KS:												

- 1. M.Morris Mano and Michael Ciletti, "Digital Design",6th edition,Pearson India Education Services Pvt.Ltd., 2018.
- 2. Stephen Brown and Zvonko Vranesic, "Fundamentals of Digital Logic with Verilog Design", 2002, 2006, Tata McGraw-Hill Publishing company Ltd. New Delhi.
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- 4. John F Wakerly, "Digital Design Principles and Practices", Prentice Hall of India, New Delhi, 2005.
- 5. Floyd TL, "Digital Fundamentals", Pearson education, NewDelhi, 2009.

Course: ECA104 Digital System Design

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	1	Ι	1	-	Ι	Ι	-		-	-	-	2	2
CO2	3	2	-	2	3	-	-	-	-	-	-	1	2	2
CO3	3	2	Ι	3	3	I	-	-	-	-	-	1	2	2
CO4	3	2	-	2	1	-	-	-	-	-	-	1	2	2
CO5	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO6	-	2	-	-	-	_	_	_	_	-	-	1	2	2
ECA104	3	1.83	-	2	2.33	_	_	_	_	_	-	1	2	2

Department : C	ompute	r Science and Engineering	Progr	amme	: B.Tec	h (EC)						
Semester : T	hird/Fo	urth	Cours	e Cate	gory Co	ode: ESC	Semest	er Exam Type	e: TY			
Course Code	Caura		Perio	ods / W	/eek	Credit	N	laximum Ma	rks			
Course Code	Course	ename	L	Т	Р	С	CA	SE	ТМ			
CSA134	Data Orient	Structures and Object- ted Programming	3	-	-	3	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	e studen	ts will	be able	e to						
Course	CO1	Analyze and implement var	ious sea	irching	and sc	orting technic	ques.					
Outcomo	CO2	Examine linear data structur	res like s	tacks, c	lueues	and linked list	and interp	oret their diffe	rence.			
Outcome	CO3	Demonstrate the represent	ation of	Non-li	near di	ata structure	s like trees	s and graph.				
	CO4	Explore the Object-Oriented	l Progra	mming	Conce	epts using C+	+.					
	CO5	Develop C++ programs by ap	plying th	ne con	cepts I	nheritance a	nd Polymo	rphism.				
UNIT-I	Arrays	, Searching and Sorting				Periods: 9						
Algorithm: Cha	aracteris	stics – Representation – Efficie	ency of a	Algorit	hms –	Data Structu	res: Chara	cteristics –				
Types – Arrays: Introduction – Types – Representation – Operations – Applications: Sparse Matrix –												
Searching: Linear Search and Binary Search – Sorting techniques: Insertion Sort, Selection Sort, Bubble Sort,												
Quick Sort and	Heap Sc	ort.										
UNIT-IILinear Data StructuresPeriods: 9												
Stacks: Introdu	ction –	Operations – Applications: Ev	aluatior	n of Ex	pressio	ons – Queues	: Introduc	tion –				
Operations – C	Circular	queues – Priority queues – [Double (ended	queue	es – Applicati	ons: Job S	Scheduling –	CO2			
Linked List: Int	roductic	on – Singly Linked List – Circu	ılarly Lir	nked Li	st and	Doubly Link	ed List – A	pplications:				
Polynomial Add	dition.					•						
UNIT-III	Non-L	inear Data Structures				Periods: 9						
Trees: Introduc	tion – T	erminology – Binary tree – Re	epresent	tation	– Trave	ersals– Graph	n: Introduc	ction –	CO3			
Terminology –	Represe	ntation – Traversals – Single S	ource a	nd All F	Pairs Sh	nortest path a	algorithms					
UNIT-IV	Introd	uction to Object-Oriented Pro	ogramm	ing		Periods: 9						
Basics Concept	ts of Ob	ject-Oriented Programming	 Struct 	ure of	C++ -	- Tokens-Exp	ressions-C	Control				
Structures – Fi	inctions	in C++: Inline Functions – Re	cursion-	– Func	tion O	verloading –	Classes ar	nd Objects –	CO4			
Constructors a	nd Destr	uctors – Friend Functions.				I						
UNIT-V	Conce	pts of Object-Oriented Progra	amming			Periods: 9						
Operators Ove	rloading	: Unary and Binary Operators	– Туре	Conve	rsions	– Inheritance	e –Types –		CO5			
Polymorphism	– Virtua	I Functions – Exception Hand	ling: Bas	sics and	Mech	ianism.						
Lecture Period	s: 45	Tutorial Periods: -	Practi	ical Pe	riods: -	· T	otal Perio	ds: 45				
Reference Boo	ks:											
1. E. Balaguru	isamy, "I	Data Structures", McGraw Hill	Educati	ion (Inc	dia) Pri	vate Limited,	2018.					
2. G. A. Vijaya	alakshmi	i Pai, "Data Structures and Al	gorithm	s: Con	cepts,	Techniques a	nd Applica	ations", McG	raw Hill			
Education	(India) P	rivate Limited, 2008.	F	<i></i>								
3. Ellis Horow	vitz, Sart	aj Sahni and Susan Anderson	Freed,	"Funda	amenta	ais of Data St	ructures i	n C", Second				
	versities	s Press (India) Private Limited	,2018.	· · · · "	N4-C		ation /les	lia) Dubation	اب مراجع ا			
4. E. Balaguri	usamy, '	Object Oriented Programmi	ing with	ι C++",	IVICG	raw Hill Edu	cation (Ind	aia) Private I	limited,			

Seventh Edition, 2017.

Course: CSA 134 Data Structures and Object - Oriented Programming

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C01	1	1	2	-	-	-	Ι	-	-	-	-	-	2	-	1
CO2	2	2	2	-	Ι	2	-	1	1	-	1	2	2	-	1
CO3	2	2	2	1	-	2	-	1	1	-	1	2	1	1	2
CO4	-	1	2	-	-	-	-	-	-	-	-	-	1	2	2
CO5	I	1	2	-	-	1	1	-	1	-	1	-	2	2	2
CSA134	1.67	1.4	2	1	-	1.67	1	1	1	-	1	2	1.6	1.67	1.6

Department :	Electron Engine	nics and Communication	Progr	amme	: B.Tecl	n. (EC)						
Semester : T	hird		Cours	e Cate	gory Co	de: PCC	Semeste	er Exam Ty	pe: LE	3		
Course Code	Course	Nama	Peri	ods / W	Veek	Credit	M	laximum N	larks			
Course Code	Course	ename	L	Т	Р	С	CA	SE	ÌΤ	М		
ECA105	Electro Labora	onic Devices and Networks atory	-	-	3	1.5	25	75	10	00		
Prerequisite	-		<u>.</u>	<u>.</u>								
	Upon	completion of the course, the	studen	ts will	be able	to						
	CO1	Demonstrate the characteris	stics of	diodes								
6	CO2	Construct rectifiers using did	odes.									
Course	CO3	Construct and analyze the d	ifferent	biasin	g circui	ts of BJT.						
Outcome	CO4	Demonstrate the characteris	stics of	BJT and	d JFET.				,			
	CO5	Determine the time and free	quency	respon	ise of R	C and RLC cir	cuits.					
CO6Design and analyze filters, attenuators and equalizers.												
List of Experiments												
1. VI characteristics of PN junction diode, Zener diode and Point contact diode CO 2. Input and output characteristics of CB transistor configuration CO 3. Input and output characteristics of CE transistor configuration CO 4. Drain and Transfer Characteristics of N-Channel JFET CO 5. Half wave, centre-tapped and bridge rectifier circuits with and without capacitance filter CO												
6. Fixed bias,	Collecto	r to base bias and potential div	vider tra	insisto	r biasin	g circuits				CO2 CO3		
 Measurem resonant R Illustrate tr experimen 	ent of (LC circui ransient t.	 i) frequency response (ii) ba ts using simulation and experi response of RC circuit for DC 	ndwidtl iment. and sinu	h and usoidal	(iii) Q-1 excitat	factor of (i) tions using si	series and mulation a	d (ii) paral and	lel	CO5		
 Design of m Frequency Design of k using Lum Lumped Ele 	n-derived and pha -type Ba ped eled ements.	d filters. a. Frequency and pha use response of the m derived and pass and Band stop filters. ments. b. Frequency and ph	ase resp high pa a. Freq ase res	onse o ss filter uency ponse	f the m r. and pha of the	derived low ase response Band stop	pass filter of the Ba and notcl	r. b. nd pass filt h filter us	ter ing	CO6		
 Design of supervision o	witched I analysi s.	Twin-T network with its freque is of attenuators and equalize	ency an ers und	d phas er give	e respo en load	onse. impedance	and atten	iuation		CO6		
Lecture Period	s: -	Tutorial Periods: -	Practi	ical Per	riods: 4	5 To	otal Period	ds: 45				
Reference Boo	ks:			-		-						
 J.Millman ,.C William H. H Engineering, 	.Halkias layt, Jr 8th Edit	and Satyabrata ,"Electronic de Jack E. Kemmerly and Steven tion, 2013.	evices ar M. Dur	nd Circo bin, "E	uits", Tl ngineer	nird edition, ring Circuit A	McGraw H .nalysis", N	lill, 2010. ⁄IcGraw Hi	ll Scie	ence		

Course: ECA105 Electronic Devices and Networks Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	2	-	-	3	2
CO2	2	1	2	I	-	-	-	-	2	I	I	I	3	2
CO3	2	2	2	-	-	-	-	-	2	I	I	-	3	2
CO4	3	-	-	-	-	-	-	-	2	2	-	-	3	2
CO5	2	3	-	-	1	-	-	-	2	2	-	-	3	2
CO6	2	3	3	3	2	-	-	-	3	2	-	-	3	2
ECA105	2.33	2.25	2.33	3	1.5	-	-	-	2.17	2	-	-	3	2

Department : C	Compute	er Science and Engineering	Progr	amme	: B.Tec	h (EC)						
Semester : 1	「hird		Cours	e Cate	gory Co	ode: ESC	Semest	er Exam Ty	ype: LB			
Course Code	Cours	a Nama	Peri	ods / V	Veek	Credit	N	1aximum I	Marks			
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TM			
	Data	Structures and Object -										
CSA135	Orien	ted Programming	-	-	3	1.5	25	75	100			
	Labor	atory										
Prerequisite	-											
	Upon	completion of the course, the	studen	ıts will	be able	e to						
	CO1	Select and implement appro	priate S	earchi	ng/sort	ing algorithi	ms for an a	pplication	i.			
Course	CO2	Implement data structures u	ising C.									
Outcome	CO3	Apply Non-linear data struct	ures fo	r a give	en prob	lem.						
	<u> </u>	Develop and implement C++	⊦ progra	ams us	ing clas	ses and obj	ects, const	ructors ar	nd			
destructors.												
CO5 Design C++ programs with inheritance and run time polymorphism.												
Experiments fo	or Cycle	1										
1. Implemer	ntation c	of Linear search and binary sea	rch.						CO1			
2. Implemer	ntation I	nsertion sort, Selection sort, Bu	ubble so	ort, Qu	ick sort	and Heap S	ort.					
3. Array imp	lementa	ation of Stacks and Queues.							CO2			
4. Implemer	ntation c	of Singly and Doubly Linked List										
5. Implemer	ntation c	of Binary Tree Traversals.		A I					CO3			
6. Implemer	itation c	of Graph Traversals and shortes	st path A	Algorit	nms.							
Experiments fo	or Cycle	2										
7. Programs	to imple	ement classes and objects.							CO4			
8. Programs		ement constructors and destru	ictors.									
9. Programs	to imple	ement different types of inheri	tance.	a tha i	uco of m	un timo noli	, maarabiana		CO5			
10. Programs			Bracti		ise of n	c un unite poly	otal Paria	dc: 15				
Reference Boo	5 kc·	Tutorial Periods	Pract		nous: 4	ו	otal Perio	us: 45				
1 Ellis Horow	ns. vita Sart	ai Sahni and Susan Anderson	Frood '	'Eunda	monta	le of Data St	ructures in		nd Edition			
Liniversitie	s Press l	(India) Private Limited 2018	i i eeu,	i unud	inenta							
2. E. Balagur	usamv.	"Object Oriented Programmi	ng with	C++"	McGra	aw Hill Edu	cation (Inc	dia) Privat	e Limited.			
Seventh Ed	lition, 20	017.		,								

со	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3	2	Ι	2	2	-	2	-	-	-	-	1
CO2	2	2	3	2	Ι	2	2	-	2	-	-	-	-	1
CO3	1	2	3	1	-	2	1	-	1	-	-	-	1	2
CO4	1	2	2	1	-	2	1	-	2	-	-	-	2	2
CO5	1	2	2	1	-	2	2	-	1	_	-	-	2	2
CSA 135	1.4	2	2.6	1.4	-	2	1.6	_	1.6	_	-	-	1.67	1.6

Course: **CSA135 Data Structures and Object -Oriented Programming Laboratory** Regulation: 2022-23

Department: H	umanitie	s and Social Sciences	Progr	amme :	B.Tech.									
Semester : T	hird		Subje	ct Categ	ory: MCC	C S	emester Ex	am Type:	-					
Course Code	Course	Nama	Pe	riods / V	Veek	Credi	t Ma	ximum Ma	arks					
Course Code	Course	ename	L	Т	Р	С	CA	SE	TM					
SHA102	Indian	Constitution	3	-	-	-	-	-	-					
Prerequisite	-													
	Upon o	completion of the course, the stude	nts will	be able	to									
	CO1	Understand the essence and signi	ficance	of the c	onstitutio	on								
Course	CO2	Recognize one's fundamental dut	ies and	rights				,						
Outcome	CO3	Appreciate the structure and func	tions of	f legislat	ure, exec	cutive a	nd judiciar	V						
	CO4	Understand the functioning of sta	te gove	rnment	s and uni	on terri	itories							
	CO5	Understand the centre-state relat	ions an	d functi	oning of (constitu	utional bod	lies						
	Introd	uction of Indian Constitution		ananeen	0	Perio	dc• 09							
The Making of I	ndian Co	Institution - The Constituent Assemb	nlv - Sou	irces of I	Indian Co	nstituti	on -							
Preamble and t		ma Court's ludgments on Breamble	Jiy 300			instituti	on							
Fleample and t	ne Supre	The Court's Judgments on Freamble	•						CO1					
UNIT-II	State,	Rights and Duties				Perio	ds: 09							
State and Unio	n Territo	ries – Citizenship - Fundamental Rig	hts - Di	rective f	Principles	s of Stat	e Policy -							
Fundamental D	Indamental Duties. CO2													
UNIT-III	Union Government Periods: 09 vernment - The Powers and Functions of the President, Vice–President, Council of Ministers, Prime													
Union Governr	nent - Tł	ne Powers and Functions of the Pr	esident	, Vice–P	resident,	Counc	il of Minis	ters, Prim	е					
Minister, Judiciary, Supreme Court - Judicial Review - Judicial Activism- Public Interest Litigation - Power and														
Functions of the Parliament - Budget Power and Functions of Parliament, Speaker of Lok Sabha.														
	State	Governments				Perio	ds: 09							
State Governm	ents – Go	overnor - State Council of Ministers	- Chief I	Vinister	- Legislat	IVE ASS	embly- Hig	h Courts						
- Union Territo	nes - Pan vats - Mu	nicipalities	401001	istitutio	nai Amei	ument		licitayats	CO4					
		- State Belations Constitutional Bo	dioc			Dorio	40.00							
Contro - State	Pelation	- State Relations, Constitutional Bo	ion - NI		Emorgor		us. US							
President- Con	stitution	Amendment Procedure- Right to 1	nformat	tion Act	- Right t		ation Mai	or						
Constitutional	Amendm	ents and their impact on Indian Polit	tical Svs	tem.	ingit t	.o Luuc		01	CO5					
Lecture Period	s: 45	Tutorial Periods:	Practi	cal Perio	ods:	Т	otal Perio	ds: 45						
Reference Bool	ks:	<u>L</u>	<u>i</u>											
1. Austin, Gra	anville. Th	ne Indian Constitution: Cornerstone	of a Nat	tion. Ox	ford Univ	ersitv P	ress. 1999.							
2. Basu, Durg	ga Das, et	al. Introduction to the Constitutior	n of Indi	ia. 20th	ed., Thor	oughly	Rev, Lexis	Nexis						
Butterwor	ths Wadł	nwa Nagpur <i>,</i> 2008.												
3. Choudhry,	Sujit, et a	al., editors. The Oxford Handbook of	f the Ind	lian Con	stitution.	Oxford	l University	/ Press, 20	16.					
4. Bakshi, Par	vinrai M	ulwantrai, and Subhash C. Kashyap,	The Cor	nstitutio	n of India	a (Unive	rsal Law Pu	ublishing, i	2016)					
5. Bhargava,	Rajeev, 'I	Politics and Ethics of the Indian Cons	titution	', 2009										
6. Rajeev Bha	6. Rajeev Bhargava - 'The Promise of India's Secular Democracy', 2010													
7. Chakrabar	7. Chakrabarty, Bidyut, India's Constitutional Identity: Ideological Beliefs and Preferences (Routledge, 2019)													
8. Jayai, Nira	Jayal, Niraja Gopal, and Pratap Bhanu Menta, The Oxford Companion to Politics in India, Oxford University Press,													
9 Kashvan 9	ubhach (C Our Constitution: An Introduction	n to Ind	ia's Con	stitution	and Co	nstitutions		T India					
100/1		c., our constitution. An introduction			SILUIUI				i inula,					
10. Kashvan S	shvan Subhash C. Our Parliament: An Introduction to the Parliament of India. Revised edition. National Book													
Trust India	a. 2011.							,	SOOK					
11. Subhash C	. Kashvar	Our Constitution Paperback –. (NB	۲ India	2012).										
12. Laxmikant	h, M. &q	uot;INDIAN POLITY". McGraw	/-Hill Ed	ucation	"C	onstitu	tion of Ind	ia".	Ministry					
of Law and	Justice,	Govt. of India.												

Course: SHA102 Indian Constitution

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	-	Ι	-	Ι	-	1	Ι		I		-	Ι	Ι	Ι
CO2	-	Ι	-	-	-	1			I	-	-	1	Ι	Ι
CO3	-	Ι	-	-	-	1	-	Ι	I	-	-	-	Ι	-
CO4	-	-	-	-	-	1	-	-	-	-	-	-	-	-
CO5	-	Ι	I	-	I	1	-	-	Ι	I	-	-	-	-
SHA102	-	1	-	-	-	1	-	-	-	-	_	-	-	-

Department: El	ectronic	cs and Communication Engineering	Progra	mme :	B.Tech	ո. (EC)								
Semester : F	ourth		Course	e Categ	ory Co	de: PCC	Semester Exa	m Typ	be: TY					
Course Code	Course	Name	Perio	ods / W	/eek	Credit	Maximun	n Mai	rks					
	course		L	Т	Р	C	CA	SE	ТМ					
ECA106	Transr	nission Lines and Waveguides	3	-	-	3	25	75	100					
Prerequisite	-													
	Upon	completion of the course, the studer	nts will b	e able	to									
	CO1	Analyze the propagation character	istics of	transm	ission	lines								
Course	CO2	Design and analyze RF filters												
Outcome	CO3	Apply Smith Chart for impedance n	natching	g of trai	nsmiss	ion lines								
	CO4	Demonstrate the understanding of impedance matching in high freque	the func ency line	dament es.	als of	transmiss	ion line theory	and						
	CO5	Analyze the radio propagation in gu	uided sy	stems.										
UNIT-I	Transr	nission Line Theory				Periods	:9							
Types of transr	nission	lines, Primary and secondary constar	nts. Gen	eral so	lution	s. Charact	eristic impeda	nce,						
propagation co	constant, attenuation and phase constants. Open circuited and short circuited lines. The cable, Reflection of line not terminated in ZO- Reflection coefficient- Distortion in transmission CO1													
telephone cabl	le, Reflection of line not terminated in ZO- Reflection coefficient- Distortion in transmission n less line.													
lines- Distortion	e, Reflection of line not terminated in ZO- Reflection coefficient- Distortion in transmission C n less line. Filters and Transients Networks Periods: 9													
UNIT-II	Distortion less line. II Filters and Transients Networks Periods: 9													
Filter fundamentals, Constant K – LPF, HPF, BPF and BSF Filter Design, Fundamentals of Attenuators and														
Equalizers – Lat	tice typ	e, Concept of reverse-networks Trans	sients in	transn	nission	lines.								
UNIT-III	Line a	t Radio Frequencies	• • • •			Periods	:9		Ī					
Standing wave	s and s	tanding wave ratio on a line – One	e eighth	wave	line –	The qua	rter wave line	and						
Impedance ma	tching –	the half wave line. The circle diagra	m for th	e dissi	pation	less line -	– The Smith Ch	art –						
	ne Smit	n chart – Conversion from Impedant	ce lo re ut impo	danco	1 coen	scloss line	i vice-versa.		03					
impedance to <i>i</i>	nole stul	h matching and double stub matching	ut impe	uance	01 a 10	551655 1116		an						
	Chara	steristics and Modes of Wayes	5.			Poriode	• 0		<u> </u>					
		Dianos — charactoristic of TE, TM ar			Voloci	tion of pr	. J							
Solution of way	n Paralle ve equat	ion in Rectangular guides TE and TM	iu i civi 1 modes	waves, : Domi	nant N	Ines of pro	pagation,		CO1					
Excitation Mod	e. Dieleo	ctric slab waveguides.	moues	, Donn	nune n	noue, neu			004					
UNIT-V	Wave	Guides and Cavity Resonators				Periods	:9		<u>I</u>					
General Wave	behavio	urs along uniform Guiding structures	s. Transv	erse Fl	ectror	nagnetic v	waves. Transve	rse						
Magnetic wave	s. Trans	verse Electric waves. TE and TM wav	es in Re	ctangu	lar wav	ve guides.	Bessel's							
differential equ	ation ar	nd Bessel function, TE and TM waves	in Circu	lar wav	e guid	es, Rectar	igular and Circu	llar	CO5					
cavity Resonato	ors.				0		0							
Lecture Periods	s: 45	Tutorial Periods: -	Practi	cal Peri	ods: -	Total	Periods: 45							
Reference Boo	ks:													
1. John D Ryde	er, "Netw	vorks lines and fields", Prentice Hall of I	ndia, Ne	w Delh	i, 2005	•								
2. E.C. Jordan	& K.G. B	almain, "Electromagnetic Waves and I	Radiatin	g Syste	ms", Pi	rentice Ha	llof India 2nd ed	lition	2003.					
(Unit IV, V).	McGraw	v-Hill, 9th reprint.			-		B. 11. 55. 5							
3. Umesh Sinh	a, "Trans	smission Lines and Network", Satya Pra	kashan F	ublishi	ng Con	npany, Ne	w Delhi, 2012.		N					

- William H Hayt and Jr John A Buck, "Engineering Electromagnetics", Tata Mc Graw-Hill Publishing Company Ltd, New Delhi, 2008.
- 5. David K Cheng, "Field and Wave Electromagnetics", Second Edition, Pearson Education Inc, Delhi, 2004.

Course: ECA106 Transmission Lines and Waveguides

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	2	-	-	-	-	-	-	1	2	1
CO2	3	3	3	2	2	-	-	Ι	Ι	I	-	1	2	1
CO3	3	3	3	2	2	-	2	-	-	2	-	1	2	1
CO4	3	3	3	2	2	-	2	-	_	2	-	1	2	1
CO5	3	3	3	2	2	-	-	-	Ι	Ι	-	1	2	1
ECA106	3	3	3	2	2	_	2	-	-	2	-	1	2	1

Department :	Electror Engine	nics and Communication	Progra	amme	: B.Tec	h. (EC)								
Semester : F	ourth	5	Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Type	e: TY					
			Perio	ods / W	/eek	Credit	N	laximum Ma	rks					
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TM					
ECA107	Electr	onic Circuit Design	3	-	-	3	25	75	100					
Prerequisite	-					<u>A</u>	<u>+</u>	<u>.</u>						
	Unon	completion of the course, the	student	ts will b	no able	a to								
	CO1	Demonstrate the understan	ding of t	the off	octs of	negative fee	dhack on	the amplifier	c					
Course	CO1 CO2	Design oscillators to genera												
Outcome	CO2	Analyze the characteristics	of multi	stage a	mnlifi	orc								
	CO3	Compare the operation of d	lifferent		r amnli	ifiors								
	C05	Demonstrate the understan	ding of t	he and	licatio	incis. Ins of onerati	ional amnl	ifier						
	CO6	Demonstrate the understan	ding of t	he anr	licatio	ons of IC 555	and IC 565							
UNIT-I	Feedb	ack Amplifiers and Oscillator			meatio	Periods: 9		•						
Feedback conc	ent-trar	nsfer gain with feedback-gene	eral chai	acteri	stics of	f negative fe	edback an	nlifiers-Type	s					
of negative fee	edback o	connections- Input resistance-	Output	resista	ance- G	General meth	odology o	f analysis of	a					
feedback ampl	feedback amplifier- Analysis of voltage series feedback, current series feedback, current shunt feedback and voltage shunt feedback amplifiers. Barkhausen's criterion for sustained oscillation - Classification of													
voltage shunt feedback amplifiers. Barkhausen's criterion for sustained oscillation - Classification of oscillators-LC oscillators: Hartley and Colpitt's oscillator-RC oscillators: RC phase shift oscillator and Wien														
oscillators-LC o	cillators-LC oscillators: Hartley and Colpitt's oscillator-RC oscillators: RC phase shift oscillator and Wien idge oscillator – crystal oscillator and frequency stability.													
bridge oscillator – crystal oscillator and frequency stability.														
UNIT-II Multistage Amplifiers and Power Amplifiers Periods: 9														
Need for cascading – Cascade amplifier – cascode amplifier- Darlington pair- Transistorised differential														
amplifier- diffe	erential	mode and common mode	operati	on- co	onfigur	ations of a	differentia	al amplifier	-					
Analysis of dua	al input	balanced output differential	amplifi	er-Tun	ed am	plifiers : sing	le tuned,	double tune	d					
and stagger to	uned ar	mplifiers. Classification of po	ower an	nplifier	rs –Cla	iss A power	amplifier	: Direct an	d CO3					
transformer co	oupled	amplifiers -Class B amplifier:	Push p	oull an	id com	plementary	symmetry	/ amplifiers	- CO4					
conversion effi	ciency c	calculations – cross over distor	tion – Cl	lass AB	amplif	fier – distorti	on in amp	lifiers -powe						
transistor – hea	t sinking	g – Operation of Class C, Class L	Dand Cla	ass S ar	nplifie	rs.								
	Opera	itional Amplifier and its Appli	cations	-	• •	· · · -	Peri	ods: 9						
Block diagram	1 - dc	and ac characteristics of ar	n op-an	າp-Equ d ກວກ	ivalent	t circuit- Fea	atures of	an op-amp						
difference am	n up-ai alifior- s	ubtractor, adder, zero, crossi	ung data	u non	window	ung ampine	comparate	nng ampine sr- Schmitt						
trigger-log and	d antilog	amplifier-integrator – differe	ng uere	-active	filters	- series regul	ator	J- Jennite	CO5					
	Timer	and PII		uctive	meers	Series regul	Dori	odc: 0	l					
IC555-Eunction	al diagr	am-Monostable multivibrato	r-l inear	ramn	genera	ator- Frequer	ncv divider	- Pulse widtl	n					
modulator- As	table or	peration -ESK generator – PP	M modi	ilator.	NF565	: Phase Lock	ed Loop -	- Basic Block	• •					
diagram- NE56	5 -Appli	cations: Frequency multiplica	tion /div	/ision-	Freque	ency translati	ion-AM de	tection – FM	CO 6					
detection-FSK	demodu	ulator.	cion y an		rieque									
UNIT-V	Wave	Generators & Data Converte	rs				Peri	ods: 9	<u>i</u>					
Wave Generat	tors: Pu	Ilse Shaping Circuits – High	Pass an	d Low	Pass	Filter using	R&C for (different tim	e					
constants - RC	C ramp	generator-constant current	ramp g	enerat	or-saw	tooth gene	rator –Bc	otstrap ram	p					
generator – M	iller inte	egrator ramp generator –Tria	ngular v	vavefo	rm gei	nerator – Pu	lse genera	tor –Functio	n n					
generator – si	newave	converter circuit. D-A and A	-D conv	erters	: DAC s	specification	s –weighte	ed resistor	CO5					
DAC- R-2R lado	ler DAC	- monolithic DAC –ADC specif	ications	- Flash	A/D c	onverter-Cou	unter type	converter –	CUB					
Servo tracking	ADC- su	ccessive approximation ADC-E	Dual slop	be ADC	•									
Lecture Period	s: 45	Tutorial Periods: -	Practi	ical Pe	riods: -	T	otal Period	ds: 45						

Reference Books:

- 1. J.Millman ,.C.Halkias and Satyabrata ,"Electronic devices and Circuits", Third edition, McGraw Hill, 2010.
- 2. Robert.F.Coughlin and Frederick F. Driscoll, "Operational Amplifiers and Linear Integrated Circuits", PHI Learning Pvt. Ltd, Sixth Edition, 2008.
- 3. David A. Bell, "Electronic Devices and Circuits", Prentice Hall of India, 5th Edition, 2008.
- 4. Ramakant Gayakwad ,"Opamps and Linear Integrated Circuits," . Prentice Hall, 4th Edition, 2000.
- 5. Roy Choudhry, "Linear Integrated Circuits", New Age International Publishers," 5th Edition, 2017.

COURSE ARTICULATION MATRIX

Course: ECA107 Electronic Circuit Design

со	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	-	-	-	-	-	-	-	-	2	-	-	2	-
CO2	2	2	3	3	2	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	1	-	-	-	-	-	-	-	2	-
CO4	2	2	2	-	1	-	-	-	-	-	-	-	2	-
CO5	3	1	2	2	2	-	-	-	-	-	-	-	3	2
CO6	2	2	3	3	2	-	-	-	-	-	-	-	3	3
ECA107	2.33	2	2.5	2.67	1.6	-	-	-	-	2	-	-	2.5	2.5

Department :	Electron Engine	ics and Communication pering	Progra	imme	: B.Tec	ch. (EC)							
Semester : I	ourth		Course	e Cate	gory Co	ode: PCC	Semest	er Exam Type	: TY				
Course Code	Cours	o Namo	Perio	ds / V	Veek	Credit	N	laximum Mar	ks				
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	ТМ				
ECA108	Signal	s and Systems	3	1	-	4	25	75	100				
Prerequisite	-												
	Upon	completion of the course, the	e student	s will	be able	e to							
Course	CO1	Classify continuous/discret	e time si	gnals a	and sys	stems.							
Outcome	CO2	Interpret continuous time s	signals in	frequ	iency d	lomain using	Fourier an	d Laplace Tec	hniques				
Outcome	CO3	Analyze continuous time LT	l system	s.									
	CO4	Interpret discrete time sign	als in fre	quen	cy dom	nain using Fou	urier and Z	-transform					
		Applyze discrete time LTL ov	uct om										
	CO5	Genetican of Signals and Sustan				Daviada: 12							
UNIT-I	Classi	Cation of Signals and System	15		C .:	Periods: 12	Dulas I						
Continuous tin	ne signai	s - Discrete time signals – Rep Leignals, Operations on the si	presenta ignals – (CION O	r signai ication	s – Step, Ran	ip, Puise, I	mpuise, d discroto	CO1				
time signals – (e signals – Continuous time and discrete time systems – Classification of systems – Properties of systems.												
	Analy	sis of Continuous Time Signal		035111	Lation	Periods: 12	roperties	or systems.					
Fourier Series	· Propert	ties - Trigonometric and Expo	nential F	ourier	Sorios	-Parsavel's r	elation for	neriodic					
signals - Fourie	er Transf	orm: Properties - Laplace Tra	nsforma	tion :	Proper	ties. R.O.C - I	nverse Lai	periodic	CO2				
transform													
UNIT-III	Analys	sis of Continuous Time LTI Sys	stems			Periods: 12			<u>i</u>				
LTI continuous	time sys	stems- Differential equations	– Transfe	er fun	ction a	nd Impulse re	esponse –	Block					
diagram repres	, sentatio	n: Direct Form Structures – Co	onvolutio	on Int	egral –	State Space	Represent	ation – State	CO3				
equations.													
UNIT-IV	Analys	sis of Discrete Time Signals				Periods: 12							
Discrete Time	Fourier S	Series: Properties - Discrete T	ïme Fou	rier Tr	ansfor	m : Propertie	es – Z Tran	sformation:	~ ^^				
Properties – Di	fferent n	nethods of finding Inverse Z-T	ransforr	natior	۱				04				
UNIT-V	Analys	sis of Discrete Time LTI Syster	ns			Periods: 12							
LTI Discrete ti	me syste	ems – Difference equations –	System	functi	on and	impulse resp	oonse – Bl	ock diagram	COF				
representation	: Direct l	Form Structures – Convolutio	n Sum – S	State S	Space F	Representatio	on - State e	quations.	COS				
Lecture Period	s: 45	Tutorial Periods: 15	Practi	cal Pe	riods: -	· T	otal Perio	ds: 60					
Reference Boo	ks:												
1. J Simon Ha	ykins an	d Barry Van Veen, "Signals and	d System	s", Se	cond E	dition, Wiley,	2007.						
2. Allan V.Op Delhi, 2015	penhein 5.	n, Allan S.Willsky and S.Hami	d Nawab	, "Sig	nals an	nd Systems",	Pearson, S	Second Edition	n, New				
 H.P.Hsu an B.P.Lathi, " 	d R.Ranj Principle	an, "Signals and Systems",Sch es of Linear Systems and Signa	aum's O Is", Oxfo	utline rd <i>,</i> Se	s, Tata cond E	McGraw Hill, dition, 2009.	Second Ec	lition, 2017.					

5. P. Ramesh Babu and R.Anandanatarajan, "Signals and Systems", Scitech Publishers, Fifth Edition, 2014.

Course: ECA108 Signals and Systems

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	2	1	2	-	-	-	-	-	-	-	3	1
CO2	3	2	2	2	2	-	-	-	-	-	-	-	3	2
CO3	3	3	2	2	1	-	-	-	-	-	-	-	3	2
CO4	3	2	2	2	2	-	-	-	-	-	-	-	3	2
CO5	3	3	2	2	1	-	-	-	-	-	-	-	3	2
ECA108	3	2.2	2	1.8	1.6	-	-	-	-	-	-	-	3	1.8

Department : E l	lectroni Engine	cs and Communication	Progra	amme	: B.Tec	h. (EC)							
Semester : F	ourth	.	Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Type	: TY				
	6	- N	Peric	ods / W	/eek	Credit	N	laximum Mai	·ks				
Course Code	Course	e Name	L	Т	Р	С	CA	SE	ТМ				
ECA109	Analo	g Communication	3	-	-	3	25	75	100				
Prerequisite	-												
	Upon	completion of the course, the	studen	ts will	be able	e to							
	CO1	Analyze the variants of Amp	litude n	nodula	tion sc	hemes							
Course	CO2	Demonstrate the understan emphasis on FM modulators	ding of sand de	the fu modul	ndame ators.	entals of Ang	le modula	ition scheme	s with				
Outcome	CO3	Compare different transmitt	ter and	receiv	er arch	itectures.							
	CO4	Demonstrate the understand	ding of v	arious	pulse i	modulation s	chemes.						
	CO5	Analyze the performance on noise.	of vario	us an	alog co	ommunicatic	on systems	s in the pres	ence of				
UNIT-I	Ampli	tude Modulation Systems				Periods: 9							
-Bandwidth Requirements- Power relations - Generation and detection of AM waves – Generation and detection of DSB-SC waves - Balanced Modulator, Ring Modulator, Coherent detection –Costas Loop - Generation and detection of SSB-SC waves - Phase discrimination method, Coherent detection – Vestigial Sideband Modulation - Comparison of AM systems.													
UNIT-II Angle Modulation Systems Periods: 9													
Introduction to Angle Modulation Systems Periods: 9 Introduction to Angle Modulation – FM and PM - Narrow band FM and Wideband FM –Bandwidth requirements-Pre emphasis, De-emphasis - Generation and demodulation of FM waves –Direct and Indirect FM generation, FM Demodulation- FM to AM Conversion-Balanced Frequency Discriminator and PLL demodulator, FM Stereo Multiplexing-Comparison of frequency modulation and Phase modulation system.													
UNIT-III	Transr	nitters and Receivers				Periods: 9							
Transmitters: C High Level trans Receivers: Class receiver – Supe receiver - Auton	Classifica smitters ssificatio er hetero natic fre	ation of transmitters - Block d 5 -FM transmitters- Direct and ons of receivers - Block diagrar odyne receiver –AGC- Merits a quency control- Communication	liagram Indirect m – Rec and dem on Rece	of AM : FM sy eiver c nerits c ivers-[broad vstems. haract of diffe Delayed	casting trans eristics - Tun rent receiver I AGC.	mitters- L ed radio fr s. Block di	ow Level and requency agram of FM	CO3				
UNIT-IV	Pulse /	Analog Modulation Schemes				Periods: 9							
Sampling proce Methods of ger	ess – Pu neration	ulse-amplitude modulation – and detection- Bandwidth-no	Pulse-V ise trade	Vidth e off	modula FDM a	ation – Pulse nd TDM.	e Position	Modulation-	CO4				
UNIT-V	Noise	in Communication Systems				Periods: 9							
Shot Noise - Thermal noise - White Noise – Noise Calculations – Equivalent Noise Bandwidth – Noise Figure – Effective Noise Temperature – Narrowband Noise representation- Noise in CW Modulation systems, Noise in Linear Receiver using coherent detection, Noise in AM receivers using envelope Detection – Noise in FM receivers- Threshold effect & Capture effect.													
Lecture Periods	s: 45	Tutorial Periods: -	Practi	cal Pe	r iods: -	Т	otal Period	ls: 45					
Reference Boo	ks:												
 Simon Haykir Kennedy G, " Taub and Sch Carlson A B, Hill, NewDel 	n, "Comi Electror nilling, "F "Commi hi, 2002	munication Systems", Wiley Punic Communication systems", 7 Principles of Communication Systems: An Introduce	ublicatio Tata Mc ystems" ction to	on, Nev Graw I , McGi signal	w Delhi Hill, Ne ^r raw Hill s and n	, 2011. w Delhi, 2009 I Internation oise in electr	9. al edition, rical comm	New Delhi, 1 nunication", N	996. AcGraw				

5. Dennis John, Roddy and Coolen, "Electronic Communications", Prentice Hall of India, New Delhi, 2003.

Course: ECA109 Analog Communication

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO2	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO3	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO4	3	2	2	2	2	1	1	-	-	-	-	1	2	1
CO5	3	3	3	3	3	2	2	-	I	-	-	1	2	1
ECA109	3	2.2	2.2	2.2	2.2	1.5	1.5	_	-	-	-	1	2	1

Department : C	hemistr	y	Progra	amme : B	.Tech. (E	C)			
Semester : F	ourth		Subjeo	t Catego	ry: BSC	Se	emester Ex	am Type:	ТҮ
Course Code	Course	Name	Pei	riods / W	'eek	Credit	Max	imum Ma	arks
	course		L	Т	Р	С	CA	SE	ТМ
SHA101	Biolog	y for Engineers	3	-	-	2	25	75	100
Prerequisite	-								
	Upon o	completion of the course, the stude	ents will	be able t	.0				
	CO1	Recall the classification of livin	g organ	isms ba	sed on r	norpho	ological, b	iochemio	al and
		Apply the concents of Mendel	's laws (of inheri	tanco to	nredia	t cinalo a	ono diso	rder in
Course	CO2	human.	5 10 445 0			preut	t single g		
Outcome		Choose appropriate dietary bio	omoleci	les for l	healthy	life.			
	CO3			•		• - 1- • - 1			
	CO4	Interpret the energy metabolis	sm and	energy t	ransfer		ogical syst	ems	
· · · · · · · ·	CO5	Prioritize the identification me	thods a	nd class	ity micro	oorgan	isms.		
UNIT-I	Classif			. 11 . 1 /1	\ <u>1</u>	Period	s: 9		
	utiine ba Enorgy a	ased on (a) cellularity- Unicellular o	r multice	ellular (b) rophs lit) ultrastr	ucture	prokaryote mmonia ev	es or	
– aminotelic. u	ricotelie	c. ureotelic (e) Habitats- acquatic o	r terrest	rial (e) M	10lecular	taxonc	my three	ACI ELION	
major kingdom	ns of life	2.		(-)			,		CO1
UNIT-II	Genet	ics					Perio	ods: 9	
Mendel's laws,	Concep	t of segregation & independent ass	ortment	. Concep	ot of allel	e. Rece	ssiveness,	and	
dominance. Sin	igle gene	e disorders in humans – Sickle cell d	isease, F	henylket	tonuria.				CO2
	·	•			T			• •	
UNIT-III Carbobydratos	BIOMO	Necules	Linida	Classifie	ation (implo d	Perio	ods: 9	
derived Import	ance of	linid soluble vitamins Amino acids	– gener:	al structu	ire essei	ntial am	ino acids	a Proteins	
- Levels of pro	tein stru	acture, structural & functional imp	portance	of prote	eins, Enz	vmes-	Definition,	Enzyme	
Activity & Unit	ts, Speci	fic Activity, Specificity, Factors aff	ecting e	enzyme a	activity.	Nucleic	acids: Typ	es and	CO3
importance.	·•				······				
UNIT-IV	Metab	polism					Perio	ods: 9	
Introduction: F	ood cha	in & energy flow. Definitions - Anal	bolism &	k Catabol	lism. Pho	otosynth	nesis: Reac	tion and	
importance. Gr	ycorysis	& TCA cycle. ATP – the energy curre		ens					CO4
UNIT-V	Micro	biology					Perio	ods: 9	
Concept of sir	ngle cel	led organisms. Concept of spe	cies &	strains.	Identif	ication	& classific	ation of	
microorganism	s. Virus -	– Definition, types, examples.					-		0
									LUS
Lecture Period	s: 45	Tutorial Periods:	Practi	cal Perio	ds:	To	otal Period	s: 45	
Reference Boo	ks:								
1 Biology Ar	alohal ar	proach: Campbell N. A. Pooco I.	2 · Hrm	Lica: Cair	5 N/ L + M	Jaccorn		Ainorchy	DV·
Jackson R	B. Pears	on Education Ltd	σ., υπγ,	LISA, CAII	ı, ıvı,∟., V	งสวรษาไ	ian, 5. A., ľ	viitiotsky,	Γ. ν.,
2. Outlines of	Biochen	nistry, Conn, E.E; Stumpf, P.K; Bruer	ning, G; [John Wil	ey and S	Sons		
3. Principles of	of Bioche	mistry (V Edition), By Nelson, D. L.;	and Cox,	M. M.W	/.H. Free	man an	d Company	/	
4. Molecular	Genetics	(Second edition), Stent, G. S.; and	Calende	r <i>,</i> R. W.H	. Freema	in and c	ompany, D	oistribute	t
bySatish Ku	ımar Jair	n for CBS Publisher				-			
5. Microbiolo	gy, Presc	cott, L.M J.P. Harley and C.A. Klein 1	995. 2nc	ledition	Wm, C.B	rown Pı	ublishers.		

Course: SHA101 Biology for Engineers

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO2	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO3	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	1	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	1	2	-	-	-	-	-	-	-
SHA101	-	-	-	-	-	1	2	-	-	-	-	-	-	-

Department: El	ectroni	cs and Communication Engineering	Progran	nme : B.Tec	:h. (EC)			
Semester : Fo	ourth		Course	Category C	ode: PCC	Semester	Exam Ty	ype: LB
Course Code	Cours	o Nomo	Period	ls / Week	Credit	Maxi	mum Ma	arks
Course Code	Cours	ename	L	T P	С	CA	SE	TM
ECA110	Digita	Il System Design Laboratory	-	- 3	1.5	25	75	100
Prerequisite	-							
	Upon	completion of the course, the studer	nts will be	able to				
	CO1	Design, implement and experiment	t the requ	ired code c	onverter l	ogic circuit		
Course		Interpret the data sheets of MSI	combina	itional circ	uit ICs to	apply the	m for de	esigning
Outcome	CO2	higher level logic circuits.	_					
	CO3	Interpret the data sheets of ICs of	f FFs, cou	nters, shift	registers	and to des	sign, imp	lement
		and test any sequential logic circu	its using t	nese ICs.				d + 0 + 0 0+
	CO4	them by simulations	fliog for c	omplination	hal and se	quential cil	rcuits an	a to test
List of Experim	nents							
1. Design and i	mpleme	entation of the following Code conver	tors					
i. BCD to e	xcess-3	code and vice versa						
ii. Binary to	gray co	ode and vice-versa						CO1
2. Design and ir	npleme	ntation of Adder/Subtractor						
i. 4 bit bina	ary Adde	er/ Subtractor using IC7483						
ii. BCD add	er using	; IC7483						
3. Magnitude c	ompara	tor						
i. Study of	4-bit ma	agnitude comparator IC						
ii. Realizatio	on of 8-l	bit magnitude comparator using 4-bit	magnituc	de compara	tor ICs			
4. Multiplexers	and En	coders						
I. Study of	an 8×1	Multiplexer IC						
iii. Realizati	ction an	o*1 multiplexer using 8*1 multiplexer	ics					
5 Decoders an	d Demu	litinlexers						CO2
i. Study of	² a 3 to 8	3 line decoder as demultiplexer						
ii. Realizat	ion of 4	to 16 line decoder using 3 to 8 line de	ecoder ICs	;				
iii. Realizat	ion of a	combinational circuit using a decoder	r IC					
6. Shift register	-							
i. Study of	a univei	rsal shift register IC						
ii. Construc	tion of	ring counter and Johnson counter us	ing a shift	t register IC	C and stud	y of their t	iming	
diagrams	5							CO3
iii. Designir	ng a PN S	Sequence Generator using a shift regi	ster IC					
7. Ripple Count	ers and	their timing diagrams						
I. 3-DIT DIN	ary up o	counter						
iii A modu	lary dow	unter(where n is the no. of EEs used to	o constru	ct the coun	tor)			
iv BCD cou	inter lisi	ing mod-10 counter ICs	o constitu		lei)			
8. Design and ir	npleme	intation of Synchronous Counters and	study of t	their timing	diagrams			
i. Binary u	o counte	er	,		,			
ii. Non-seq	uential l	binary counter						
iii. 3-bit bin	ary up/	down counter						CO3
9. Study of a M	emory l	C						
i. READ and	d WRITE	operations involving memory chips						
ii. Expansio	on of me	mory size						
10. Writing Ver	ilog cod	le for the following circuits:						CO4
i. Ex-OR Ga	ate ii. Fu	ıll Adder iii. Multiplexer iv. Binary Up	-Counter	v. Shift Re	gister			

Lecture Periods: -	Tutorial Periods: -	Practical Perio 45	ls: Total Periods: 45
Reference Books:			
1. Leach Malvino, "Digital Prin	ciples and Applications", Tata N	AcGraw Hill, Fifth e	lition, 2005.

Course: ECA110 Digital System Design Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1	1	2		Ι	-	3	2	-	1	1	1
CO2	3	2	2	2	2	-	-	-	3	2	-	2	1	2
CO3	3	3	2	2	3	-	-	-	3	2	-	2	2	3
CO4	3	3	2	2	2	-	-	-	3	2	-	1	3	2
ECA110	3	2.5	1.75	1.75	2.25	-	-	-	3	2	-	1.5	1.75	2

Department: El	ectronics and	d Communication Engineering	Program	me : B.	Tech.	(EC)			
Semester : Fo	ourth		Course C	ategor	y Cod	e: PCC	Semester	Exam Ty	pe: LB
Course Code	Course Na	me	Periods	/ Wee	k	Credit	Maxi	mum Ma	irks
FCA111	Floatsonia		L	T	P	С 1 г	СА	SE	TM 100
ECAIII Prerequisite	Electronic	Circuit Design Laboratory	-	-	3	1.5	25	75	100
Freiequisite	Unon com	pletion of the course, the studen	ts will he a	hle to					
	CO1 De	monstrate the effects of feedbac	k on porfe	rmanc	o of a	molifior	с.		
	CO1 De	more the operations of differen	t nower a	mnlifie	rs wit	h their (s. haracteris	tics	
	CO2 CO	sign oscillators to generate AF ar	nd RF frequ	iency ii	is wit	imulati	on and har	dware m	odel
Course	CO4 De	termine the characteristics of dif	ferential a	mplifie	ers.				ouen
Outcome	CO5 Exa	amine applications of IC 555 and	IC 741.						
	co6 De	sign solution for different real tir	ne proble	ms with	n IC 55	55 and I	C 741 using	g simulati	ion and
List of Exporim	hai	rdware model.							
1 To design	construct an	d measure the frequency respo	nse innut	imned	ance	and out	nut imned:	ance of	
a) voltage s	hunt b) volta	age series negative feedback amp	lifiers wit	n and w	vithou	t feedba	ack.		
2. Design and	measureme	nt of frequency response, signal	handling c	apacity	, inpu	it and o	utput impe	dances	CO1
of cascade a	amplifier and	d cascode amplifier.	_		-				
a) To obta	in the frequ	ency Vs. power and load Vs. pow	er charact	eristics	of Cla	iss A po	wer amplifi	er.	
b) To obta	ain the frequence	uency Vs. power and load Vs. p	ower char	acteris	tics o	f Class	B complem	entary	CO2
symme	try amplifier	·	••						
3. To design, c a) BC b) We	onstruct and ain Bridge c)	a study the following oscillator cir Hartley and d) Colnitts Oscillator	cuits :-						CO3
4 To study the	annlication	naricy and dy colpits oscillator	•						
a) Invertir	ng amplifier a	and Non-inverting amplifier							
b) Summe	er and subtra	actor							
c) Voltage	follower								
d) Integra	tor and Diffe	erentiator							CO4
5. To study zei	ro crossing d	letector, window detector and Sc	hmitt trigg	ger usin	ig op-	amp			CO5
6. To design a	nd test the p ad study usi	performance of a 2^{∞} order LPF, H	PF, BPF ar f	id BSF i	using	Op-amp	IC /41.		CO6
a) Astable	Multivibrat	or	1						
b) Monost	table Multivi	brator							
8.To design, c	onstruct and	d study the performance of Mille	r integrato	or and B	Bootst	rap ram	p generato	or using	
op-amp.			-			·		-	
9. To Construc	ct and study	the performance of							
(a) DAC circ	uits – R-2R a	nd ladder type.							
(b) Successi	ve approxim	ation type ADC							CO5
10. To design	and study th	ne working of							CO6
a) Astable b) Monos	table Multiv	ibrator using IC 555							
Note: Experime	ntal results a	are to be validated with simulated	d results.						
Lecture Periods	5: -	Tutorial Periods: -	Practica	Peri	iods:	Total	Periods: 45	;	1
	_		45						
Keterence Book		Catuahrata "Electropia devices -	nd Circuit	"" Th:"-	1 ~ 4:+:	00 14-1		010	
1. J. Milliman, C 2. Robert F Co	.maikias and F	rederick F Driscoll "Operational	Amnlifier	s and Li	inear	un, IVICO Integrat	aw IIII, 2 ted Circuits	010. " PHIIA	arning
Pvt. Ltd, Sixt	h Edition, 20	08.	, inpine		cui			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	чттр

Course: ECA111 Electronic Circuit Design Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	1	1	-	1	-	-	-	2	2	-	-	2	-
CO2	2	1	1	-	1	-	-	-	2	2	-	-	2	-
CO3	2	2	3	2	2	-	-	-	3	2	-	-	2	1
CO4	3	-	-	-	-	-	-	-	2	2	-	-	2	-
CO5	3	1	2	2	2	-	-	-	3	2	-	-	3	3
CO6	2	2	3	2	2	-	-	-	3	2	-	-	3	3
ECA111	2.33	1.4	2	2	1.6	-	-	-	2.5	2	-	-	2.33	2.33

Departm	ent: E	lectro Engine	nics and Communication pering	Progra	amme	: B.Tec ł	n. (EC)			
Semester	r : Fo	urth		Cours	e Cate	gory Co	de: PCC	Semest	er Exam T	ype: LB
Course	odo	Cours	Nama	Perio	ods / W	/eek	Credit	N	laximum l	Marks
Course Co	oue	Course	ename	L	Т	Р	С	CA	SE	TM
ECA112		Analo Labor	g Communication atory	-	-	3	1.5	25	75	100
Prerequi	site	-								
	Upon completion of the course, the students will be able to									
	CO1Design and test various analog modulators and demodulators.									
Course	CO1 Design and test various analog modulators and demodulators. urse CO2 Design and test various circuits used in transmitters and receivers									
Outcome	2	CO3	Construct and test various p	ulse mo	odulato	or circui	ts			
	CO1 Design and test various analog modulators and demodulators. Durse CO2 Design and test various circuits used in transmitters and receivers utcome CO3 Construct and test various pulse modulator circuits CO4 Analyze the performance of various analog modulation systems through simulation ist of Experiments CO4									
List of Ex	CO3 Construct and test various pulse modulator circuits CO4 Analyze the performance of various analog modulation systems through simulation st of Experiments									
1. De	sign and	d testir	ng of Amplitude Modulation ar	nd Demo	odulat	ion circı	uits.			
2. De	sign and	d testir	ng of DSB-SC Modulation and D	emodu	lation	circuits				CO1
3. De	sign and		ig of Frequency Wodulation ar	id Demo		ion circi	uits.			
4. De 5 Im	sign and nlomon	tation	and testing of Simple and Dela	vod Aut	omati	c Gain (ontrol circu	uite		
5. m 6 De	sign and	l Testii	and testing of Simple and Dela	yeu Aui	Jinati	c dani c		1113.		603
7. Fre	equency	Respo	onse of Mixer Circuit.							COZ
8. Im	plemen	tation	and testing of PAM circuit.							
9. Im	plemen [.]	tation	and testing of PWM and PPM	circuit.						CO3
10. Sin	nulation	of AN	I/FM/PM modulation and Dem	nodulati	on sys	tem.				<u> </u>
11. Pe	rformar	nce ana	alysis of AM and FM systems in	presen	ce of r	noise.				004
Lecture P	Periods:	-	Tutorial Periods: -	Practi	cal Pe	riods: 4	5 T	otal Perio	ds: 45	
Referenc	e Books	5:								
1. Simon	Haykin,	"Com	munication Systems", Wiley Pu	Iblicatio	n, Nev	v Delhi,	2011.			
2. Kenne	dy G <i>,</i> "E	lectror	nic Communication systems", T	ata Mc	Graw H	Hill, Nev	v Delhi, 200	9.		

Course: ECA112 Analog Communication Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	2	2	2	Ι	-		1	1	-	1	1	2
CO2	3	2	2	2	2	Ι	-		1	1	-	1	1	2
CO3	3	3	3	3	2	-	-	-	1	1	-	1	1	2
CO4	3	3	3	3	2	2	2	_	1	1	-	1	1	2
ECA112	2.75	2.5	2.5	2.5	2	2	2	_	1	1	-	1	1	2

Department : E	lectroni Engine	cs and Communication eering	Program	nme : B	B.Tecl	n. (EC)			
Semester : F	ifth		Course (Catego	ry Co	de: PCC	Semester	Exam Ty	oe: TY
Course Code	Cours	a Nama	Period	s / We	ek	Credit	Max	imum Ma	irks
Course Coue	Course	e Name	L	Т	Р	С	CA	SE	ТМ
ECA113	Digita Proce	l Signal Processing and DSP ssors	3	1	-	4	25	75	100
Prerequisite	-		i	L	.i		1	ii.	
	Upon	completion of the course, the stude	ents will b	e able	to				
	CO1	Interpret the use of DFT to obtai using fast algorithms.	n spectru	m of d	liscre	te time si	ignals and e	evaluate	the DFT
Course Outcome	CO2	Design IIR digital filters from anal specification and draw the implem	og filters ientation	namel structi	ly But ure of	terworth IIR filter	and Cheby using block	shev for diagram.	a given
	CO3	Design Linear phase FIR digital fi and draw the implementation stru	Iters using Icture of F	g wind IR filte	lowin er usii	g and fre	equency sar liagram.	mpling m	ethods
	CO4	Describe multi rate sampling tech	niques an	d theiı	rapp	ications.			
	CO5	Identify the special features of DS modes of a specific DSP processor	P Process	ors an	d out	line the a	rchitecture	and addr	essing
UNIT-I	DFT a	nd FFT				Periods:	: 12		
DFT- inverse DF	T, prop	erties of DFT. Advantages of FFT - ra	adix 2 FFT	- Decir	natio	n in Time	and Decim	ation in	
frequency , Flow	wgraph	for 8 point FFT , Inverse DFT using FI	FT.						CO1
UNIT-II	IIR Filt	er Design				Periods:	: 12		
IIR filters - adv	antages	and disadvantages - Design of IIR	filters fro	m ana	log E	utterwor	th and Che	byschev	
filters - Impulse	e invaria	nce and bilinear transformation me	thods of I	IR digi	tal fil	ter desigr	n – Realizati	ion of IIR	CO2
		, cascade, parallel and ladder realiza	ation.			Doriodo	17		
EIR filtors - Int	roducti	an - Symmetric and asymmetric EIE) filtors _	Linoar	nha		ars - Desig	n of EIP	
using frequenc	y samplersal, lin	ing techniques – Design of FIR filte ear phase and poly phase realization	rs using v	vindov es.	ving t	echnique	ers – Desig . Realizatio	on of FIR	СО3
UNIT-IV	Multir	ate Signal Processing				Periods:	: 12		l
Principles of mu and interpolato sub band codin	ultirate ors- Poly g of spe	DSP – Decimation and Interpolation phase FIR filter structures - Multist ech signals, Digital filter bank - 2 cha	by intege age Decin annel Qua	r facto nators idratu	ors – S and re mi	Structures Interpolat	s for FIR dec tors. Applic bank.	cimators ations -	CO4
UNIT-V	Digita	Signal Processors				Periods:	: 12		
Introduction to schemes, multi chip peripheral	o progra ported s, PDSPs	mmable DSP processors – MAC un memory - VLIW architecture –pipe with RISC and CISC- Architecture of	nit- Modif lining S _l TMS3200	ied Bu pecial C6X.	is str addr	uctures a essing mo	nd memory odes in P-D	y access SPs- On	CO5
Lecture Period	s: 45	Tutorial Periods: 15	Practica	l Perio	ods: -	Tota	l Periods: 6	0	
Reference Boo	ks:								
 John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing: Principles, Algorithms and Applications", PHI learning, Fourth edition, New Delhi 2008. B.Venkataramani and M.Bhaskar, "Digital Signal Processors- Architecture, programming and Applications", Tata McGraw Hill, Fourth Edition, 2005. 									

Sanjit K. Mitra, "Digital Signal Processing: A Computer Based Approach", Tata McGraw Hill, Third Edition, 2005.
 P. Ramesh Babu, "Digital Signal Processing", Scitech Publications, Sixth Edition, 2014.

Course: ECA113 Digital Signal Processing and DSP Processors

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	1	-	-	-	-	-	-	-	1	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-	2	2
CO3	3	3	3	3	1	1	-	-	Ι	-	Ι	-	2	2
CO4	3	2	2	2	1	١	I	I	I	-	I	I	1	١
CO5	2	1	1	1	1	١	-	-	Ι	-	2	-	2	2
ECA113	2.8	2.4	2.2	2.2	1	-	-	-	-	-	2	-	1.6	2

Department : I	Electror Engine	nics and Communication Seering	Progra	amme	: B.Tec	:h. (EC)					
Semester : F	ifth		Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Ty	pe: TY		
Course Code	C		Perio	ods / V	Veek	Credit	N	1aximum N	arks		
Course Code	Cours	ename	L	Т	Р	С	CA	SE	TM		
ECA114	Digita	l Communication	3	-	-	3	25	75	100		
Prerequisite	-					-					
	Upon	completion of the course, the	studen	ts will	be able	e to					
	CO1	Demonstrate the understar systems.	nding of	f the k	basic b	uilding blo	cks of Basel	oand comm	nunication		
Course Outcome	CO2	Compare and contrast suita receivers.	ble Bas	eband	signall	ing techniq	ues and the	eir impact o	n digital		
	CO3 Decide upon appropriate source coding and spread spectrum techniques based on the nature of the information sources and application needs. CO4 Analyse the BER performance of various bandpass communication systems. NIT-I Output ization and Encoding Periods: 9										
	CO4	Analyse the BER performance	ce of va	rious k	pandpa	ss commur	nication syst	ems.			
UNIT-I	Quan	tization and Encoding				Periods:	, Э				
Sources and Si	ources and Signals – Basic Signal Processing Operations in Digital Communication – PCM generation and ecovery using match filter - Analysis of uniform and non uniform quantizers - Delta modulation - Analysis of										
recovery using	rces and Signals – Basic Signal Processing Operations in Digital Communication – PCM generation and overy using match filter - Analysis of uniform and non uniform quantizers - Delta modulation - Analysis of a modulators – Delta modulation and adaptive delta modulators - DPCM - Comparison of PCM and DM CO1										
delta modulato	very using match filter - Analysis of uniform and non uniform quantizers - Delta modulation - Analysis of a modulators – Delta modulation and adaptive delta modulators - DPCM - Comparison of PCM and DM be basis of speech signal										
on the basis of	speech	signal.									
UNIT-II	Baseb	and Signalling Techniques					Peri	ods: 9			
Need for line sl density bipolar	haping o coding	of signals, Signaling formats - - Scrambling and unscramblin	RZ/NRZ	, Duo l nnel ec	pinary, qualizat	Split phase tion-ISI –Ey	e (Manchest e pattern –	er) and Hig Receiving	h CO2		
Filters-Matche	d Filter	and Correlation receiver.				T					
UNIT-III	Sourc	e Coding					Perio	ds: 9			
Purpose of redundancy, Sł Fano code, Huf	f er nannon' fman co	ncoding- Uniquely de 's first and second fundamen ode.	ciphera Ital theo	ble orem,	code Shanne	es- Coc on's encod	le effic ing algorith	iency a m, Shanno	nd n CO3		
UNIT-IV	Bandp	bass Transmission & Receptior	า				Perio	ds: 9			
BASK, BFSK, an FSK, QAM, MSK	BASK, BFSK, and BPSK- Transmitter, Receiver, Signal space diagram, Error probabilities. M-ary PSK, M-ary FSK, OAM, MSK and GMSK- Optimum detector, Signal constellation, error probability-OEDM.										
UNIT-V	Synch	ronization & Spread Spectrum	n Techni	ques		· · · ·	Perio	ds: 9	i		
Synchronizatio – Network sync	n: Need hroniza	for synchronization - Synchro tion.	nizatior	n meth	ods - B	it, word and	d frame syn	chronizatio	n		
Spread Spectru Discrete seque Frequency hop	im Tec nce spr spread	hnique: Introduction to Sprea ead spectrum with coherent spectrum modulation.	ad Spec BPSK, S	trum 1 ignal s	Fechnic pace d	ques - Pseu limensiona	do noise se lity and pro	quences, cessing gai	n, CO3 CO4		
Lecture Periods	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -		Total Perio	ds: 45	i		
			.±			k					

Reference Books:

- 1. Bernard Sklar, "Digital Communications- Fundamentals and applications", Pearson Education, New Delhi, 2009.
- 2. Simon Haykin, "Digital Communications", John Wiley & Sons, Inc. Singapore, 2011.
- 3. Lathi B P "Modern Digital and Analog communication Systems", Oxford University Press, 2010.
- 4. Proakis J G, "Digital Communications", Tata McGraw Hill, New Delhi, 2008.
- 5. Taub and Schilling D, "Principles of communication systems", McGraw Hill, New Delhi, 2008.

COURSE ARTICULATION MATRIX

Course: ECA114 Digital Communication

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	1	2	1	-	Ι	-	Ι	1	2	1
CO2	2	3	3	2	2	1	1	-	-	-	-	1	2	1
CO3	3	2	3	2	2	2	1	-	-	-	-	1	2	1
CO4	3	2	2	2	2	2	1	-	-	-	-	1	2	1
ECA114	2.75	2.5	2.75	2	1.75	1.75	1	-	-	-	-	1	2	1
Department : C	ompute	er Science and Engineering	Progr	amme	: B.Tec	ch (EC)								
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Semester : F	Semester : Fifth Course Category Code: ESC Semester Type: TY Course Code Course Name Periods / Week Credit Maximum Marks L T P C CA SE TM													
Course Code	Cours	o Namo	Perio	ods / W	/eek	Credit	N	1aximum I	Marks	;				
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	Т	M				
CSA136	Micro Micro	processors and controllers	3	-	-	3	25	75	1	00				
Prerequisite	-			1	1	1		11.						
-	Upon	completion of the course, the	e studen	ts will	be abl	e to								
	CO1	Interpret the basic concept	ts and r	orogra	mmin	g aspects of	8086 Mic	roprocess	ors.					
Course	CO2	Analyze the peripherals and	d interfa	ce the	m with	x86 process	ors	-						
Outcome		Interpret and assess the fu	nction o	f Progra	mmab	le Interface Co	ntrollers (PI	C) microco	ontrol	ler &				
	CO3	its Peripherals.						-,						
	CO4	Design and execute program	ms on A	dvance	d RISC	Machine (Al	RM) micro	controller	•					
	CO5	Develop and implement Mic	crocontr	oller b	ased S	ystems.	· · · · · · · · · · · · · · · · · · ·							
UNIT-I	16 bit	Microprocessor Architecture	and Pro	gramn	ning	Periods: 9								
Introduction -	Evoluti	on of Microprocessors- Intel	8086 N	Nicrop	rocess	or Architectu	ıre – Pin	descriptio	n –					
External Memo	ory Add	ressing – Bus Cycles. – Addr	essing N	/lodes	- Instr	uction Set –	Directives	- Asseml	oly	CO1				
Language Programming.														
UNIT-II Peripheral Interfacing Periods: 9														
Introduction - I/O interfacing - Parallel communication interface and Serial communication interface using														
8086 Microprocessor – D/A and A/D Interface - Timer – Printer Interface. BIOS (11H to 14H) and DOS														
interrupt (21H) functions for console.														
UNIT-III	PICM	icrocontroller				Periods: 9								
Microchip's PIC	Micro	controller - Salient features – I	Harvard	archite	ecture	– register file	structure	9 —						
addressing mo	odes – C	CPU registers – Instruction s	et – Ext	ternal	interru	upts – Timer	s: Compai	re & Capt	ure	CO3				
modes – PWM	outputs	- SSP and SPI - I ⁻ C bus - ADC	. charact	eristic	s – UAI	RI-serial pro	gramming	•						
UNII-IV	Introc	luction to ARM Microcontroll	er			Periods: 9								
RISC versus C	CISC –	ARM Processor Fundament	als - AR	M 7	Archite	ecture – LP	C2148 mi	icrocontro	ller					
Introduction –	Interna	I memory map – Thumb/ARN	/I instruc	ctions -	- Asse	mbly Langua	ge Progra	mming.						
Peripheral det	alis – Im Rifoatur	iplementation of GPIO, Time	r/Count	er, UAI	r, int	errupt archit	ecture – A	DC and D	AC.	CO4				
	Breatur	es of LPC2148.	1:			- • • •								
	Progra	amining and Applications of N			5	Periods: 9		nto loca	~T					
Firmware deve	elopmen	it using Embedded C – Introd	uction t	.o data	types		a stateme	nts – 100p	JS –	CO4				
Application of n	nicrocor	ntrollersl: Traffic Light controls	svstem -	- DC M	lotor S	peed control	– Network	Router		CO5				
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	riods: -	- T	otal Perio	ds: 45						
Reference Books:														
1. Krishna Kant, "Microprocessors and Microcontrollers: Architecture, Programming and System Design 8085, 8086,														
8051, 8096'	, PHI Le	arning Pvt. Ltd., Second Editio	on, 2013			0 0		Ū.	-	-				
2. A.K. Ray and	d K.M.Bı	urchandi, and A.K.Ray, "Advan	iced Mic	roproc	essora	and Peripher	als", McGr	aw Hill Int	ernat	ional				
Edition, Thir	rd Editio	on, 2017.												
3. John B. Peat	:man, "E	Design with PIC Microcontrolle	ers", Pea	rson E	ducatio	on, 2013								
4. Andrew N. S	4. Andrew N. Sloss Dominic Symes and Chris Wright, "ARM System Developer's Guide Designing and Optimizing													
System Soft	ware", I	Morgan Kaughmann/Elsevier	Publishe	ers, 200)6.									
5. Muhammad	d Ali Ma	zidi, SarmadNaimi, SepehrNa	imi, and	Janice	Mazio	di, "ARM Ass	embly Lan	guage Pro	gram	ming				
& Architect	ure", ll E	dition, 2016.												

Course: CSA136 Microprocessors and Microcontrollers

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	1	1	1	1	Ι	2	1	2	1	2	2
CO2	3	3	2	1	1	2	1	Ι	2	1	2	1	2	2
CO3	3	3	2	1	1	2	1	-	2	1	2	1	2	2
CO4	3	3	2	1	1	2	1	-	2	1	2	1	2	3
CO5	3	3	3	2	2	2	1	-	2	1	3	1	2	3
CSA136	3	3	2	1.2	1.2	1.8	1	_	2	1	2.2	1	2	2.4

Department : II	EDC		Progra	amme	: B.Tec	:h.						
Semester : F	ifth		Cours	e Cate	gory Co	ode: PAC	Semest	er Exam Type	: TY			
Course Coulo	6	- N	Perio	ods / W	/eek	Credit	N	laximum Mar	ks			
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	ТМ			
EPA101	Entre	epreneurship	3	-	-	2	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	studen	ts will	be able	e to						
Course	CO1	Outline the basics of Entrepr	eneurs	hip and	d desig	n thinking.						
Outcome	CO2	Extend the knowledgeable to	o build	busine	ss moc	lel and MVF).					
outcome	CO3	Outline the costing and reve	nue.									
	CO4	Outline about marketing and	d sales.									
	CO5	Explain about team and com	npliance	e requi	remen	ts.						
UNIT-I	Proble	em and Customer				Periods:	9					
Effectuation, Finding the flow. Entrepreneurial style, business opportunity, problems worth solving,												
methods for fir	nding pr	oblems, problem interviews. [Design T	hinkin	g, Con	sumer and	customer, r	narket types,	CO1			
segmentation	and targ	geting, early adopters, Gains,	Pains ai	nd "Jol	os-To l	be done, Va	alue Propos	ition Canvas				
(VPC), Identifying Unique Value Proposition (UVP).												
UNIT-II	Busin	ess Model and Validation				Periods:	9		1			
Types of Busir	ness Mo	odels, Lean Canvas, Risks.	Building	soluti	on der	no, solutior	n interviews	, problem-				
Solution test, C	ompetit ion	tion, Blue Ocean Strategy. MVI	P- Build	-ivieas	ure-Lea	arn feedbad	ck loop, iviv	P interviews,	02			
	DON.	we and Cost				Poriode:	2					
Dovonuo Strop		ma costs gross and not margi	inc nri		nd coc	ondary roy	onuo stroon	ac Difforont				
nricing strateg	ies - nr	and costs and Operations	rosts: B	liary a	nu sec of unit	costing F	inancing Ne	W Venture-	CO3			
various sources	s - inves	tor expectation-Pitching to Inv	vestors		Ji unit	costing. I		ew venture-	005			
UNIT-IV	Marke	eting and Sales				Periods:	9					
Difference bet	ween n	roduct and brand - positionir	ng state	ment	Buildi	ng Digital I	Presence S	ocial media-				
company profi	le page	– Sales Planning - buving decis	sions. Li	stenin	g skills	. targets. U	nique Sales	Proposition	CO4			
(USP), sales pit	ch, Follo	ow-up and closing a sale.	, _		0	,						
UNIT-V	Team	and Support				Periods:	9					
Team Building	- Share	ed leadership - role of a good	team -	- team	fit - d	lefining role	es and resp	onsibilities -				
collaboration t	ools and	d techniques- project manager	nent, ti	me ma	nagen	nent, workf	Iow, delega	tion of tasks.	CO5			
Business regula	Business regulations - starting and operating a business - compliance requirements.											
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -		Total Perio	ds: 45	<u>-</u>			
Reference Boo	ks:											
1. Nandan H,	"Fundai	mentals of Entrepreneurship",	Prentic	e Hall I	ndia, 2	2013.						
2. LearnWISE	, "Digita	l learning platform", Wadhwar	ni Found	dation,	www.	learnwise.c	org					
3. Khanka S.S	, "Entrej	preneurial Development", S Ch	and & C	Compa	ny, 200)7.						
4. Sangeetha	4. Sangeetha Sharma, "Entrepreneurship Development", Prentice Hall India, 2017.											
5. Anil Kumar	.S, "Entr	repreneurship Development",	New Ag	ge Publ	ishers,	, 2003.						

Course: EPA101 Entrepreneurship

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	1	1	2	3	1	2	1	-	-	2	2	ŀ	-	Ι
CO2	2	3	1	3	1	1	1	-	1	2	2	-	-	I
CO3	1	-	2	2	-	2	1	-	1	2	-	-	-	Ι
CO4	-	-	2	3	-	2	3	2	1	3	1	-	-	-
CO5	-	2	-	2	-	3	-	-	-	2	2	2	-	-
EPA101	1.33	1.2	1.4	2.6	0.4	2	1.2	0.4	0.6	2.2	1.4	0.4	-	_

Department	Elect Engine	ronics and Communication pering	Pro	gramn	ne : B.Tec	h. (EC)					
Semester : F	ifth		Cou	irse Ca	tegory Co	ode: PCC	Semest	er Exam Typ	e: LB		
Course Code	Cours	o Namo	Pe	eriods	/ Week	Credit	N	laximum Ma	arks		
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	TM		
ECA115	Digita	l Signal Processing Laboratory	-	-	3	1.5	25	75	100		
Prerequisite	-										
	Upon	completion of the course, the stu	udent	ts will	be able to)					
	CO1	Demonstrate the computation Using MATLAB software.	of DI	T and	FFT and s	studying its	s applicati	ons in signa	l analysis		
	CO2	Design and test IIR, FIR and mu	ltirat	e filte	rs using s	oftware.					
Course Outcome	CO3	Relate the various spectral esti	matio	on tec	hniques u	ising softw	are.	ag coftwara			
outcome		Demonstrate the design and te	sting	s or an	equalizer			ig soltware.			
	CO4	studying the effects of sampling generating various types of wa	in wr g and vefor	fiting I quan rms.	programs tization, i	mplement	DFT, Conv	volution and	FFT and		
CO5 Experiment with writing programs on a floating point DSP processor and design and implement IIR and FIR filters.											
List of Experiments											
1. DFT comp	utation	and application to find Circular c	onvo	lution	of two si	ignals. Con	nparison d	of linear and			
circular co	nvolutio	ons.							CO1		
2. Spectrum	analysis	of different signals using FFT algo	prithr	ns.							
3. Design of	IIR filte	er for the given specifications u	sing	impul	se invaria	ant and bil	inear tra	nsformation	I		
technique	and stu	dy its frequency response charac	cteris	tics.	_						
4. Design an	d Imple	mentation of FIR filter for the	giver	ו spec	ifications	using free	quency sa	impling and			
windowin	g techni	que and study its frequency resp	onse	chara	cteristics.				CO2		
5. Design and	a impier	nentation of Multirate LPF filters		ie give	en specific	ations.					
6. Simulation	1 OT OITTE	erent non-parametric spectral esti	imati	ontec	nniques.				CO3		
7. Lyuanzati	ampling	aliasing offects and quantization	n offe	acts (d	istortions	arising fro	musing	inder-			
sampling	and less	number of hits) using floating no	int D	SP nrc	nstortions ncessor kit	-	ini using u	inuer-			
9 Implemen	tation of	of Linear and Circular convolution	n and	4 FFT	Imnlemer	 ntation usi	ng floatin	g noint DSP	,		
processor	kit.		in and		mpiemei	itution usi	ing noutin	5 point 001	CO4		
10. Generatio	10. Generation of different waveforms using floating point DSP processor kit.										
11. IIR filter de	esign for	the given specifications using flo	ating	point	DSP proc	essor kit.					
12. FIR filter d	esign fo	r the given specifications using flo	ating	g poin	t DSP prod	cessor kit.			CO5		
Lecture Period	s: -	Tutorial Periods: -	Pra	ctical	Periods: 4	5 To	otal Perio	ds: 45	······		
Reference Boo	ks:					L					
1. Vinay K.Ingle	and Joh	n G.Proakis, "Digital Signal Proces	ssing	using	MATLAB"	CL Engine	ering, Thii	d Edition, 20)11.		
2. B.Venkatara	2. B.Venkataramani and M.Bhaskar, "Digital Signal Processors- Architecture, programming and Applications", Tata										
McGraw Hil	l, Fourth	edition, 2005.									

Course: ECA115 Digital Signal Processing Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	3	1	1	-	3	2	-	1	3	3
CO2	3	3	3	2	3	1	1	-	3	2	-	1	3	3
CO3	3	3	3	2	3	1	1	_	3	2	_	1	3	3
CO4	3	3	3	2	3	1	1	-	3	2	-	1	3	3
CO5	3	3	3	2	3	1	1	_	3	2	_	1	3	3
ECA115	3	3	3	2	3	1	1	_	3	2	_	1	3	3

Semester : Fifth Course Course Code Semester Exam Type: LB Course Code Course Name Periods / Week Credit Maximum Marks ECA116 Digital Communication Laboratory - - 3 1.5 25 75 100 Prerequisite - - 3 1.5 25 75 100 Course Outcome Outline, construct and test the performance of various baseband modulati techniquesusing both experimentally and/or through simulations. - Course Outcome Coastify the popular coding formats employed in baseband communication systems a inspect its merits and demerits. -											
Course Code Course Name Periods / Week Credit Maximum Marks ECA116 Digital Communication Laboratory - - 3 1.5 25 75 100 Prerequisite - - 3 1.5 25 75 100 Course Outcome CO1 Outline, construct and test the performance of various baseband modulati techniquesusing both experimentally and/or through simulations. CO1 Outline, construct and test the performance of various baseband modulati techniquesusing both experiments performats employed in baseband communication systems a inspect its merits and demerits. CO3 Classify the popular coding formats employed in baseband communication systems. CO4 Assess the importance of signal processing techniques employed at the digital recent through simulations. Assess the importance of signal processing techniques employed at the digital recent through simulations. List of Experiments 1. Construct a Pulse code modulator and demodulator circuit. Obtain the coded output for the given sine wave. Construct a time division multiplexing circuit to combine two different sampled data/voice streams onto a single channel by assigning time slots to each. Obtain the TDM output. C 3. Construct a Delta modulator and demodulator circuit. Obtain the coded output for the given sine wave. C 4. To study the diff											
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9. Design and analyse various pulse snaping filters- Guassian Filters, Cosine filters. Observe the obtained are response through simulations	4										
10 Construct an Amplitude Shift Keying (ASK) modulator and demodulator circuit. Obtain the ASK											
modulated and demodulated waveforms											
11. Construct a Frequency Shift Keying (FSK) modulator and demodulator circuit. Obtain the FSK modulated											
and demodulated waveforms.											
12. Construct a Binary Phase Shift Keying (BPSK) modulator and demodulator circuit. Obtain the BPSK											
modulated and demodulated waveforms.	3										
13. Simulate BASK, BFSK and BPSK circuits. Obtain the time domain and frequency domain response of the											
above modulation schemes. Compare its bit error performance.											
14. Design and construct a LFSR circuit to generate the required PN-Sequence and observe the nature of PN											
code generated. Also test its properties through simulation.											
15. DS CDMA: To design and construct DS-CDMA circuit and verify its operation. Obtain the DS-CDMA											
waveform.	-										
16. FH CDMA: Construct a frequency synthesizer circuit using PLL for the given frequency values. Obtain the	4										
synthesized waveform.											
Lecture Periods: -Tutorial Periods: -Practical Periods: 45Total Periods: 45											

Reference Books:

- 1. Laboratory Manual Prepared by the Department of ECE, PTU.
- 2. Simon Haykin, "Digital Communications", John Wiley & Sons, Inc. Singapore, 2011.
- 3. Bernard Sklar, "Digital Communications– Fundamentals and applications", Pearson Education, New Delhi, 2009.
- 3. Dennis Silage, "Digital Communication Systems Using MATLAB and Simulink", 2009.

COURSE ARTICULATION MATRIX

Course: ECA116 Digital Communication Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	2	2	-	-	-	2	1	-	1	2	1
CO2	3	3	1	3	2	-	-	-	2	1	-	1	2	1
CO3	3	2	2	1	2	_	_	_	2	1	_	1	2	1
CO4	3	3	3	2	2	_	_	_	2	1	_	1	2	1
ECA116	3	2.75	1.75	2	2	_	_	_	2	1	_	1	2	1

Department : Computer Science and Engineering Programme : B.Tech (EC) Semester : Fifth Course Category Code: ESC Semester Exam Type: LB												
Semester : F	ifth		Cours	e Cate	gory Co	de: ESC	Semeste	er Exam Ty	pe: LB			
Course Code	Cours	- Nama	Perio	ods / W	/eek	Credit	М	aximum N	1arks			
Course Coue	Course	ename	L	Т	Р	С	CA	SE	TM			
CSA137	Micro Micro	processors and controllers Laboratory	-	-	3	1.5	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	e studen	ts will	be able	to						
	CO1	Develop and execute asse	embly l	angua	ge prog	gram of Inte	l 8086 in	cluding a	rithmetic,			
		searching sorting, string m	anipulat	tion op	peratior	ns, traffic ligh	it control a	and Stepp	er motor			
Course		control.										
Outcome	CO2	Develop and execute the peripheral devices.	asseml	oly La	nguage	Programs fo	or interfacir	ng Intel 8	086 with			
	CO3	Assess microcontroller rea converters and Analog-to-D	l time i igital co	nterfa nverte	ces incl ers.	uding RTC, s	erial ports	, Digital-1	to-Analog			
	CO4	Analyse the programming as	spects o	f PIC a	nd ARM	l microcontro	ller.					
Experiments U	sing 808	6 Microprocessor with MASN	N									
1. Arithmetic operations: Multi-byte Addition, Subtraction, Multiplication, Division.												
2. Searching and Sorting												
3. String Operations												
4. Traffic light	control											
5. Stepper mo	otor con	trol							CO2			
Experiments II	sing PIC	and ARM Controller										
7 Implement	ation of	Simple Programs										
8. Implement	ation of	Interrupts										
9. Implement	ation of	UART features.										
10. Interfacing	SD card	and Graphical LCD										
11. Implemen	tation of	SPI and I2C communication										
12. Implement	ation of	USB communication										
13. Implement	ation of	Real-Time Clock using timer a	ind inter	rupt								
14. Interfacing	with Ke	yboard matrix										
15. Interfacing	with Sin	gle/Multi channel Analog to [Digital C	onvert	or							
16. Interfacing	16. Interfacing with Digital to Analog Convertor CO3											
17. Implement	ation of	watch dog timer							CO4			
10. ITallic Ligi	nts Contra	01 prface										
20 Sneed cont	rol of D	Cmotors										
21. Parallel po	rt interfa	ace with printer										
Lecture Period	s: -	Tutorial Periods: -	Practi	cal Per	riods: 4!	5 Tot	tal Periods	: 45	L			
					_	i						
L												

Course:	CSA 137	Microprocessors and Microcontrollers Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	1	1	1	1	-	2	1	2	1	1	2
CO2	3	3	2	1	1	2	1	-	2	1	2	1	1	2
CO3	3	3	2	1	1	2	1	-	2	1	2	1	2	3
CO4	3	3	2	1	1	2	1	-	2	1	2	1	2	3
CSA 137	3	3	2.25	1	1	1.75	1	-	2	1	2	1	1.5	2.5

Department :	Electron Engine	ics and Communication	Progra	amme	: B.Tec	h. (EC)						
Semester : Sixth Course Category Code: PCC Semester Exam Type: TY Course Code Course Name Periods / Week Credit Maximum Marks												
	~	••	Peric	ods / W	/eek	Credit	N	laximum M	arks			
Course Code	Course	e Name	L	Т	Р	С	СА	SE	TM			
ECA117	Micro	wave and Optical	3	-	-	3	25	75	100			
Droroquisito	Engine	eening										
Frerequisite	-	completion of the course, the	ctudon	tc will	ho able	, to						
	υροπ		studen			- LU						
	CO1	Demonstrate the understand	ling of t	he limi	tation	s of conventi	onal vacuu	im tubes at	microwave			
	<u> </u>	frequencies and various met	thods of	gener	ating a	nd amplifyin	g microwa	ve signals.				
Course	COZ	Analyze and test microwave	e compo	onents	and ci	rcuits.			-			
Outcome	CO3	Summarize the signal degrad performance.	dation r	nechar	nisms i	n optical fibe	er and ther	eby optimi	ze the fiber			
	CO4	Design a fiber optic link with	approp	oriate	light so	ources, deteo	ctors and a	amplifiers.				
		Demonstrate the working	principl	es of	optical	fiber link.	WDM and	passive o	ptical			
	CO5	networks.			-	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			-			
UNIT-I	Micro	wave Devices				Periods: 9						
Gunn diode an	d its mo	odes of operation, IMPATT an	d TRAP	ATT di	odes,	MESFET and	Parametr	ic amplifier	s.			
Two cavity klys	tron am	plifier – Power and efficiency	conside	eratior	s. Refl	ex Klystron o	oscillators -	- Modes ar	nd con			
efficiency consi	deratio	ns. Operation and applications	s of cylir	ndrical	Magne	etrons and H	elix TWT.		C01			
UNIT-II	S-Para	meters and Microwave Meas	uremen	ts			Peri	ods: 9				
Scattering parameters: Properties of S matrix, Operation and applications of Hybrid Tee, Hybrid rings (rat-												
race), attenuat	race), attenuators, matched load, waveguide corners, bends and twists. S matrix derivation for Directional											
couplers, Circul	ators ar	nd Isolators.										
Microwave Me	easuren	nents: VSWR, power, freque	ncy, im	pedan	ce, sca	attering para	ameters a	nd dielectr	ic CO2			
constant measu	iremen	ts. Antenna radiation pattern a	and gair	n meas	ureme	nts.						
UNIT-III	Optica	al Fibers					Perio	ods: 9				
Element of an	Optical	Fiber Transmission link, Prop	pagation	n of lig	ght, Op	otical fiber s	tructures,	acceptance	2			
angle, Numeric	al apert	ure. Fiber attenuation - absor	ption, s	catteri	ng and	bending los	ses. Disper	rsion –				
Material and w	/avegui	de dispersion. Signal distortio	on in Sl	И fibe	rs, Pola	arization Mo	ode disper	sion, Desig	n CO3			
Optimization of	SM fibe	ers -RI profile and cut-off wave	elength.									
UNIT-IV	Optica	al Sources, Detectors and Amp	lifiers				Perio	ods: 9				
LED - LED struc	tures -L	ight source materials -Quantu	um effic	iency	and LE	D power, M	odulation	of LED. Lase	er			
Diode Modes a	nd Thre	shold condition -Rate equatior	ns -Exte	rnal Q	uantun	n efficiency -	Resonant	frequencie	s,			
single mode las	er. Opt i	ical detectors: PIN diode and A	APD —op	eratio	n and o	characteristi	cs. Erbium	Doped Fibe	er CO4			
Amplifiers - Principle, Operation and Applications.												
UNIT-V	Optica	al Networks	• •				Perio	ods: 9	T			
System design	System design consideration- Point – to –Point link design –Link power budget –rise time budget. Principle											
of SONET / SDH	l and W	DM, Basic principle and archit	ectures	of Bro	adcast	t - and - sele	ct WDM N	etworks an	d CO5			
wavelength Ro		tworks. Solitons, Optical CDM	A, PON		IH. .•	-	-+-!					
Lecture Periods	5:45	Tutorial Periods: -	Practi	cal Pel	10as: -	I	otal Period	1S: 45				
Reference bool	(S:		D				2002					
1. Samuel Y. Lia	ao, "Mic "Orthic	crowave Devices and Circuits",	Pearsor	1 Educa	ation, T	nird Edition,	, 2003.					
2. Gera Keiser,				W HIII,			d Edition	2000				
3. Annapurna l		SISIER. Das, IVIICTOWAVE Engin	eering"	, iata	IVICG13	w HIII, Secon	u Eultion,	2009.				
4. SUDAI Kar,	4. Subal Kar, "Microwave Engineering Fundamentals, Design and Applications", University Press, 2016.											
5. Rajiv Kamas Edition 201	waiii, K N	uniai in sinalajan and G.H. Sas	aki, U	JUCALI	vetwol	NS – A Practi	cal Perspe	clive ,EISE	ner, miru			
Luition, 201	.											

Course: ECA117 Microwave and Optical Engineering

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	3	3	3	3	1	3	-	١	1	I	2	1	١
CO2	3	3	2	3	2	1	2	-	١	1	I	2	2	١
CO3	2	2	2	3	2	1	2	-	١	I	I	2	2	I
CO4	3	2	3	3	3	2	2	-	Ι	Ι	-	3	2	1
CO5	2	2	3	3	2	2	3	-	١	1	1	3	2	Ι
ECA117	2.4	2.4	2.6	3	2.4	1.4	2.4	_	-	-	-	2.4	1.8	-

Department F	ectronic	s and Communication Engineering	Program	nme : l	B.Tech.	(EC)							
Semester : S	ixth		Course (Catego	orv Cod	e: PCC	Semeste	er Exam Tv	/pe: TY				
			Perio	ds / W	/eek	Credit	Max	(imum Ma	arks				
Course Code	Course	e Name	L	, T	Р	С	СА	SE	TM				
ECA118	Data C	Communication Networks	3	-	-	3	25	75	100				
Prerequisite	-												
	Upon	completion of the course, the studen	nts will be	able t	to								
	CO1	List the prime functions of layered	architectu	ire mo	odels w	ith the p	rotocol su	ite.					
	CO2	Compare and contrast the variou	us netwo	rking	techno	logies a	nd their	growth					
_	CO3	Select suitable MAC/LLC protocols	dependin	g upo	n the a	pplicatio	n needs.						
Course Outcome	CO4	Analyse all the critical functional Mobile - IP/TCP Layers	differenc	es ar	nd its i	mpact b	etween	Non-Mob	ile and				
	CO5	Recommend appropriate networki	ng techno	امعنوه	and se	orvices fo	r emergin	g annlicat	ions				
UNIT-I	Comn	nunication Networks		logics		Period	••• 9	5 upplicat	10115				
Data Commun	ications	- Network Criteria- Network Types-	Network	Mode	ls- TCP	/IP Proto	col Suite.	OSI					
Model. Digital	Fransmi	ssion - Transmission Media – Multiple	exing and	Carrie	er syste	ms- Swite	ching Tech	niaues -					
Circuit and Pac	ket swit	, ching. Overview of networks- PSTN, I	Internet, d	conne	, ction o	riented r	etworks:	.25 X.25	CO1				
networks, Fram	e relay	and ATM, Ethernet, Wireless LANs, w	vireless W	ANs, t	elepho	ne netwo	orks for da	ita.					
UNIT-II	Link co	ontrol and Medium Access Layer				Period	s: 9						
Data link layer: error detection & correction methods: Parity, Cyclic redundancy codes, checksum codes,													
Hamming codes. Flow control Protocols, High level Data link Control Protocols, operation modes, ATM													
protocols. Med	ium acc	ess Control: TDMA, FDMA, CDMA, ra	andom aco	cess p	rotoco	s, conter	ntion base	d	COL				
protocols. MAC	layer fo	or Wireless LAN, Wireless WAN.											
UNIT-III	Netw	ork and Transport Layer				Period	s: 9		T				
Network layer	: Intern	etworking & devices, IP protocol and	d associat	ted pr	rotocol	s (ARP, R	ARP, ICM	P, IGMP)	-				
	assiess a	addressing, Routing algorithms: Dista		or rou	ransno	rt Lover	Drocoss		CO3				
delivery: UDP: 7	FCP: one	en and closed loop Congestion contro	l algorithr	v0. i n.	ranspo	It Layer.	TTUCESS	to process	,				
UNIT-IV	Mobil	e IP & TCP				Period	s: 9						
Goals, assump	tions a	nd requirements. IP packet deliver	v. Agent	disco	overv.	Registrat	ion. Tunn	eling and	1				
encapsulation,	Optim	izations, Reverse tunnelling, IPv	6, IP m	icro-n	nobility	suppor	rt, Dynai	nic host	t				
configuration	protoco	I. Classical TCP improvements, in	nairect i	CP, 3	snoopir	ig ICP,	NIODIIE	ICP, Fasi					
	5/2G	vireless networks. Support for mobil	, Selectiv	e rec Lwido		Juportov	t transfor	protocol	1 004				
Hypertext mar	kun lar	iguage-System architecture-Wireless	s annlicat	ion n	rotoco	l (versio	n 1 x)-Arc	hitecture					
Wireless teleph	ionv apr	blication.	appricat	, on p		(101010)			'				
UNIT-V	Adva	nced Networks and Services				Period	s: 9						
Differentiated	and inte	egrated services, Audio and Video C	ompressi	on, Re	eal-Tim	e Traffic,	Voice O	/er IP and	1				
Multimedia Su	pport—	SIP, Real-Time Transport Protocol (RTP). Intr	oduct	ion to	Cellular	networks	Evolution	1				
1G, 2G, 3G, 40	i standa	rds, Satellite networks, Ad hoc and	Sensor n	etwor	rks. Ent	erprise I	Network (Concepts:	CO5				
VPNs, MPLS ne	etworks,	Next Generation Multiservice ATM	, Beyond	IP, 50	6 hetne	ts, IoT –	Issues an	d					
challenges.				•				_					
Lecture Period	s: 45	Tutorial Periods: -	Practica	I Peri	ods: -	Total P	eriods: 45	5	•				
Note : Every stu	ident sh	ould carry out a mini project for this o	course an	d subi	mit the	report in	stead of a	ssignmen	t.				

Reference Books:

- 1. Behrouz A Forouzan, "Data Communication and Networking", Tata McGraw-Hill, New Delhi, 2013.
- 2. Jochen Schiller, "Mobile Communication", Pearson education, 2nd edition 2005.
- 3. Aftab Ahmad, "Data Communication Principles -For Fixed and Wireless Networks", Kluwer Academic Publishers, 2003.
- 4. Gurudeep S. Hura, Mukesh Singhal, "Data and Computer Communication Networking and Internetworking", CRC Press, 2001.
- 5. William Stallings, "Data and Computer Communication", Pearson Education, Eighth edition, 2007.

COURSE ARTICULATION MATRIX

Course: ECA118 Data Communication Networks

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	3	2	2	2	-	-	-	-	2	2	1
CO2	3	2	3	2	1	2	2	-	-	-	-	1	1	1
CO3	3	3	3	3	2	2	2	-	-	-	-	1	1	1
CO4	3	3	3	2	2	2	3	-	-	-	-	1	1	1
CO5	3	2	2	2	2	3	3	-	-	-	_	1	1	1
ECA118	3	2.6	2.8	2.4	1.8	2.2	2.4	-	-	-	-	1.2	1.2	1

Department	: Ele	ectroni	ics and Engine	Communication	1 Progra	amme	: B.Tech	. (EC)						
Semester : S	ixth		U	<u> </u>	Cours	e Cate	gory Cod	de: PCC	Semeste	er Exam Ty	ype: TY			
					Per	ods /	Week	Credit	Max	imum Ma	arks			
Course Code	Cours	e Nam	e		L	T	Р	С	СА	SE	TM			
ECA119	VLSI D	Design			3	-	-	3	25	75	100			
Prerequisite	-				L	i.	i		.ii	i				
	Upon	compl	etion of t	he course, the stud	ents will l	be able	e to							
	CO1	Desig	gn the ba	sic building blocks o	f CMOS a	nalog	circuits	consideri	ng the ele	ctrical pro	operties.			
	CO2	Desi	gn the co	mbinational logic ci	rcuits usi	ng sta	tic CMOS	S logic.						
Course		Desi	gn the co	mbinational and se	quential l	ogic ci	ircuits us	sing Pass	transistor	Transmi	ssion			
Outcome	CO3	Gate	and Dyn	amic CMOS logic.	•	0		0						
		Desi	gn the ba	sic arithmetic function	onal bloc	ks usir	ng CMOS	and anal	vze the ha	rdware				
	CO4	com	plexity.				0		,					
	CO5	Dete	ermine th	e test vectors of a fa	aulty circu	uit.								
	CO6	Disc	uss the st	eps in physical desi	, gn flow.									
UNIT-I	MOS	Techno	ology					Period	s:9					
MOS, CMOS, I	BiCMOS	5 Tech	nology, E	Basic Electrical Prop	perties o	f MOS	5 Circuit	s: Ids –	Vds relat	ionships,				
Threshold Vol	Threshold Voltage Vth, Gm, Gds and ωο, Body Effect, Latch-up in CMOS circuits, Short-Channel													
Effects, Channe	cts, Channel Length modulation and Device Scaling, MOS Active Resistor, Current Sinks and Sources,													
CurrentMirrors	urrent Mirrors - Current mirror with Beta Helper, Degeneration, Cascode current Mirror, Widlar and Wilson													
CurrentMirror,	Current	t and V	oltage Re	ferences, Band gap	Referenc	e, Des	ign of Op	bamp usii	ng CMOS.					
UNIT-II	NIT-II CMOS Circuit Characterization Periods: 9													
Moore's Law - CMOS Inverter – DC and Switching Characteristics of CMOS Inverter – Propagation Delay –														
Sheet Resistand	ce – Inv	erter l	Pair Delay	- NMOS, CMOS –	Power Di	ssipat	ion – Re	alization	of Combir	national	CO2			
Logic Functions	using s	tatic Cl	MOS – CN	1OS Layers – Stick D	iagram –	Desigr	Rules - (CMOS Lay	/out.					
UNIT-III	Desigi	n of Lo	gic Circui	ts and Array Subsys	tem			Period	s: 9					
Pass Transisto	r - Tra	nsmiss	sion Gate	e - Realization of	Combina	tional	Logic	Using Pa	ss Transis	stor and				
Transmission G	ate – N	NAND,	NOR, XO	R, Multiplexers - N	AND and	NOR	based Pl	A using	NMOS an	d CMOS,				
Finite State Ma	achine	Design	– Dynam	ic, Pseudo NMOS	and Dom	ino Ba	ased CM	OS Logic	Circuits -	- Charge	CO3			
Sharing. Inverte	er, NANI		NOR using	g BICMOS. Realizatio	on of Sequ	ientia	Circuits	using Ira	ansmissior	n Gate –				
Registers - D-La	itch – D	-FIIP-FI	op – Men	nory elements – DR	AIVI – SRA	IVI.		- · ·	~					
UNIT-IV	Datap	bath Su	bsystem	Design				Period	s: 9	-				
Realization of A	Adders u	using C	MOS - Fu	ll Adder – Ripple Ca	rry Adde	r – Cai	rry Look-	Ahead A	dder – Car	ry Select				
Adder – Carry S	ave Ad	lder – L	Design of	signed Parallel Add	ers- Com	parato	ors – Mag	gnitude C	omparato	r – Code	~~~			
Converters – P	arity an	10 Gray	y Codes -	Multipliers – Seria		er – P h Ence		uitipliers	5 – Unsign Dooth Eng	ed array	C04			
Inulupiler – Sig	A and I	Intiplier	S = 2 S CC	omplement multipli So Troo Multiplior	er – Bool Svetalia D		od Multi	viouilleu plior Pa	BOULH ENC	ouing –				
rauix-2, rauix -						ipeim		рпег – ва		I.				
	Fault	Niodel	s and Phy	sical Design Autom		- • • •		Period	s: 9	.				
Need for testin	ig- i est	Proce	dure, Des	ign for Testability -	Ad Hoc	i estin	g – Scan	-Based I	est-Bound	ary-Scan				
Design – Bull	L-IN-Sell	I-Test(E	sisi)- ie n Introc	SI-Pallern General	ion - Fi	auit N n Cucl	/lodels -	- Autom	Ialic Test	Pattern	COE			
	auit Siff	rowth		Danning - Higrarch	ical Trac	hacad	e – Parti	tioning –			C05			
Lee's algorithm		nuwun ation -	– FIUUL F - Scheduli	$n \sigma = \Delta S \Delta P$ and $\Delta I \Lambda I$		มสรษณ		ing higu		outing –				
Lecture Deriod	s• 45		Tutorial	Periods -	Practi	cal Po	riods: -	Total	Periode: 15		<u> </u>			
			iatoria		TIACU					-				

Reference Books:

- 1. Philip E. Allen and Douglas R. Holberg, "CMOS Analog Circuit Design", Oxford University Press, International Second Edition/Indian Edition, 2010.
- 2. Neil H. E. Weste, David Harris and Ayan Banerjee, "CMOS VLSI design A circuits and Systems Perspective", Dorling Kindersley (India) Pvt Ltd, 2009.
- 3. Naveed A. Sherwani, "Algorithms for VLSI Physical Design Automation", Springer, Third Edition, 1999.
- 4. Paul. R. Gray, Paul. J. Hurst, S. Lewis and R. G. Meyer, Analysis and Design of Analog Integrated Circuits, Wiley International, Fifth Edition, 2010.
- 5. Jan M. Rabaey, Anantha Chandrakasan and Borivoje Nikolic, "Digital Integrated Circuits A Design Perspective", Prentice Hall of India, 2012.

COURSE ARTICULATION MATRIX

Course: **ECA119 VLSI Design** Regulation: 2022-23

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO2	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO3	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO4	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO5	2	2	2	2	2	-	-	-	-	-	-	2	3	1
CO6	2	2	2	2	2	-	-	-	-	-	-	2	3	1
ECA119	2.66	2.66	2.66	2.66	2	-	-	-	-	-	-	2	3	1

Department : H	umaniti	es and Social Sciences	Programme : B	.Tech									
Semester : C	DDD/EV	EN	Subject Catego	ry: PE	Ser	nester Exa	am Type: •	ТҮ					
Course Code	Course	Name	Periods / We	eek	Credit	Max	imum Ma	rks					
	Course		L T	Р	С	CA	SE	TM					
HSA102	Indust	rial Economics & Management	3 -	-	3	40	60	100					
Prerequisite:	-												
	The co	urse will enable the students:											
	CO1	Demonstrate economic theor techniques applied to a v management issues.	ies, revenue an ariety of eco	id cost nomic,	concept non-ec	ts and se conomic	et of ana and fir	alytical nancial					
Quitcomo	CO2	Analyse the overall performation functional relationships between	ance of an eco en macroecono	onomy mic agg	through gregates	n an un	derstand	ing of					
outcome.	CO3	Demonstrate knowledge on b practice.	usiness manage	ement	concept	s to rela	te theor	y with					
	CO4	Interpret company's income st position of a company.	atements and b	alance	sheets to	o ascerta	in the fir	nancial					
	CO5	Apply financial planning, pro investment and project manag	ject scheduling ement problem	g and s.	financial	analysis	s to eco	nomic					
UNIT-I MICRO AND MACRO ECONOMICS AND ITS APPLICATIONS Periods: 09 Nature and Scope of Economic science: Micro – Macro Economics Economic decisions and Technical decisions													
Elasticity of Demand, cost components, Concepts of ISO-Quant – Break Even Analysis – Market structure – Price of Product Nature of pricing in different types of competition Small Scale Industries – Role of SSI in Indian Economy. Macro Economics: Nature and functions of Money – National Income – GNP and Savings – Inflation and Deflation concept – Business Cycle – Foreign Trade and Balance of payment.													
Types and Prine Coordinating Co (Ownership) of	ciples of ontrollir a firm N	f Management – Elements of Man ng - Scope of Management – Typ 1erits and Demerits.	agement – Planr es of Organizatic	ning, Or on Meri	ganising, ts and D	Staffing, emerits –	Directing, - Types of	CO2					
UNIT-III	INDUS	TRIAL FINANCE			Periods	: 09		i					
Need for Finan Preparation of each types.	ce – Typ Trading,	es of finance – Sources of finance Profit and loss Account and Bala	– Types of Inves nce Sheet – type	tment – es of acc	- Evaluati counting	on of Inve and signi	estment – ficance of	- CO5					
UNIT-IV	PRODI	JCTION MANAGEMENT			Periods	: 09							
Theory of Prod Scheduling – M Dispatches.	luction I Aaterial	Function – Types of Production M Control Concepts of Productivity	lerits and Demer – Measuremen	rits – Pr t of Pro	ocess Pla oductivity	anning – v – Inspe	Routing – ction and	CO4					
UNIT-V	MARK	ETING MANAGEMENT			Periods	: 09							
Core Concepts of Marketing -0 Needs – Wants – Demand, Marketing Vs Selling – Products and Markets – Pricing and related factors – Channels of Distribution – Promotion Advertising – Market Research Vs Marketing COS Research													
Lecture Periods	s: 45	Tutorial Periods:	Practical Period	ds:	Tot	al Period	s: 45						
Reference Books 1. Varshney Mał 2. Dutt & Sunda	s neswari ram. "In	"Managerial Economics" S Chand & dian Economy" S Chand & Co New	& Co, New Delhi 2 Delhi 2015	2011									

3. Pandey I.M, "Elements of Financial Management" Wiley Eastern Ltd New Delhi 2015

- 4. H.L. Ahuja, "Macro Economics for Business and Management, S Chand & Company Ltd 2011
- 5. O.P Khanna, "Industrial Engineering and Management, DhanpatRai and Sons, 2009.

6. Philip B Kotler, "Marketing Management, MacMillan, New York 2011.

Course: HSA 102 Industrial Economics and Management

СО	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
CO1	-	-	-	-	-	1	-	-	-	-	1	1	
CO2	-	-	-	2	-	-	-	-	-	-	1	1	
CO3	-	-	-	-	-	1	-	-	3	-	3	2	
CO4	-	-	-	-	-	-	-	-	-	-	3	1	
CO5	-	-	-	-	-	1	-	-	2	-	3	2	
HSA102													

Depa	rtment :	Electroi Engine	nics and Communication	Progr	amme	: B.Tecl	h. (EC)							
Seme	ster : S	ixth	0	Cours	e Cate	gorv Co	de: PCC	Semest	er Exam Type	: LB				
		[Perio	ods / W	veek	Credit	N	/aximum Ma	rks				
Cours	e Code	Cours	e Name	L	Т	Р	C	CA	SE	TM				
ECA1	20	Micro Engine	wave and Optical eering Laboratory	-	-	3	1.5	25	75	100				
Prere	quisite	-	· · · · · · · · · · · · · · · · · · ·			L			L					
	•	Upon o	completion of the course, the	student	ts will b	be able	to							
		CO1	Demonstrate the characteris	stics of r	nicrow	vave sou	urces.							
Cours	se	CO2	Analyse the performance of	microw	vave co	mpone	ents and ante	ennas.						
Outco	ome	<u> </u>	Experimentally evaluate VSV	VR, imp	edance	e and di	ielectric cor	istant usin	g Microwave	test				
		03	bench.	-					_					
		CO4	Experimentally measure the	e light pi	ropaga	tion ch	aracteristics							
		CO5	Demonstrate the design and	d testing	g of mi	crowav	e link.							
List o	of Experim	ents												
1.	Mode cha	aracteri	stics of Reflex Klystron	_										
_	Mode cha	aracteri	stics measurement of Reflex K	lystron (Oscillat	tor and	estimation of	of ETS and	ETR					
2.	Gunn dio	de char	acteristics and standing wave	pattern										
	a) V-Iar	Id V-P CI	haracteristics of Gunn diode.	avalana	+h and	oporat	ing froquon	av of Cupr	diada using	05				
	b) ivieas	d wayor	t of standing wave pattern, w	aveleng	,tri anu	operat	ing frequent	cy of Guni	i diode using					
3. Determination of VSWR and impedance of unknown load														
 Determination of VSWR and impedance of unknown load a) To measure VSWR of a matched load. CO 														
a) To measure VSWR of a matched load. b) To measure impedances of load such as capacitive iris, horn antenna, etc CC														
 b) To measure impedances of load such as capacitive iris, horn antenna, etc 4. Measurement of VSWR and return loss using reflectometer method. 														
 Measurement of VSWR and return loss using reflectometer method. Badiation pattern of antenna 														
5.	Estimatio	on of FN	BW, HPBW and side lobe level	l of the	given a	ntenna	1							
6.	Determir	nation o	f gain of an antenna											
	a) To de	termine	e gain of identical horn antenr	na.										
	b) To de	termine	e gain of unknown parabolic re	eflector						CO2				
7.	Characte	ristics of	f microwave components							CO5				
	Characte	ristics o	f given passive microwave co	ompone	nts su	ch as d	irectional co	oupler, ma	agic tee,					
	circulato	r and isc	olator.											
8.	Determir	nation	of dielectric	C	onstan	t	of	given	materia	CO2				
	Measure	ment of	relative and absolute dielect	tric cons	stant o	t given	dielectric m	aterials su	uch as	CO3				
~	wood, re	non, ing	ilon, rubber, ebonite, etc., usir	ng basic	micro	wave se	etup							
9.	Study of (optical f	iber characteristics											
	a) riequ	unition	sponse of fiber							CO4				
	c) Coupl	ling loss	and bending loss							CO5				
	d) Nume	erical ac	perture and acceptance angle											
10.	Characte	ristics o	f digital link using optical fiber	٠										
	a) To est	tablish a	digital fiber optic link and obt	tain its f	requei	ncy resp	oonse.							
	b) To ob	tain BEI	R of the digital fiber optic link.			, ,				CO5				
	c) To set	t up a Tl	DM link using fiber optics and	transmi	it the n	nultiple	exed audio a	nd data an	d receive					
	the s	ame.												
Lectu	re Period	s: -	Tutorial Periods: -	Practi	ical Pe	r <mark>iods: 4</mark>	5 T	otal Perio	ds: 45					
Refer	ence Boo	ks:												
1. An	napurna	Das and	Sisir K. Das, "Microwave Engir	neering"	', Tata	McGrav	w Hill, Secon	d Edition,	2009.					
2. Ge	rd Keiser,	"Optica	I Fiber Communications", Tata	a McGra	w Hill,	Fifth Ec	dition, 2013.							

Course: ECA120 Microwave and Optical Engineering Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	3	3	3	2	-	-	3	2	-	-	1	-
CO2	2	2	3	2	3	1	-	-	1	1	-	-	1	-
CO3	3	3	3	2	2	1	-	-	2	2	-	-	2	-
CO4	3	3	3	3	3	1	-	-	3	2	-	-	2	-
CO5	2	2	3	3	3	2	-	-	3	2	-	-	1	-
ECA120	2.4	2.4	3	2.6	2.8	1.4	-	-	2.4	1.8	-	-	1.4	-

Departm	ent : E	lectro	nics and Communication	Progra	amme	: B.Tecl	h. (EC)							
Semester	r : Si x	xth	0	Cours	e Cate	gory Co	de: PCC	Semest	er Exam T	ype: LB				
<u> </u>		^	- N	Perio	ods / V	Veek	Credit	N	1aximum	Marks				
Course Co	ode	Cours	e Name	L	Т	Р	С	CA	SE	TM				
ECA121		Data (Labor	Communication Networks atory	-	-	3	1.5	25	75	100				
Prerequi	site	-												
Course		Upon	completion of the course, the	e studen	ts will	be able	e to							
Outcome	•	CO1	Demonstrate the functionin	ng of var	ious m	echani	sm employe	d at lower	/ upper l	ayers.				
outcome		CO2	Analyze the various mechan	isms inv	volved	in comr	nunication r	networks i	nvolved ι	using NS.				
		CO3	Compare the different routi	ng proto	ocols.									
		CO4	Develop and examine unica	ast / mul	lticasti	ng com	munication	for variou	s types of	f networks.				
List of Ex	xperime	ents												
1. C	Commu	nicatio	n between PC's											
а	a) Seria	al com	munication using RS 232C.											
b	o) Para	allel Co	mmunication using 8- bit para	illel cabl	e.									
2. C	Demons	tratior	of error detection codes usin	g simula	ition so	oftware	•							
a	a) Pari	ty Che	ck											
0 2 T	D) Cycl	IC Redu	Indancy Check											
3. I	N Law	y the performance of error correction codes.												
а 1 т	a) nan Folovalu	iiiiiig (iato the	a performance of flow control	mechar	nicmc i	n a data	notwork							
4. I 2	a) Stor	ale the		mechai	1151115 1	ii a uata								
h	$r_{\rm r}$ $r_{\rm r}$	hack N												
с С	c) Sele	octive R	eiect											
5. C	Demons	trate t	he operation of the Ethernet.											
6. T	Го demo	onstrat	e LAN Trainer Experiments							CO1				
а	a) MAG	C Proto	col Analysis							CO2				
b	o) Rou	ting Al	gorithms											
С	c) Toke	en pass	sing											
d	d) File	transfe	er using FTP											
7. C	Design a	nd ver	ify congestion control algorith	nm										
а	a) toke	en buck	ket											
b	o) leal	ky bucł	ket											
8. P	Perform	ance A	nalysis and modelling of											
a	a) Voic	e traff	IC											
	n Data molom	a u di ili ontotio	u up of Data encryption and door	votion										
9. II		childliù car ciel	hor	ypuon										
d h	a) Vign	sai cipi	nei her											
u 0	ער און אין אין אין אין אין אין אין אין אין אי		אוכו											
10. I	Jsing T(CP/IP s	ockets, write a client server	program	to m	ake clie	ent sending	the file na	ame					
	and serv	ver to s	end back the contents of the	request	ed file	if prese	ent.							
u				. 294030										

1.00											
	ture Deriods: -	Tutorial Daviada		Total Pariods: 45							
 Simulation of ICMP pings for a network management. Perform multicast communications using appropriate simulator tools (NS2/QUALNET etc.). Examine the effect of ATM adaptation layers and service classes on the performance of the network using appropriate simulator tools (NS2/QUALNET etc.). Sharing of processed image from one host to another using Scan IP imaging software. 											
	a) TCP/IP b) UDP	, 	. ,								
	13. Simulate a Layer2 VF 14. Installation, configur	N through fibre Optical ration, classification and	l Link. I performance analysis of		CO3						
	12. Implementation of o Simulator.	listance vector routing	algorithm and Link state rou	ting algorithm using any							
	simulator.										

Course: ECA121 Data Communication Networks Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	3	3	2	-	-	3	2	-	1	1	1
CO2	3	3	2	2	3	1	-	-	1	1	-	1	1	1
CO3	3	3	2	2	2	1	-	I	2	2	-	1	2	1
CO4	3	3	2	3	3	1	-	-	3	2	-	1	2	1
ECA121	3	3	2	2.5	2.75	1.25	-	-	2.25	1.75	-	1	1.5	1

Department :	Electror Engine	nics and Communication	Progra	amme	: B.Tec	h. (EC)								
Semester : S	ixth	<u> </u>	Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Type:	LB					
	^	- N	Perio	ods / V	Veek	Credit	N	/laximum Marl	۲S					
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	ТМ					
ECA122	VLSI D	esign Laboratory	-	-	3	1.5	25	75	100					
Prerequisite	-													
	Upon	completion of the course, the	e studer	nts will	be able	e to								
Course	CO1	Examine the functionality of synthesis tool.	of the co	ombina	ational	and sequen	tial logic o	circuits using >	(ilinx ISE					
Outcome	CO2	Analyze static timing analys	is using	Xilinx	ISE too	Ι.								
	CO3	Develop Verilog HDL progra	ms and	emula	ite usin	g FPGA.								
	CO4	Build the layout of the give	en scher	matic i	using N	_ /licro wind a	nd Desigr	Schematic To	ool.					
		Develop the Spice code and	evaluat	te the r	perform	ance of the	given circi	uit through S-F	dit using					
	CO5	Tanner EDA Tool.	eruluu				Beee .							
Part – I VLSI Fr	ont End	Design												
Using HDL based design entry, perform the synthesis/simulation of following combinational/sequential sircuits using Viliax ISE Tool and generate Technology schematic and Synthesis Report														
circuits using Xilinx ISE Tool and generate Technology schematic and Synthesis Report.														
1. a) Design a	1. a) Design and verify the functionality of a 1-Bit Adder and Subtractor.													
b) Design a	Design and verify the functionality of a 1-Bit Adder and Subtractor. Design and verify the functionality of an 8-Bit Serial and Parallel adder/Subtractor.													
2. a) Design a	nd verif	y the functionality of a 4-bit u	nsigned	larray	multipl	ier.								
b) Design a	nd verif	y the functionality of a 4-bit si	igned m	ultiplie	er.									
3.a) Design a	nd verif	y the functionality of a Freque	ency Div	ider Ci	rcuit.									
b) Design a	nd verif	y the functionality of a Serial I	Data Tra	ansfer S	System				CO1					
c) Design a	nd verif	y the functionality of a 4-bit ri	pple co	unter.										
d) Design a	nd test	a Switch Debounce System.												
4. Designa	Camera	a Scanner and SPST Keypad Er	ncoder s	system										
5. Design a	a Mux/D	emux based Security System.												
6. Design o	of Code	Converters.												
7.a) Finite St	ate Mao	chine Implementation – Vendi	ing Mac	hine S	ystem									
b) Sequen	ce Deteo	ctor (Mealy and Moore)												
8. Realizat	ion of R	OM / RAM			-		-							
9. Using Xi	linx ISE	Synthesis tool, perform place	and ro	ute ba	ck annc	otation of 4-l	oit counte	r and observe	CO2					
the stat	ic timing	g analysis.	•											
Part – II Implen	nentatio	on using Spartan6 FPGA Boar	d											
10. Seven S	egment	Display												
11. LCD														
12. Traffic L	ight Cor	htroller							CO3					
13. 4x4 Mat	rix Keyp	bad												
14. UARTIN	nplemer													
Part – III VLSI B	аск Епа	Design		C . I	<u> </u>									
15. Using IV	licrowin	d and Dsch Tool, generate the	layout	of the	TOIIOWI	ng circuits:			CO1					
d) 4-Bil Cd b) 4y4 Bit I	Multinli	-Allead Adder							004					
16 Using T	nnerFC	A Tool perform the static tin	ning ana	alvcicı	ising I -	Edit and evt	ract the SI							
andveri	fy the d	esign rules.	<u>6</u> and	ary 313 C	5115 L-1		act the J							
	verter	CMOS NAND and CMOS NOR	gates						CO5					
b) CMOST	Different	tial Amplifier	Duics											
Lecture Period	s: -	Tutorial Periods: -	Practi	ical Pe	riods: 4	5 T	otal Perio	ds: 45						
Reference Boo	ks:													
1. Laboratory N	Manual,	Department of ECE, Puduche	rry Tech	nnolog	ical Uni	versity, Pud	ucherry.							
2. Stephen Bro	wn and	Zvonko Vranesic, "Fundame	ntals of	Digita	Logic	with Verilog	, Design", 1	2006, Tata Mc	Graw-					
Hill Publish	ing com	pany Ltd. New Delhi.		-	•		· ·	- 						

Course: ECA122 VLSI Design Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	3	3	2	-	-	1	2	-	2	3	2
CO2	3	3	3	3	3	2	-	-	1	2	-	2	3	2
CO3	3	3	3	3	3	2	-	-	1	2	-	2	3	2
CO4	3	3	3	3	3	2	-	-	1	2	-	2	3	2
CO5	3	3	3	3	3	2	-	-	1	2	-	2	3	2
ECA122	3	3	3	3	3	2	-	-	1	2	_	2	3	2

рерагинени. п	lumaniti	es and Social Sciences	Progra	mme : B	3.Tech. (EC)							
Semester : S	ixth		Subjec	t Catego	ory: MC	C Ser	nester Ex	am Type:	-				
Carrie Carda	6	N	Per	iods / W	Veek	Credit	Ma	ximum M	arks				
Course Code	Course	Name	L	Т	Р	С	CA	SE	TM				
SHA103	Essenc Knowl	e of Indian Traditional edge	3	-	-	-	-	-	-				
Prerequisite	-					<u>.</u>							
Course	Upon o	completion of the course, the	students will	be able	to								
Outcome	CO1	Explain and connect to the ba scientific perspective	sics of Indian	traditio	nal knov	wledge fro	om a moo	lern					
UNIT-I						Periods	: 23						
nealth tare.	WNIT-II Periods: 22 CO Philosophical tradition, Indian linguistic tradition, Indian artistic tradition.												
UNIT-II Philosophical tr	adition,	Indian linguistic tradition, India	an artistic trac	dition.		Periods	:22		CO1				
UNIT-II Philosophical tr Lecture Period	adition,	Indian linguistic tradition, India	an artistic trac Practi c	lition. cal Perio	ods:	Periods Tot	: 22	ds: 45	CO1				
UNIT-II Philosophical tr Lecture Period Reference Boo	radition, s: 45 ks:	Indian linguistic tradition, India	an artistic trac Practic	dition. c al Perio	ods:	Periods Tot	: 22 cal Perioc	ds: 45	CO1				

Course: SHA103 Essence of Indian Traditional Knowledge

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	I	Ι	Ι	Ι	Ι	Ι	Ι	Ι	Ι	-	-	I	Ι	Ι
SHA103	-	_	_	_	-	_	_	-	-	_	_	-	-	-

Department :	Electronics and Communication Engineering	Progra	mme	: B.Tee	ch. (EC)							
Semester : S	Seventh	Course	Cate	gory C	ode: PCC	Semest	er Exam T	ype: T	1			
		Perio	ds / W	/eek	Credit	N	1aximum	Marks				
Course Code	Course Name	L	T	Р	С	CA	SE	TN	M			
ECA123	Wireless Communication	3	-	-	3	25	75	10	0			
Prerequisite	-	. <u>.</u>				<u>.</u>	<u>.</u>					
	Upon completion of the course, the	e student	s will	be ab	le to							
	CO1 Demonstrate the understan	nding of a	liffere	ont tvr	pes of wireless	technolo	pgies.					
	CO2 Analyse the different multip	ath fadi	ng ma	dels.			- <u></u>					
Course	CO3 Analyse the BER and capacit	v perfor	manc	e unde	er different fac	ding chan	nels.					
Outcome	CO4 Summarise the different div	versity an	id eau	Jalizati	ion techniques	s of multi	nath envi	ronme	nt.			
UNIT-I	Wireless services	ererey an			Periods: 9							
Applications ar	nd Requirements for wireless services	- Types	of Wi	reless	services. Real	uirements	s for servi	ces.				
Technical Cha	llenges. Trend in Cellular radio and	persona	al cor	nmuni	ication. Secon	nd genera	ation Cell	ular				
Networks, Third Generation (3G) Wireless Networks, LTE, LTE-A, Wi-Max, Wireless Local Loop (WLL),												
Wireless Local Area network (WLAN), Bluetooth and Personal Area Networks												
UNIT-II Large Scale Multipath Propagation Periods: 9												
Large scale Path loss and shadowing: Wireless communication Environment, Radio Wave Propagation,												
Transmit and R	eceive Signal Models, Free-Space Pat	h Loss, R	ay Tra	acing,	Empirical Path	n Loss Mo	dels,		CO2			
Simplified Path	Loss Model, Shadow Fading, Combine	ed Path Lo	oss ar	nd Sha	dowing.							
UNIT-III	Small Scale Multipath Propagation				Periods: 9							
Small Scale M	ultipath propagation: Impulse respon	nse of a	multi	path r	nodel, Multip	ath Paran	neters- Ti	me				
dispersion, Col	nerence bandwidth, Doppler spread a	nd cohei	rence	time.	Types of smal	l scale fa	ding - Fad	ing	CO2			
effects due to	Delay and Doppler spread. Statistical	Multipat	th Cha	annel	Models: Rayle	igh and R	ician					
distribution.												
	Performance and Capacity Analysis			_	Periods: 9	-						
Block diagram	of wireless Communication system. D	Demodul	ation	: Dem	odulator struc	ture, erro	or probab	ility				
In AWGN chan	nels, Error Probability in flat fading c	inanneis,	Erro	r Prod	ability in Delay	y and Fre	quency		CO3			
Channel State	ng Channels. Capacity Analysis:	city of Fia	at iau ty of f		anneis, Chann	el and sy	stem moc	iei,				
	Borformance Enhancement Techni	r, Capaci	LY UT I	reque			anneis.		,			
UNIT-V	(Qualitative Treatment only)	ques			Periods: 9							
Diversity – M	icro and Macro diversity Transmit [Diversity	with	and v	vithout Chann	el state	Informati	on				
Diversity comb	pining techniques. Equalisation – Ada	ptive ea	ualiza	tion. I	Linear and No	n-Linear	equalizati	on.				
Zero forcing an	nd LMS Algorithms. Introduction to M	1IMO Wi	reless	Comr	munications. N	AIMO Svs	tem Mod	el.	CO4			
SVD of MIMO, MIMO Capacity Analysis for static and fading channels. Introduction to Multiuser MIMO.												
Lecture Period	s: 45 Tutorial Periods: -	Practic	al Pe	riods:	- To	tal Perio	ds: 45	i				
Reference Boo	ks:	.1										
1. Andreas F.	Molisch," Wireless Communications",	John Wil	ey Pre	ess, se	cond Edition,2	011.						
2. Andrea Go	ldsmith, "Wireless Communications",	Cambrid	Ige Ur	niversi	ty Press, 2005							
3. Theodore	S.Rappaport, "Wireless Communication	n: Princip	oles ai	nd Pra	ctice", PHI, See	cond Editi	ion, 2006.					
4. David Tse	and Pramod Viswanath, "Fundament	als of W	/ireles	s Con	nmunications"	, Cambrid	dge Unive	rsity P	ress,			
2006.												
5. Aditya.K.Je	gannathan, "Principles of Modern Wir	eless Cor	nmur	nicatio	n Systems",Ta	ta McGra	w Hill, 201	16.				

Course: ECA123 Wireless Communication

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	3	2	1	1	1	-	-	-	-	1	1	2
CO2	3	3	3	2	2	1	1	-	-	-	-	1	3	2
CO3	3	3	3	2	1	1	1	-	I	-	-	1	2	2
CO4	3	1	1	1	1	-	-	-	-	-	-	1	1	1
ECA123	3	2	2.5	1.75	1.25	1	1	-	-	-	-	1	1.75	1.75

Department :	Electror Engine	nics and Communication eering	Progr	amme	: B.Tec	h. (EC)							
Semester : S	eventh		Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Typ	e: TY				
	6	- NI	Perio	ods / V	Veek	Credit	N	laximum Ma	arks				
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TM				
ECA124	Inforr	nation Theory and Coding	3	-	-	3	25	75	100				
Prerequisite	-			4	-åå		.	å					
	Upon	completion of the course, the	studen	ts will	be able	e to							
	CO1	Apply the concept of entrop	by and d	lifferei	nt chan	nel models t	o solve nu	merical pro	blems.				
Course	CO2	Construct block codes, BCH	,RS cod	es and	l convo	lutional code	es						
Outcome		Develop an in-depth under	standin	g of c	oncate	nated codes	and exhib	oit proficien	cy in the				
	CO3	design of Turbocodes.		•				•	•				
	CO4 Interpret the concepts involved in the detection of signals corrupted with noise.												
UNIT-I	Introduction to Information Theory Periods: 9												
Measure of inf	of information- Entropy of symbols –Continuous and discrete cases, Conditional entropies- Mutual												
information ar	nd Trans	s information. Discrete mem	oryless	chann	els-Cha	annel repres	entations-	noiseless	CO1				
channel, lossle	ss chanı	nel, deterministic, Binary Symi	metric o	hanne	el, Binar	y Erasure ch	annel and	their	COI				
capacities. Cor	tinuous	s and discrete channels with no	oise- Sha	annon	Hartley	theorem an	id its impli	cations.					
UNIT-II	Error	Control Coding: Block Codes, I	BCH and	RS Co	odes	Periods: 9							
Definitions and	l Princip	les: Hamming weight, Hammi	ng dista	nce, N	/linimur	m distance d	ecoding.						
Single parity of	codes, I	Hamming codes, Repetition	codes	- Line	ar bloc	ck codes, Cy	clic code	s. Syndrom	e CO2				
calculation, End	coder ar	nd decoder. Basic principle of I	BCH and	d RS co	des								
UNIT-III	Error	Control Coding: Convolutional	Codes			Periods: 9			*				
Encoding of Co	nvolutio	onal codes, Structural propert	ies, Dist	ance p	propert	ies, Viterbi D	ecoding A	lgorithm fo	ſ				
decoding, Soft-	-output	t Viterbi Algorithm, Stack and	d Fano	seque	ntial de	ecoding Algo	orithms, M	ajority logi	; CO2				
decoding.													
UNIT-IV	Error	Control Coding: Concatenate	ed Code	es & T	'urbo	Pariods: 9							
	Codes	6				1 01003. 5							
Single level Cor	ncatena	ted codes, Multilevel Concate	nated co	odes, S	Soft dec	cision Multist	tage decoc	ling,					
Concatenated	coding	schemes with Convolutional	Inner o	codes,	Introd	uction to Tu	rbo codin	g and their	CO3				
distance prope	rties, De	esign of Turbo codes.											
UNIT-V	Detec	tion of Signals and Channel	s With	Noise		Periods: 9							
Hypothesis tes	ting- Ba	aye's criterion Minimum erro	r proba	bility	criterio	n, Neyman I	Pearson cr	iterion, Mir	⁾⁻ cod				
max criterion N	/laximu	m likelihood detector- Wiener	filter.						04				
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	riods: -	Т	otal Period	ds: 45					
Reference Boo	ks:												
1. Das, S.K.Mu	ullick an	d P.K.Chatterjee, "Principles of	f Digital	Comm	nunicati	on", Wiley E	astern Lim	ited, 1986.					
2. Shu Lin & Da	aniel J. C	Costello, Jr, "Error Control Codi	ing", Pe	arson	/ Prenti	ce Hall, Seco	nd Edition	, 2004.					
3. R Bose, "Inf	ormatio	on Theory, Coding and Cryptog	raphy",	TMH	2007. (F	or units-3,48	&5)						
4. K.SamShan	mugam	, "Digital and Analog Communi	ication S	System	ıs", Johi	n Wiley and S	Sons, 1985						

5. Simon Haykin, "Communication Systems", John Wiley and Sons, Fourth Edition.

Course: ECA124 Information Theory and Coding

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1	Ι	1	Ι	1	Ι	Ι	_	_	1	2	1
CO2	3	2	1	_	1	_	1	_	-	_	_	1	2	1
CO3	3	2	1		1	_	1		-	_	_	1	2	1
CO4	3	2	1	_	1	_	1	_	-	_	_	1	2	1
ECA124	3	2	1	-	1	_	1	-	-	_	_	1	2	1

Department : I	Electron Engine	ics and Communication	Progr	amme	:B.Tec	h. (EC)							
Semester : S	eventh	5	Cours	e Cate	gory Co	ode: PCC	Semest	er Exam T	vpe: TY				
			Perio	nds / M	/eek	Credit	N	laximum l	Marks				
Course Code	Course	e Name	1	Т	P	C	 СА	SF	TM				
ECA125	Embe	dded System	3	-	-	3	25	75	100				
Prerequisite	-		<u>.</u>			<u>.</u>		<u>.</u>					
	Upon	completion of the course, the	studen	ts will	be able	e to							
	CO1	Classify the different types o	f I/O de	vices a	nd the	protocols us	ed for seri	ial commu	inication.				
Course	CO2	Interpret the programming	, concept	ts and (develo	p C programs	for embe	dded syst	ems.				
Outcome	CO3	Evaluate the performance o	f real ti	me ope	erating	svstem.		······					
	CO4	Evaluate the embedded syst	em usir	ng faul	t tolera	ant analysis.							
	CO5	Develop low power embedd	led syst	em mo	dels u	sing power re	ductions	technique	S.				
UNIT-I	Intro	duction			acio a	Periods: 9		ceeninque					
Introduction to	Embed	ded Systems - Design Metrics	– Chall	enges	in Fmh	edded system	n Design -	Design fl	ow -				
Embedded Pro	ressors	- IC Terminology - Full-Cust	m/\/IS	l – Ser	ni-Cust	tom $\Delta SIC - P$	I D Introdu	iction to	RISC				
architecture V	cture, VLIW and DSP processors. Introduction to I/O Devices – Types - Synchronous, Iso-synchronous												
and Asynchron	cture, VLIW and DSP processors. Introduction to I/O Devices – Types - Synchronous, Iso-synchronous CC vnchronous Communications – Serial Communication – 12C, USB, CAN – Wireless Communication –												
IrDA	ynchronous Communications – Serial Communication – I2C, USB, CAN – Wireless Communication –												
UNIT-II	A. T-II Programming for Embedded Systems Periods: 9												
Programming i	n assem	bly language (ALP) vs High Lev	/el Lang	uage -	C Prog	gram Element	s:- Macro	s and					
functions, Use	of Date	Types, Structure, Pointers, Fu	unction	Calls -	- Progr	am Modeling	g Concept	s – Progra	im CO 2	2			
Models- DFG M	lodels –	FSM Models – Modeling of M	ultiproc	essor S	System	IS.		0					
UNIT-III	Real-t	time Operating Systems				Periods: 9							
Real Time Ope	erating	Systems – Structure of a R	tos –	Proces	s – Ta	ask – Thread	ls – Task	Schedulir	1g —				
Classification of	of Sched	luling Algorithms – Event Dr	iven Sc	heduliı	ng –Ra	te monoton	ic schedu	ling – Ear	liest				
deadline first so	chedulin	g. Inter Process Communication	on:- Sha	ared da	ta pro	blem, Use of	Semaphor	e(s), Prior	ity CO3	3			
Inversion Prob	lem and	d Deadlock Situations - Eval	uating o	operat	ing sys	stem perforn	nance – F	Power					
optimization st	rategies	for processes.											
UNIT-IV	Reliat	pility Evaluation Techniques				Periods: 9							
Introduction t	o Relia	bility Evaluation Techniques	5 – Re	liability	/ Moc	lels for Har	dware Re	edundancy	/ -				
Permanent fau	lts only	y - Transient faults. Introdu	ction to	o clock	syncl	hronization -	- A Non-l	Fault-Tole	rant				
Synchronizatio	n Algori [.]	thm - Fault-Tolerant Synchror	nization	in Har	dware	– Completel	y connect	ed zero	CO4	4			
propagation tir	ne syst	em – Sparse interconnection	zero p	ropaga	ition ti	ime system -	-Fault tole	erant anal	ysis				
with Signal Pro	pagatio	n delays.											
UNIT-V	Low P	Power Design				Periods: 9							
Sources of Pow	ver Diss	ipation–Power Reduction Tec	hniques	s–Algo	rithmic	c Power Mini	mization–	Architect	ıral				
Power Minimiz	ation–	Logic and Circuit Level Powe	er Minir	nizatio	n – C	ontrol Logic	Power M	inimizatio	n – cor	-			
System Level P	ower N	1anagement. Internet of Thin	gs – Re	quiren	nents,	Characteristi	cs and Ap	plications	; - COS	כ			
Smart Lighting -	- Smart	Traffic Light Control – Smart P	arking a	and Sm	art Irri	gation.							
Lecture Periods: 45 Tutorial Periods: - Practical Periods: - Total Periods: 45													
Note : Every student should carry out a mini project for this course and submit the report instead of assignment.													
Reference Boo	ks:												
1. Rajkamal, '	'Embed	ded Systems Architecture", F	Program	nming	and D	esign, TATA	McGraw	Hill, Seco	nd reprint	t,			
2008.													
2. C.M.Krishna	a and Ka	ng G. Shin, "Real Time System	s", TATA	A McGr	aw-Hi	ll, Third reprir	nt <i>,</i> 2010.						
3. Wayne Wo	lf, "Com	puters as Components: Princi	ples of	Embec	Ided Co	omputing Sys	stem Desig	gn", Morg	an				
Kaufmann I	Publishe	rs, Third reprint, Harcourt Ind	ia, 2012										
4. Santanu Ch	attopad	hyay, "Embedded System Des	ign", Pro	entice	Hall of	India Learnir	ıg, 2013.						
5. David E.Sim	ion, "An	Embedded Software Primer",	Pearso	n Educ	ation A	Asia, First Indi	an Reprin ⁻	t, 2000.					

Course: ECA125 Embedded Systems

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	3	2	2	1	1	_	Ι	Ι	-	1	1	3
CO2	3	3	3	3	3	1	1	-	2	2	-	1	3	3
CO3	3	2	3	2	2	1	1	_			_	1	1	3
CO4	3	2	3	3	2	1	1	-	-	-	-	1	1	3
CO5	3	3	3	2	3	1	1	-	2	2	-	1	3	3
ECA125	3	2.4	3	2.4	2.4	1	1	_	2	2	_	1	1.8	3

Department :	Electron Engine	ics and Communication	Progr	amme	: B.Tec	h. (EC)						
Semester : S	eventh		Cours	e Cate	gory Co	ode: PCC	Semest	er Exam Typ	e: LB			
Course Code	Cours	Namo	Peri	ods / V	Veek	Credit	N	1aximum M	arks			
Course coue	Course		L	Т	Р	С	CA	SE	TM			
ECA126	Wirele Labora	ess Communication atory	-	-	3	1.5	25	75	100			
Prerequisite	-			-								
	Upon	completion of the course, the	studen	nts will	be able	e to						
6	CO1	Practically analyze the c communication link	ompon	ents	of trar	nsmitter and	d receive	er of a w	ireless			
Outcome	CO2	Examine the error performa error correction codes.	ince of	mobile	e radio l	links for digit	al modula	ition schem	es and			
	CO3 Examine the working of GSM, CDMA, WLAN and Wireless sensor networks.											
	CO4Analyse the parameters of a RF network using Vector Network Analyser.											
	 CO5 Build the algorithms of speech and images processing related to wireless communication 											
List of Experim	ents											
 Establishn Design an 	nent and d testing	l study of Wireless Communic g of GMSK Modulator and stud	ation Li ly its sp	ink at X ectrum	(band t n using	o transmit vo Spectrum an	oice. alyser.		CO1			
 Simulate f and comp SIMULINK Simulate a a) Cyclic channel w 	the effect oute sym C. and stud redunda vith vary	ct of noise on Quadrature Pha bol error rate, bit error rate a y the performance of error de ancy check and b) Hamming ing error probabilities.	se Shift nd a sca tection codes u	atter p and cc using N	g and Q lot of tl prrectio MATLAE	Quadrature A he modulate n codes: 3 SIMULINK 1	mplitude d signal us for a Bina	Modulation sing MATLA ry symmetr	з со2 у			
 Performan a) GSM N b) WLAN c) Hetero 6. a) Simular 7. b) Design 8. Establish a 	nce anal etwork. Networl geneous tion of H and imp and stud	ysis of Wireless Networks usin k. s network of GSM and WLAN. and off mechanisms in Cellula plementation of PAN Networks y a Prototype Wireless Sensor	g QualN r Mobil s using l Netwo	Net: e Com NETSIN rk usin	munica Л. Ig NI La	tions using N bVIEW.	IETSIM.		СО3			
 Design and testing of Yagi antenna using Vector Network Analyzer. Study the characteristics of MIC components using Vector Network Analyser. 												
11. Simulate a 12. Simulate a	and stud and stud	y algorithms for Speech signal y algorithms for Image proces	proces sing.	sing.					CO5			
Lecture Period	s: -	Tutorial Periods: -	Pract	ical Pe	riods: 4	5 To	otal Perio	ds: 45				
Reference Boo	ks:											
1. Laboratory N	Aanual F	Prepared by the Department o	f ECE, P	TU.								
2. Andrea Gold	smith, "۱	Wireless Communications",Ca	mbridg	e Univ	ersity P	ress (2005))			
3. Frank Gustra	u, "RF ar	nd Microwave Engineering– Fu	indame	ntals o	t Wirele	ess Commun	ications",	Wiley (2012).pdt			

Course: ECA126 Wireless Communication Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2	1	2	2	-	_	-	2	1	-	1	1	1
CO2	1	2	1	2	2	Ι	Ι	Ι	2	1	Ι	1	1	1
CO3	1	2	1	2	2	Ι	-	Ι	2	1	Ι	1	1	1
CO4	1	2	1	2	2	Ι	Ι	-	2	1	Ι	1	1	1
CO5	1	2	1	2	2	_	_	_	2	1	_	1	1	1
ECA126	1	2	1	2	2	_	_	_	2	1	_	1	1	1

Department : Electronics and Communication Engineering			Programme : B.Tech. (EC)										
Semester : Seventh				e Cate	gory Co	Semest	mester Exam Type: LB						
Course Code	Cours	Periods / Week C			Credit	N	Maximum Mark						
Course Coue	Course	L	Т	Р	С	CA	SE	TM					
ECA127	Embe	dded System Laboratory	-	-	3	1.5	25	75	100				
Prerequisite	-												
	Upon completion of the course, the students will be able to												
Course	CO1	CO1 Examine the issues involved in embedded system design.											
Outcome	CO2	Apply microcontroller programming and interfacing skills.											
outcome	CO3	Design, develop and test the embedded systems.											
	CO4	Develop the program and analyse codes using an IDE.											
	CO5 Implement and test small scale embedded systems.												
List of Experim	ents												
1. Introduction to the development environment - Blinking LEDs													
2. Serial	Commun	ication between the microcon	troller	and PC									
3. Digital	rigital Clock												
4. Digital	4. Digital Voltmeter												
5. AULOII	5. Automatic intensity Controlled Light												
7 Tomporature Measurement and Display													
7. Tempe 8 Hot Ch	8 Hot Chamber Temperature Controller												
9. Obsta	Obstacle Detector												
10. Passw	assword based Security Lock												
Lecture Period	ure Periods: - Tutorial Periods: - Practical Periods: 45 Total Periods: 45												
Reference Boo	ks:		1										
1. Laboratory Manual Prepared by the Department of ECE, PTU.													
2. Jonath Learni	 Jonathan. W. Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition, Cengage Learning, 2012. 												

Course: ECA127 Embedded Systems Laboratory

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	2	1	1	Ι	2	-	Ι	1	1	3
CO2	3	3	3	3	3	1	1	Ι	2	2	Ι	1	3	3
CO3	3	3	3	3	3	1	1	Ι	2	_	Ι	1	1	3
CO4	3	3	3	3	3	1	1	Ι	2	-	Ι	1	1	3
CO5	3	3	3	3	3	1	1	Ι	2	2	Ι	1	3	3
ECA127	3	3	3	2.8	2.8	1	1	Ι	2	2	-	1	1.8	3
Department : I	Electronics a Engineerin	and Communication	Progr	amme	: B.Tec	h. (EC)								
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Semester : S	eventh		Cours	e Cate	gory Co	de: PAC	Semeste	er Exam Typ	e: -					
Course Code	Course No.		Perio	ods / V	Veek	Credit	N	laximum Ma	arks					
Course Code	Course Na	ne	L	Т	Р	С	CA	SE	ТМ					
ECA128	Mini Proje	ct	-	-	2	1	100	-	100					
Prerequisite	-													
	Upon com	pletion of the course, the	e studen	ts will	be able	e to								
	CO1 Der	nonstrate the understar	iding of	state c	of art te	chnology a	nd objectiv	e of the pro	ject.					
Course	CO2 An	alyze problems / create a	a new pi	roduct	proces	s.								
Outcome	СОЗ Ар	ply knowledge and skills	s acquir	ed to i	dentify	a solution	for specific	problem o	r an issue.					
	CO4 Im	plement and evaluate th	e propo	sed so	lution/	developed	projects.							
	CO5 Do	cument the findings of t	ne repor	rt and I	make e	ffective pre	sentation.							
	. L		Mini Pr	oject										
The students v areas but with Engineering, In i) Con ii) Sig iii) Ima iv) Bio v) Dat vi) VLS vii) Em vii) Rol ix) Inte xi) Cry In the course of project work is supervision of a	will carry out substantial formation Te mmunication nal Processin age Processin o-Medical Ele ta Communic Si bedded Syst botics ernet of Thin cificial Intellig yptography a of the degree in the area a faculty. The itted at the e	t a project in one of th multidisciplinary compo- echnology, Mechanical En- ng ng ctronics cation ems gs gence nd Security e programme each grou of their specialization e progress of the work w end of the semester after	p of not and the vill be m	t more e mini onitor	e than t i projection i project	cs and com ical Engine edical Engin chree stude ct will be assessed ir oject work.	nts has to implement iternally. A	identify a n ed under project rep	ng ce CO1 CO2 CO3 CO4 CO5					
Lecture Period	s: -	Tutorial Periods: -	Practi	ical Pe	riods: 3	0 .	Total Period	ds: 30	<u>i</u>					

Course: ECA128 Mini Project

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	1	1	1	1	3	3	2	2	3	2
CO2	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO3	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO4	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO5	-	-	-	-	-	-	-	-	3	3	3	3	3	3
ECA128	3	3	2.75	2.75	2.5	1	1	1.75	3	3	2.2	2.2	3	2.2

Department :	Electror Engine	nics and Communication	Progra	amme	: B.Te o	ch. (EC)					
Semester : S	eventh		Cours	e Cate	gory C	ode: MCC	Semest	er Exam Type:	-		
Course Code	Cours	o Namo	Perio	ods / W	/eek	Credit	N	1aximum Marl	٢S		
Course Coue	Cours		L	Т	Р	С	CA	SE	ТМ		
ECA129	Profes	ssional Ethics	2	-	-	Non-Credit	-	-	-		
Prerequisite	-										
	Upon	completion of the course, the	e studen	ts will	be abl	e to					
Course	CO1	Demonstrate the understan	ding of t	he eth	ical ar	nd moral princi	iples.				
Outcome	CO2	Identify the ethical problem	ns and a	nalyze	them.						
••••••	CO3	Interpret and confront mor	and d	ilemm	as.						
	CO4	Demonstrate the understan	ding of t	he ma	jor etł	nical theories.					
CO5 Apply ethical theories to resolve moral issues.											
UNIT-I Ethics and Moral Principles Periods: 6											
Profession – Morals – Ethics and Moral – Professional Ethics – Ethics and Science. Types of Ethics – con											
Normative Eth	ics, Meta	a-Ethics and Applied Ethics.									
	Analy	sis of Ethical Problems				Periods: 6					
Ethical problen	ns and a	inalysis – Engineering Ethics –	Micro-E	thics,	Macro	-Ethics. Ethica	l analysis	– Normative	CO2		
	Mora	juli y aliu Factual Iliquii y – Cas I Dilemmas	sestudy	•		Pariods: 6					
Moral Dilemm		finition – examples of moral	dilemm		nothor	ferious. o	olving m	oral dilamma			
Kohlberg's the	orv of m	ioral development – Heinz's d	ilemma	– Gillig	pan's t	heory – Case s	study. Cor	orar unerrinas	,. CO3		
Controversy –	Authorit	y and Autonomy – Multiple N	lotives -	- Safety	y in En	gineering.					
UNIT-IV	Ethica	al Theories				Periods: 6					
Ethical Theorie	s – Virt	ue Ethics: Aristotle and Mac	Intyre, L	Jtilitari	ian Eth	nics: Act Utilita	arian and	Rule	~~		
Utilitarian, Dut	y Ethics	and Rights Ethics - Case Study	<i>.</i>						C04		
UNIT-V	Applic	ation of Ethical Theories				Periods: 6					
Engineering as	Social Ex	xperimentation.							CO5		
Lecture Periods: 30 Tutorial Periods: - Practical Periods: - Total Periods: 30											
Reference Boo	ks:										
 Mike W. M Charles B. F Charles E. I Thompson John R Boa Edmund G 	artin and Fledderr Harris, N Wadswo tright, "I Seebau	d Roland Schinzinger, "Ethics i nann, "Engineering Ethics", Pe Aichael S. Pritchard and Micha orth, A Division of Thomson Le Ethics and the Conduct of Bus er and Robert L Barry, "Funda	n Engine earson P ael J. Ra earning iness", P ametals	eering" rentice bins, " Inc., Ui Pearsoi of Ethi	', Tata e Hall, I Engine nited S n Educ cs for	McGraw Hill, I New Jersey, 20 eering Ethics – itates, 2000. ation, New De Scientists and	New Delh 004. Concepts Ihi, 2003.	i, 2003. s and Cases", s". Oxford Uni	versitv		

Press, Oxford, 2001.

Course: ECA129 Professional Ethics

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	Ι	Ι	Ι	Ι	2	2	3	3	3	3	3	Ι	Ι
CO2	1	Ι	Ι	Ι	Ι	2	2	3	3	3	3	3	Ι	Ι
CO3	1	-	Ι	-	Ι	2	2	3	3	3	3	3	Ι	Ι
CO4	1	Ι	-	Ι	-	2	2	3	3	3	3	3	Ι	-
CO5	1	_	-	_		2	2	3	3	3	3	3	_	-
ECA129	1	_	-	_	_	2	2	3	3	3	3	3	_	-

Department :	Electron Engine	ics and Communication pering	Progra	amme	: B.Tech	h. (EC)						
Semester : E	ighth		Cours	e Cate	gory Co	de: PAC	Semeste	er Exam Type:	-			
Course Code	Cours	-	Perio	ods / V	Veek	Credit	M	laximum Marl	٢S			
Course Code	Cours	e	L	Т	Р	h. (EC) ode: PAC Semester Exam Type: - Credit Maximum Marks C CA SE TM 1 100 - 100 e to within a specified time limit. ck the competitive examinations. erviews. ge of the undergraduate students, r broad areas of electronic circuits, . This viva-voce also prepares the						
ECA130	Comp	rehensive Test	-	-	2	1	100	-	100			
Prerequisite	-				<u>.</u>							
	Upon completion of the course, the students will be able to											
Courso	CO1	Evaluate the technical strer	ngth in tl	he cor	e area.							
Outcome	CO2	Choose answers for questic	ons in pr	ecise r	nanner	within a sp	ecified time	e limit.				
Outcome	CO3	Build the technical skill to f	ind the o	criteria	to crac	k the com	petitive exa	minations.				
	CO4	Develop confidence to app	ear for p	olacem	nent inte	erviews.						
		Con	nprehen	sive To	est							
The comprehe pertaining to the communication students for the knowledge.	nsive vi he subje n systen eir com	va-voce is intended to test ects covered in the previous s ns, electromagnetic waves a petitive examinations like GA	the dom emester and sign TE, IES a	nain kr rs fallir al pro nd als	nowledg ng unde cessing o enabl	ge of the u r broad ard . This viva es them to	undergradua eas of electi -voce also self-assess	ate students, ronic circuits, prepares the their domain	CO1 - CO4			
Lecture Period	s: -	Tutorial Periods: -	Practi	ical Pe	riods: 3	0	Total Period	ls: 30				

Course: ECA130 Comprehensive Test

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	Ι		-	1	Ι	-	-	1	3	3
CO2	3	3	3	2	Ι	Ι	Ι	1	Ι	Ι	Ι	1	3	3
CO3	3	3	3	2	_	_	-	1	_	-	-	1	3	3
CO4	3	3	3	2	_	_	-	1	_	3	-	1	3	3
ECA130	3	3	3	2	_	_	_	1	_	3	_	1	3	3

Department :	Electror Engine	nics and Communication eering	Progr	amme	: B.Tec	h. (EC)									
Semester : I	Eighth		Cours	e Cate	gory Co	ode: PAC	Semest	er Exam Typ	e: -						
Course Code	Cours	o Namo	Perio	ods / V	Veek	Credit	Ν	/laximum Ma	arks						
Course coue	Cours	ename	L	Т	Р	С	CA	SE	TM						
ECA131	Interr	nship	-	-	-	2	100	-	100						
Prerequisite	-														
	Upon	completion of the Internship,	iship, the students will be able to												
	CO1	Develop expertise on one of	r more a	applica	lications of the core courses										
Course	CO2	Build expertise in the field for	or a car	eer tra	nsition	•									
Outcome	CO3	Build professional networking	ng.												
	CO4	Develop valuable skills and l	knowled	dge.											
	CO5	Perceive an idea of industri	al and c	organiz	ational	l/company	setup								
			Intern	ship											
• The main	purpose	of internship is to enhance	the gei	neral p	orofessi	ional outlo	ook and cap	ability of th	e						
student to	advance	his chances of improving the	career	opport	tunities				CO1						
The stude	nt is re	quired to undergo ' <i>internshi</i>	p' in ir	ndustry	//res	earch labo	oratory / hi	gher learnii	ng -						
institution	for a m	inimum period of 6 weeks in	a max	imum	of 3 sp	pells during	g vacations.	Each spell	of CO5						
internship	shall be	for a period of not less than 2	weeks.												
The studer	nt will m	nake the presentation for a d	uration	of 20	to 25 i	minutes ar	nd also subr	nit a detaile	d						
report afte	r comple	etion for the purpose of assess	sment.												
Lecture Period	ls: -	Tutorial Periods: -	Pract	ical Pe	riods: -		Total Perio	ds: -							

Course: ECA131 Internship

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	1	3	1	1	1	2	2	2	2	3	2
CO2	3	2	2	1	3	1	1	1	2	2	2	2	3	2
CO3	3	2	2	1	3	1	1	1	2	2	2	2	3	2
CO4	3	2	2	1	3	1	1	1	2	2	2	2	3	2
CO5	3	2	2	1	3	1	1	1	2	2	2	2	3	2
ECA131	3	2	2	1	3	1	1	1	2	2	2	2	3	2

Department :	Electror Engine	nics and Communication	Progr	amme	: B.Tecl	h. (EC)							
Semester : E	ighth		Cours	e Cate	gory Co	de: PAC	Semest	er Exam Type	: PR				
Course Code	Cours	e Name	Perio	ods / W	/eek	Credit	N	1aximum Mar	ks				
Course Coue	Cours	e Name	L	Т	Р	С	CA	SE	ТМ				
ECA132	Proje	ct Work	-	-	8	8	60	40	100				
Prerequisite	-												
	Upon	completion of the course, the	e studen	ts will	be able	e to							
CO1 Demonstrate the understanding of state-of-the-art technology, objective and different pha of the project work.													
Course CO2 Analyze problems / create a new product process.													
Outcome	CO3	Apply knowledge and skil issue.	lls acqu	ired to	o ident	ify a soluti	on for sp	ecific proble	m or an				
	CO4	Implement the project using	g hardw	vare / s	oftwar	е.							
	CO5	Evaluate the solution agains	st bench	n mark	standa	rds.							
	CO6	Document the findings of th	ne repor	rt and i	make e	ffective pre	sentation.						
			Project	Work									
Each batch of 2 under the supe	2 or mo ervision	re students will be assigned a of a guide.	n exper	imenta	al or a s	imulation p	project to b	e carried out					
The student is laboratory / hig	given ar gher lea	n option to carry out this proje rning institution.	ect worl	k eithe	r in the	college or	in an indus	try / research	CO1 CO2				
The project wo	ork will	be carried out under the sup	ervision	n of a p	project	guide from	the depar	tment. In the	e CO3				
case of studer	nt carry	ing out the project work ou	tside th	ne colle	ege, an	external g	guide from	the relevant	t CO4				
organization sh	hall be a	ssigned in addition to the inte	rnal guio	de fror	n the d	epartment.			CO5				
Students will I	be conti	inuously monitored and asse	essed re	gardin	g the p	progress of	their wor	k and will be					
advised suitabl	y throug	sh a panel of review committe	e.			~~ .		1. 120					
Lecture Period	s: -	Tutorial Periods: -	Pract	ical Pe	riods: 1	20	lotal Period	ds: 120					

Course: ECA132 Project Work

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	1	1	1	1	3	3	2	2	3	2
CO2	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO3	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO4	3	3	3	3	3	1	1	2	3	3	2	2	3	2
CO5	2	2	3	3	2	1	1	2	3	3	2	2	3	2
CO6	-	-	-	-	-	-	-	-	3	3	3	3	3	3
ECA132	2.8	2.8	2.8	2.8	2.4	1	1	1.8	3	3	2.17	2.17	3	2.17

Professional Elective Courses

Department : I	Electror Engine	nics and Communication	Progra	amme	: B.Tec	:h. (EC)							
Semester : F	ourth		Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Ty	pe: TY				
	A A A A	- N	Peric	ods / W	/eek	Credit	N	1aximum N	larks				
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TM				
ECA201	Rando Proce	om Variable and Random sses	3	-	-	3	25	75	100				
Prerequisite	Basic	knowledge on communication	theory.			*							
	Upon	completion of the course, the	e studen	ts will	be abl	e to							
Course	CO1	Demonstrate the understand	ding of t	he bas	ic prob	bability theor	y and rand	dom variab	les.				
Outcome	CO2	Extend the random variable	knowle	dge to	rando	m process.							
Outcome	CO3	Evaluate the response of rar	ndom siរ្	gnals to	o linea	r systems.							
	CO4	Demonstrate the understan	ding of t	he bas	sics of	Markov proce	ess.						
	CO5	Apply Random Variable and	d Randoi	m Proc	esses	theory for pr	actical sys	tems.					
UNIT-I	Introd	luction to Probability theory a	and ran	dom		Periods: 9							
	variab	les											
Mathematical, deterministic, probability models Sample space- discrete and continuous. Baye's Law, Probability law- Binomial, Multinomial, Geometric laws, Bandom variable – Discrete random variables and													
Probability law- Binomial, Multinomial, Geometric laws. Random variable – Discrete random variables and continuous random variables- cumulative distribution function, probability density function, expectation													
continuous random variables- cumulative distribution function, probability density function, expectation,													
variance.													
	Rando	om process		-	с	Periods: 9	•	• • •					
Gaussian- Rand	iom var	Table, joint Gaussian random	variable	e, Iran	storma	ation of Gaus	sian rand	om variabl	e. CO2				
random vector,	, randor s. Dotor	ministic and Non-deterministi	c proces		ntinuo	imit theorem	om proces	ss, stationa	ry				
	S. Deter	ral characteristics of random	nrocess	3C3. CC		Periods: 9	•		<u> </u>				
Power spectral	density	v = continuous time and discre	te time	rando	m nro	ress Respons	e of linea	r systems t	o CO3				
random signals	– cont	inuous time and discrete time	e system	is. Pov	ver spe	ectrum densi	tv nroner	ties. Frønd	ic COS				
theorems.					iei op		c) proper						
UNIT-IV	Introd	luction to Markov process				Periods: 9			<u>i</u>				
Discrete time N	/arkov (chains –n-step transitional pro	babiliti	es, stat	te prot	babilities and	steady sta	ate	CO4				
probabilities. C	Continuo	ous time Markov chains –stat	te occuj	pancy	times,	transition ra	ates and s	steady stat	e				
probabilities. El	ements	of queueing systems, Little's f	formula	•									
UNIT-V	Practi	cal Applications				Periods: 9							
Probability mo	del of a	voice transmission system.	Kalman	filter, l	Bandpa	ass, Band lin	nited and	Narrowba	nd				
random proces	s with e	example. Characterization of w	vhite an	d colo	red no	ise by power	spectrum	with	CO5				
relevant examp	ole.												
Lecture Periods	s: 45	Tutorial Periods: -	Practi	cal Per	riods: -	· T(otal Perio	ds: 45					
Reference Bool	ks:				-		-	-					
1. Alberto Leo	n-Garcia	a, "Probability and Random pr	rocess fo	or Elec	trical E	Engineering",	Second e	dition, Pea	rson				
Education, 1	.994. 				21. and 1	Dutin at a la - // •		1:11 1	ional				
2. Peyton Z.Pe	ebies, "	Propability Kandom Variables	and Kar	naoms	signal I	Principles", N	ic-Graw-F	iiii internat	lional				
a John A Gubr	uniudi E	ingineering series, 1987.	as for El	octrica	al and (Computer Eng	tingers" (ambridge	Iniversity				
Press 2006	iei, Pl(boability and random Process	CS IUI EI	ecifica		computer ch	sincers, (annunde	University				
4. Charles The	errien N	/urali Tummala, "Probability :	and Ran	ldom P	rocess	ses for Flectri	cal and C	omputer					
Engineers".	Second (edition, CRC press.2018.						emparer					
5. Venkataram	a Krishr	an, "Probability and Random P	vrocess"	, Wiley	Inters	science, 2006							

Course: ECA201 Random Variable and Random Processes

со	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	2	2	Ι	Ι	Ι	Ι	-	Ι	1	2	Ι
CO2	2	3	2	2	2	Ι	Ι	Ι	Ι	-	Ι	1	2	Ι
CO3	3	3	1	3	2	_	_	_	_	-	_	1	2	_
CO4	3	3	1	3	2	_	_	_	_	-	_	1	2	_
CO5	3	3	1	3	2	_	_	_	_	_	_	1	2	_
ECA201	2.8	3	1.2	2.6	2	_	-	-	-	_	_	1	2	_

Department :	Electron Engine	nics and Communication	Progr	amme	: B.Tec	ch. (EC)			
Semester : I	ourth	8	Cours	e Cate	gorv Co	ode: PEC	Semest	er Exam Tv	pe: TY
			Peri	ods / V	veek	Credit	N	/aximum N	/arks
Course Code	Cours	e Name	L	T	P	C	CA	SE	TM
ECA202	Comp Organ	uter Architecture and ization	3	_	-	3	25	75	100
Prerequisite	Ŭ			1	L	<u>.</u>	<u>L</u>		
	Upon	completion of the course, the	e studer	nts will	be abl	le to			
	CO1	Describe the operational co	ncents	of vario	ous fur	nctional units	of a com	outer	
Course	CO2	Create a block diagram for t	he give	n arith	metic,	logical or tra	nsfer ope	ration	
Outcome	CO3	Illustrate the instruction cyc	le and o	ontrol	unit d	esign of a ba	sic compu	ter	
	CO4	Illustrate the function of dif	ferent	arithm	etic ha	rdware algor	ithms.		
	CO5	Demonstrate the understand	ding of	the co	ncepts	of Cache me	emory, Vir	tual memo	ry and DI
	CO6	Demonstrate the unders communication and synchro	tanding mizatio	of n	the c	concepts of	inter p	processor	arbitratio
UNIT-I	Struct Micro	ure of Computers and Regist	er Tran	sfer ar	d	Periods: 9			
arithmetic mice UNIT-II Instruction coor reference instr formats, addre Computer (RIS UNIT-III Control memo Addition and s	ro-opera Basic (les, com ructions, ssing mo C). Micro ry, addre	tions, logic micro-operations, Computer Organization and D puter registers, computer inst , input-output and interrupt. odes, data transfer and manipu- programmed Control and Co ess sequencing, micro-program on multiplication and division	shift mi esign tructior Central ulation, mputer n examp algorit	cro-op ls, insti proce progra Arithn ble, De hms f	eration ructior ssing of am cor netic sign of	ns, arithmetic Periods: 9 n cycle, timing unit: stack or ntrol, Reduced Periods: 9 control unit.	g and cont ganization d Instruction	t unit. trol, memo n, instructi on Set	ry- on CO1 CO3
decimal arithm	ietic unit	t, decimal arithmetic operation	ns.	11115, 1	loating	-point antini	letic oper	ation,	CO4
UNIT-IV	Memo	bry System				Periods: 9			<u>i</u>
Basic concepts	s, semic	onductor RAM types of Read	d Only	Memo	ry (RO	M), cache n	nemory, p	performanc	e CO
	, virtuari	memory, secondary storage ra	iiu, Dire	ct we	nory A	Derieder 0			
Characteristics communication	of mult n and syr	tiprocessors, interconnection nchronization, cache coherence	structu ce, share	res, in ed mer	ter pro nory m	ocessor arbiti nultiprocesso	ration, int rs.	er process	or CO1
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	r iods: -	- T	otal Perio	ds: 45	
Reference Boo	ks:		.1	_		i			
 M. Moris M Carl Hamad 2002. William Sta 	ano, "Co cher, Zvo Ilings, "(mputer System Architecture", 3 onks Vranesic, SafeaZaky, "Con Computer Organization and Arc	B rd editic nputer(chitectu	on, Pear Organiz re- des	rson/Pl ation" signing	HI, India, 2006 , 5 th edition, for performa	5. McGraw H Ince", 8 th e	Hill, New De	elhi, India ntice Hall,
New Jersy, 4. Andrew S. 1 5. Sivarama P.	2010. anenbau Dandam	um , "Structured Computer Orga nudi, "Fundamentals of Compute	anizatior er Orgar	η", 5 th e	edition, and D	, Pearson Educ esign", Spring	cation Inc, er Int. Edit	New Jersy, tion, USA, 2	2006. 003.

Course: ECA202 Computer Architecture and Organization

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	2	2	2	-	-	-	-	2	2	2
CO2	3	3	2	2	2	1	1	-	-	-	-	2	2	2
CO3	3	3	2	2	2	2	1	-	-	-	-	2	2	2
CO4	3	3	2	2	2	1	1	-	-	-	-	2	2	2
CO5	3	3	2	2	2	2	2	-	-	-	-	2	2	2
CO6	3	3	2	2	2	1	1	-	-	-	-	2	2	2
ECA202	3	3	2	2	2	1.5	1.33	-	-	-	-	2	2	2

Department :	Electror Engine	nics and Communication	Progra	amme	: B.Tec	h. (EC)				
Semester : F	ifth		Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Type	: TY	
	_		Peric	ods / W	/eek	Credit	N	/aximum Mar	ks	
Course Code	Cours	e Name	L	Ť	Р	С	СА	SE	ТМ	
ECA203	Anten	nas and Wave Propagation	3	-	-	3	25	75	100	
Prerequisite	-		.1			L		.ii		
	Upon	completion of the course, the	studen	ts will	be able	e to				
	CO1	Demonstrate the understand	ding of a S.	antenn	a radia	ation and reco	eption and	d to know abo	out the	
•	CO2	Illustrate the concept of ant	enna ar	rays a	nd its r	adiation patt	ern.			
Course Outcome	CO3	Analyze the given aperture,	slot and	d horn	anteni	nas and its ra	diation			
	CO4	Identify the best suitable an	tennas	for a g	iven co	ommunicatio	n systems			
		Compare the different signa	l propa	gation	mode	s and identify	the mech	nanism of the		
	CO5	atmospheric effects on radio	wave p	propag	ation.	o unu lucitur,				
UNIT-I	Electr	omagnetic Radiation and Fun	dament	tals of		Periods: 9				
	Anten	ina								
components-Hertizan dipole, half wave dipole, monopole antenna. Basic Antenna Parameters: Gain, Directivity, Effective aperture, Radiation Resistance, Radiation Intensity, Beam width, Beam Efficiency, Input Impedance, Antenna Apertures and Effective Height. Matching – Baluns, Polarization mismatch, Antenna noise temperature, Radiation from oscillating dipole, Half wave dipole. Folded dipole, Yagi antenna.CO1UNIT-IIPoint Sources and Antenna ArraysPeriods: 9Point Sources- Definition, Pattern, arrays of 2 Isotropic Sources - Different Cases, Principle of Pattern Multiplication. Linear arrays of point sources – Direction of Maxima, Direction of Minima and Beam Width – Types of arrays – Broad side, End fire, Colinear, Parasitic arrays. Method of excitation of antennas – Impedance matching techniques.CO2										
Impedance ma	tching to	echniques.								
UNIT-III	Apert	ure, Slot and Horn Antennas					Peri	ods: 9		
Aperture Anter Duality princip Antenna, Refle	nnas: M le, Metł ctor Ant	agnetic Current and its fields, nod of Images, Pattern proper enna-Flat reflector, Corner Ref	Unique rties, Slo flector,	ness th ot ante Comm	eorem enna, H on curv	n, Field equiv Horn Antenna ved reflector	alence pri a, Pyramic shapes.	nciple, dal Horn	СО3	
UNIT-IV	Specia	al Antennas					Peri	ods: 9		
Loop antennas	, Travel	ling Wave antennas – V and rl	hombic	anten	nas, Pa	arabolic Ante	nna, Lens	Antenna and		
Wide band an antennas for m detectors, Dive	Wide band antennas – Log-periodic antennas – Micro strip antenna – Ultra wideband antenna – Smart antennas for mobile communications – Antennas for Bio-Medical Applications –Antenna for infrared detectors, Diversity/MIMO.									
UNIT-V	Propa	gation of Radio Waves					Peri	ods: 9		
Modes of prop	pagation	, Structure of atmosphere ,	Ground	l wave	propa	agation, Trop	ospheric	propagation,		
Duct propagati - Introduction, Super retraction Wave Propagation Ionosphere, Ra MUE and skip F	on, Trop Field S on, M-C tion - In ay Path,	boscatter propagation, Flat ea trength Variation with Distan urves and Duct Propagation, troduction, Structure of Ionos Critical Frequency, MUF, LUF, Multi-hon Propagation	rth and ce and Scatter phere, F OF, Vir	Curve Heigh ing Ph Refract tual He	d earth t, Effec enome ion an eight a	a concept. Spa ct of Earth's ena, Troposp d Reflection nd Skip Dista	ace Wave Curvature heric Pro of Sky Wa nce, Relat	Propagation e, Absorption pagation. Sky ves by ion between	, CO5	
Lecture Deriod	c· Δ5	Tutorial Dariade	Dracti	cal De	inde -	. T	ntal Porio	dc· 45		
Lecture Periou	3. 43	TULOIIdi FEITUUS	FIALL		1043			uj. 4j		

Reference Books:

- 1. Krauss.J.D, "Antennas", II edition, John Wiley and sons, New York, 1997.
- 2. John D Kraus, Ronald J Marhefka, Ahmad S Khan, "Antennas and Wave Propagation", Tata McGraw HillPublication, 4th Edition, 2012.
- 3. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2003.
- 4. I.J.Bahl and P.Bhartia, "Microstrip Antennas", Artech house, Inc., 1980.
- 5. Simon R Saunders, "Antennas and Propagation for wireless communication system", John Wiley Publications, 3rd Edition, 2001.

COURSE ARTICULATION MATRIX

Course: ECA203 Antennas and Wave Propagation

со	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	1	1	1	-	2	-	-	-	-	1	1	1
CO2	3	3	1	1	1	-	2	-	-	-	-	1	1	1
CO3	3	3	1	1	1	-	2	-	-	-	-	1	1	1
CO4	3	3	1	1	1	-	2	-	-	-	-	1	1	1
CO5	3	3	1	1	1	-	2	-	-	-	-	1	1	1
ECA203	3	3	1	1	1	-	2	-	-	-	-	1	1	1

Department :	Electror Engine	nics and Communication eering	Progra	amme	: B.Tecł	n. (EC)			
Semester : F	ifth		Course	e Cate	gory Co	de: PEC	Semeste	er Exam Type:	ТҮ
Course Code	C		Peric	ods / W	/eek	Credit	M	laximum Mark	S
Course Code	Cours	ename	L	Т	Р	С	CA	SE	ТМ
ECA204	Deep	Learning	3	-	-	3	25	75	100
Prerequisite	Know	ledge in programming and Ma	ichine Le	earning	3				
	Upon	completion of the course, the	e studen	ts will	be able	to			
	CO1	Interpret various ML approa	aches wi	th me	rits and	demerits.			
Course	CO2	Summarize various ML/DL a	algorithn	ns witl	n techni	ical upgrada	tions emp	loyed in them.	
Outcome	CO3	Analyse the challenges asso	ciated v	vith di	mensio	nality reduct	tion and o	ptimization.	
outcome	CO4	Formulate appropriate DL a	pproach	suitat	ole for s	pecific appli	cation.		
UNIT-I	Mach	ine Learning and its Basic Con	cepts			Periods: 9			
Introduction to	o machi	ine learning- Linear models (SVMs a	nd Pe	rceptro	ns, Perceptr	on learnir	ng algorithm,	
Multi-layer Pe	rceptro	ns (MLP), Representation o	of powe	r MPI	_s, logi	stic regress	ion)- Intr	o to Neural	
Nets: What a	shallov	v network computes- Traini	ing a no	etworl	c: loss	functions,	back prop	pagation and	CO1
stochasticgrad	ient des	cent- Neural networks as univ	ersal fur	nction	approxi	mates.			
UNIT-II	Overv	iew of Deep Learning					Perio	ods: 9	
History of Deep	o Learni	ng- A Probabilistic Theory of D	eep Lea	rning-	Back pr	ropagation a	nd regular	ization,	
batch normaliz	ation- \	/C Dimension and Neural Ne	ts-Deep	Vs Sh	allow N	letworks- Co	onvolution	al Networks-	CO2
Generative Adv	/ersaria	Networks (GAN), Semi-super	vised Lea	arning	•				
UNIT-III	Dimer	nsionality Reduction Techniqu	les				Perio	ods: 9	1
Linear (PCA, LD	A) and i	manifolds, metric learning - Au	uto enco	ders a	nd dim	ensionality r	eduction i	n networks -	CO2
Introduction to	o Convn	et - Architectures – AlexNet,	VGG, Ind	ceptio	n, ResN	et - Training	g a Convne	et: weights	CO3
Initialization, b		rmalization, nyper parameter	optimiza	ition.					
UNII-IV	Optim	nization Methodologies					Perio	ods: 9	
Optimization i	n deep	learning– Non-convex opt	imizatio	n for	deep	networks- S	stochastic	Optimization	-
Generalization	in neui	rai networks- Spatial Transfo	rmer Ne	etwork	s- Recu		Drks, LSTIV	I - Recurrent	CO2
Artificial Neuro	rk Langi	uage woodels- word-Level Riv		еер ке	emorce	ement Learn	ing - Com		03
	Case S	Studies and its Applications					Perio	nds: 9	<u> </u>
ImageNet- Det	ection-	Audio Wave Net-Natural Lan	guage P	rocess	ing Wo	rd2Vec - Io	int Detect	ion-	
Bioinformatics	- Face R	ecognition-Scene Understand	ling-Gat	hering	Image	Captions.			CO4
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -	T	otal Period	ls: 45	<u>.</u>
Reference Boo	ks:								
1. Cosma Rohill	la Shaliz	i, "Advanced Data Analvsis fro	m an Ele	ementa	ary Poin	it of View". 2	2015.		
2. Deng & Yu, "	Deep Le	arning: Methods and Applicat	ions", N	ow Pu	blishers	, 2013.			
3. Ian Goodfello	ow <i>,</i> Yosł	nua Bengio, Aaron Courville, "I	Deep Lea	arningʻ	", MIT P	ress, 2016.			
4. Michael Niel	sen, "Ne	eural Networks and Deep Lear	ning", D	etermi	nation	Press, 2015.			
5. Kevin P. Mur	phy, "M	achine Learning: A Probabilist	ic Persp	ective'	', MIT P	ress, 2012.			

Course: ECA204 Deep Learning

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	1	1	3	3	1	-	1	-	-	-	-	1	2	2
CO2	1	1	3	3	1	-	1	-	-	-	-	1	2	2
CO3	1	1	3	3	1	-	1	-	-	-	-	1	2	2
CO4	1	1	3	3	1	-	1	-	-	-	-	1	2	2
ECA204	1	1	3	3	1	-	1	-	-	-	-	1	2	2

Department : I	Electror Engine	nics and Communication	Progra	imme	: B.Tec	h. (EC)					
Semester : S	ixth		Course	e Cate	gory Co	de: PEC	Semeste	er Exam Ty	pe: TY		
		•.	Perio	ds / V	Veek	Credit	M	laximum N	1arks		
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	TM		
ECA205	Contr	ol Systems Engineering	3	-	-	3	25	75	100		
Prerequisite	-										
	Upon	completion of the course, the	student	s will	be able	to					
Courso	CO1	Demonstrate the understan	ding of n	nathe	matical	modelling of	felectrical	/mechanic	al systems.		
Outcome	CO2	Analyse the time domain be	haviour	of co	ntrol sy	stems.					
Outcome	CO3	Analyse the frequency dom	ain beha	viour	of cont	rol systems.					
	CO4	Investigate the stability of c	ontrol sy	vstem	s.						
	CO5	Determine control systems	using sta	te sp	ace app	roach.					
UNIT-I	Contro	ol System Modelling				Periods: 9					
Introduction to	o contro	ol system-Basic elements of o	control s	syster	n-Open	and closed	loop cont	rol system	۱S-		
Differential equ	uation r	epresentation of physical sys	stems-Tr	ansfe	r functi	on-Mathema	atical mod	elling of			
electrical and m	nechani	cal systems (Translational and	Rotation	nal)-A	nalogou	us System-Blo	ock diagra	m reductio	ⁱⁿ CO1		
techniques-Sig	nal flow	graph.									
UNIT-II	Time l	Domain Analysis				Periods: 9			•		
Time response	analysi	s-transient and steady state	behavio	r of c	ontrol s	ystems-Stan	dard test	signals – 1	īme		
response of Fir	st orde	r system-step, ramp and imp	ulse res	ponse	analys	is-Second or	der syster	n – step	CO2		
response anal	ysis-ste	ady state error-generalized	error o	co-eff	icient–F	Response wi	ith P, PI,	PD and	PID •••		
controllers.											
	Frequ	ency Domain Analysis				Periods: 9					
Frequency resp domain specific	ponse-F cations-I	requency domain specificati Bode plot-Stability analysis usi	ions-Cor ng Bode	relatio plot-	on betv transfe	ween time r function fro	domain a om Bode p	ind freque lot-Polar	ency CO3		
plot.			-								
UNIT-IV	Stabil	ity Analysis				Periods: 9					
Concepts of sta	bility-L	ocation of poles on s-plane fo	r stabilit	y-Rou	th-Hur\	witz stability	criterion-I	Nyquist	<u> </u>		
stability criterio	stability criterion-Root locus Techniques.										
UNIT-V State Space Analysis Periods: 9											
Concepts of sta	oncepts of state, state variables and state model - state space models for continuous time LTI systems										
using physical,	using physical, phase and canonical variables - Transfer function from state space representation – solutions										
of state space e	equation	ns – concepts of controllability	and obs	ervat	oility.						
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -	То	otal Period	ds: 45			
Reference Boo	ks:										
1. I.J.Nagrath, I	И. Gopa	al, "Control Systems Engineerir	ng", New	Age	nternat	tional, Fifth E	dition, Ne	w Delhi, 20)11.		
2. K. Ogata, "M	lodern C	Control Engineering", Fifth Edit	ion, Pea	rson E	ducatio	on, 2010.					
3. Farid Golnar	aghi an	d Benjamin C.Kuo, "Automatic	Control	Syste	ms", Nii	nth Edition, V	Viley, 201	4.			
4. R. Ananda N	lataraja	n and P. Ramesh Babu, "Con	trol Syst	ems E	Inginee	ring", Fourth	Edition, S	SciTech Pu	blications		
(India) Pvt. L	imited,	Chennai, 2013.									

5. Norman S. Nise, "Control Systems Engineering", Sixth Edition, Wiley, 2010.

Course: ECA205 Control Systems Engineering

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	2	Ι	Ι	Ι	Ι	1	Ι	1	2	3
CO2	3	3	2	2	2	Ι	Ι	Ι	Ι	1	Ι	1	2	3
CO3	3	3	2	2	2	-	_	_	_	1	_	1	2	3
CO4	3	3	2	2	2	-	-	-	-	1	-	1	2	3
CO5	3	3	2	2	2	_	-	-	-	1	_	1	2	3
ECA205	3	3	2	2	2	_	_	_	_	1	_	1	2	3

Semester Sixth Course Code: Semester	e : B.Tech. (EC)	: B.Tec	amme	Progra	cation	ics and Communic ering	lectroni Engine	Department : I					
Course Code Course Name Periods / View Credit Maximum Marks ECA206 Digital Image and Video Processing 3 - - 3 25 75 100 Prerequisite Digital Signal Processing & DSP Processors 3 - - 3 25 75 100 Prerequisite Digital Signal Processing & DSP Processors - 3 - - 3 25 75 100 Course QOI Outline the fundamentals of image procession woels - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - 3 - - - - - -	egory Code: PEC Semester Exam Type: TY	gory Co	e Cate	Cours			i xth	Semester : S					
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UNIT-V 2-D Motion Estimation and Video coding basics Periods: 9	co4		nals.	ideo sig	npling of v	interlaced scan -Sam	ve and ir	video-Progress					
	Periods: 9		sics	oding ba	d Video co	otion Estimation and	2-D Mo	UNIT-V					
Optical flow, general methodologies, pixel based motion estimation, Mesh based motion Estimation, global	ion, Mesh based motion Estimation, global	ion, Me	timati	tion es	based mo	nethodologies, pixel	eneral m	Optical flow, g					
Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based	ution motion estimation. Waveform based	, ution mo	resolu	, multi	stimation	gion based motion e	ion, Reg	Motion Estimat					
coding, Block based transform coding, predictive coding.	COS			, ing.	lictive cod	nsform coding, pred	ased trar	coding, Block b					
Lecture Periods: 45 Tutorial Periods: - Practical Periods: - Total Periods: 45	eriods: - Total Periods: 45	eriods: -	cal Pe	Practi	ods: -	Tutorial Peri	: 45	Lecture Period					
Reference Books:							(S:	Reference Boo					
 R.C.Gonzalez and R.E. Woods,"Digital Image Processing ", 4th edition, Pearson,2018. Yao Wang, Jorm Ostermann and Ya – Qin Zhang, "Video processing and communication ",1st edition, Pearson,2001. M. Tekalp,"Digital video Processing", 2nd edition, Prentice Hall International, 2015. Chris Solomon, Toby Breckon, "Fundamentals of Digital Image Processing A Practical Approach with Examples. 	edition, Pearson, 2018. cessing and communication ", 1st edition , Il International, 2015.	edition, cessing Il Intern	', 4th o proc ce Hal	essing " ;, "Video , Prentic	nage Proc Qin Zhang Id edition	.E. Woods,"Digital In stermann and Ya – (video Processing", 2n w Breckon "Eundom	z and R.I Jorm Os 01. Digital vi	 R.C.Gonzale Yao Wang, Pearson,20 M. Tekalp," 					

Matlab", John Wiley & Sons, 2011.

Course: ECA206 Digital Image and Video Processing

Regu	lation:	202	2-23

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C01	3	3	3	3	2	-	-	-	-	1	-	1	2	2
CO2	3	3	3	3	2	-	-	-	-	1	-	1	2	2
CO3	3	3	3	3	2	-	-	-	-	1	-	1	2	2
CO4	3	3	3	3	2	-	-	-	-	1	-	1	2	2
CO5	3	3	3	3	2	-	-	-	-	1	-	1	2	2
ECA206	3	3	3	3	2	-	-	-	-	1	-	1	2	2

Department :	Electron Engine	ics and Communication ering	Progr	amme	: B.Te o	ch. (EC)			
Semester : S	ixth		Cours	e Cate	gory C	ode: PEC	Semest	er Exam Type	TY
Course Code	Course	Nama	Perio	ods / W	/eek	Credit	N	laximum Mar	ks
Course Coue	Course	ename	L	Т	Р	С	CA	SE	ТМ
ECA207	Wavel Applic	et Transforms and ations	3	_	-	3	25	75	100
Prerequisite	-								
	Upon	completion of the course, the	studen	ts will	be abl	e to			
Course	CO1	Describe wavelet functions	and the	ir prop	erties				
Course	CO2	Interpret multi-resolution a	nalysis a	and wa	velet l	basis for mul	ti-resolutio	on analysis.	
Outcome	CO3	Describe continuous wavele	et transf	^f orm, it	ts feat	ures and inve	erse compi	utation.	
	CO4	Demonstrate the understand	ding of t	the use	e of filt	er banks and	l computat	ion of discrete	e wavelet
		transform and its inverse.	_				-		
	CO5	Apply wavelets for various i	mage p	rocessi	ing app	olications.			
UNIT-I	Wave	let Transforms and Properties	S			Periods: 9			
Vector spaces-	Basis- D	imension- Orthogonality and	Orthor	ormal	ity-Def	finition of wa	avelet- Pro	perties-	
Representatior	n of wav	velet function- Examples of v	wavelet	functi	ion: Ha	aar, Daubacl	nies, Shanı	non, Morlet,	CO1
Mexican, Hat, S	Sinc, Gau	issian, Bi-orthogonal wavelets	•						
UNIT-II	Multi-	Resolution Analysis (MRA)				Periods: 9			
Definition of N interpretation-	1RA- Co PRQMF	nstruction of a general ortho filters banks.	onorma	I MRA-	- Wave	elet basis fo	r MRA- Dig	gital filtering	CO2
UNIT-III	Contin	uous Wavelet Transform				Periods: 9			
Definition of C	CWT- CV	VT as a correlator- Constant	Q fact	or filte	ering i	nterpretatio	n and tim	e frequency	CO3
resolution-Inve	erse CW	Τ.							
UNIT-IV	Filter E	Banks and Discrete Wavelet T	ransfor	m		Periods: 9			
Filter banks and scheme- Wavel	d Sub-ba et trans	and coding principles- Inverse form using poly phase matrix	DWT co factoriz	omputa ation.	ation-	Multiband w	avelet trar	nsform lifting	CO4
UNIT-V	Wavel	et Applications				Periods: 9			<u>.</u>
DTWT for ima	ge comp	pression- Wavelet denoising-	Speckle	e remo	val- Ec	dge detectio	n and Obje	ect isolation-	CO5
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	riods:	-	otal Perio	ds: 45	<u> </u>
Reference Boo	ks:		1						
1. Raguveer N Education,	V.Rao, S 2005.	5.Ajit Bopardikar, "Wavelet T	ransfor	ms: In	troduc	tion to theo	ory and ap	plications", P	earson
2. Jaideva C C John Wiley	Goswam & Sons,	i and Andrew K Chan, "Fund Inc. , Singapore, 2011.	amenta	ls of V	Vavele	ets – Theory,	Algorithm	is and Applica	itions",
3. Stephane G	i. Mallat	, "A Wavelet tour to signal pro	cessing	", Acad	demic I	Press, Third E	Edition, 200)9.	
4. Soman K P	and Rai	machandran K I, "Insight into	wavele	ets: Fro	om The	eory to Prac	tice", Pren	tice Hall, New	[,] Delhi,

Third Edition, 2010.5. Sidney Burrus C, "Introduction to Wavelets and Wavelets Transforms: A Primer", Prentice Hall, New Delhi, 2002.

Course: ECA207 Wavelet Transforms and Applications

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	1	1	1	1	Ι	_	Ι	_	-	1	-	_	1
CO2	3	1	1	1	1	-	-	-	-	-	1	-	-	1
CO3	3	1	1	1	1	_	_	_	_	_	1	_	_	1
CO4	3	1	1	1	1	_	-	_	_	_	1	_	_	1
CO5	3	1	1	1	1	_	_	_	_	_	1	_	_	1
ECA207	3	1	1	1	1	-	_	-	_	_	1	_	_	1

Department :	Electronics and Communication Engineering	Progr	amme	: B.Tec	:h. (EC)							
Semester : S	ixth	Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Ty	oe: TY				
	- ···	Peri	ods / V	veek	Credit	N	/laximum M	arks				
Course Code	Course Name	L	T	Р	С	CA	SE	TM				
ECA208	Satellite Communication Systems	3	-	-	3	25	75	100				
Prerequisite	-			1	<u>.</u>	I	.ii					
	Upon completion of the course, the	e studer	ts will	be able	e to							
	CO1 Demonstrate the understan	ding of	the bas	sic con	cepts of sat	ellite comm	nunication.					
Course	CO2 Analyze orbital mechanics a	nd satel	lite ear	th com	nmunicatio	ns.						
Outcome	CO3 Design a satellite link for val	rious ort	oits and	l capac	ity enhance	ement						
	CO4 Demonstrate the understan	ding of	ontical	satellit	es and mic	rosatellites						
	CO5 Analyze the recent trends a	nd tech	nologia	s of sat	tellite comr	nunication						
UNIT-I	Basic Concents of Satellite Commu	munication Periods: 9										
Types of satell	tes- Satellite orbit- satellite constell	ation- o	rbital r	nechar	nics- equati	on of orbit-	orbital					
elements look angles determination - limits of visibility - sub satellite point - spacecraft technology-												
structural, prin	hary power, attitude and orbit contro	l, therm	al, pro	pulsior	n, telemetr	, tracking a	and					
command, con	nmunication and antenna subsystem	s – eart	h eclip	se of s	atellite - su	in transit ou	itage-	CO1				
launching proc	edures and launch vehicles –In orbit t	est- eme	erging	trends	in mission	control.	-	02				
UNIT-II Orbital Mechanics and Satellite Link Attributes Periods: 9												
Types of earth	station- earth station design require	ments-1	terrest	rial inte	erface, sub	systems of	earth statio	n -				
receive and tra	nsmit chain, antenna systems –satel	lite grou	ind cor	nmuni	cation equi	pment - sys	stem reliabi	lity				
and design life	time. Basic transmission theory-sa	tellite li	ink att	ributes	- combine	d uplink an	d down lin	k CO2				
model design,	Link budget and Eb/No calculation.	Perfor	mance	impai	rments – s	ystem nois	e, inter					
modulation and	interference – Propagation characte	eristics a	ind free	quency	considerat	tion.						
		•			Periods: 9	•	• • • • • • • • • •	- 1				
Satellite Access	5 – Types - concepts - FDMA – pre ass	igned a	na aen na offi	nand as	ssigned - in	ter modulat	ion and bac					
TDMASDMA-C	MA - DS & EH CDMA system- compa	rison of	multin	le acce	ss schemes	apacity - sat	enite switci					
	Ontical Communication	13011 01	munip		Doriodo	י. ז						
Intor catallita	inks froquency hand ontical comp	nunicati	on for	catalli	to potwork	r ontical	courcos an	4				
detectors-bloc	diagram of ontical satellite cross lin	k- ontica	al hean	satem nacqui	isition trac	king and no	inting-	u CO4				
satellite system	for global mobile telecommunication	system	– arch	itectur	re - frequer	cv band allo	cation.	04				
UNIT-V	Future Trends and its Applications				Periods:)						
Packet satellit	e networks and services. fixed satelli	te servi	ces. bro	oadcas	t satellite s	ervices. mo	bile satellit	e				
services-VSAT-	Radar SAT, global positioning satelli	te syste	m - ma	aritime	satellite se	ervices, loca	l broadban	d				
networks-ATM	over satellite, IP over satellite, micro	, satellite	es, nan	osatell	ites, CUBES	AT, role of s	satellite in	CO5				
future network	•		•									
Lecture Period	s: 45 Tutorial Periods: -	Pract	ical Pe	riods: -	•	Total Perio	ds: 45					
Reference Boo	ks:											
1. Pritchend a	1. Pritchend and Sciulli, "Satellite communication systems engineering", PHI Learning, 1986.											
2. M. Richhar	a, "Satellite communication system d	esign an	d anal	ysis", N	AcMillan Pu	blishers, 19	96.					
3. Dennis Rod	dy, "Satellite Communications", Tata	McGraw	∕ Hill, F	ourth I	Edition, 201	.0.						
4. Timothy Pr	att, Charles Bostian, Jeremy Allnutt, "S	atellite	Comm	unicat	ions", Wile	y Second Ed	ition.					
5. Iri. I. HA, "	Digital Satellite Communications", Mo	Graw H	III, Sec	ond Ed	ition.							

Course: ECA208 Satellite Communication Systems

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	2	3	1	1	Ι	Ι	Ι	Ι	1	2	2
CO2	3	3	2	2	3	1	1	-	-	-	-	1	2	2
CO3	3	3	3	2	3	1	1	-	-	-	Ι	1	2	2
CO4	3	3	2	2	3	1	1	_	-	-	-	1	2	2
CO5	3	3	2	2	3	1	1	-	-	-	Ι	1	2	2
ECA208	3	3	2.2	2	3	1	1	-	-	-	-	1	2	2

Department :	Electron Engine	ics and Communication	Progr	amme	: B.Tec	h. (EC)			
Semester : S	eventh		Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Ty	/pe: TY
			Perio	ods / W	/eek	Credit	Ν	/aximum N	Narks
Course Code	Cours	e	L	T	Р	С	CA	SE	TM
ECA209	Micro Desigi	wave Integrated Circuit	3	_	-	3	25	75	100
Prerequisite	-								
	Upon	completion of the course, the	e studen	ts will	be able	e to			
Course	CO1	Demonstrate the understan transmission of microwave f	ding of frequen	the op cies.	eration	and worki	ng of the va	arious sour	ces for the
Outcome	CO2	Outline various Microwave	s Integr	ated C	ircuits	Componen	ts.		
	CO3	Analyze Active and Passive	Microw	ave De	vices.				
	CO4	Summarize the various Mic	rowave	Semic	onduct	or Sources	and Amplif	iers.	
	CO5	Demonstrate the understan	ding of t	he var	ious Fa	brication to	echniques a	of MMC's/	MMIC's.
UNIT-I	Transr	nission Lines				Periods: 9)		
Characteristics	of co	nventional transmission str	uctures	, vario	ous pla	anar trans	mission lir	nes for N	IICs,
comparison of	various	MIC transmission media. Des	sign of s	striplin	e and r	nicrostrip t	ransmissio	n lines. De	sign
of coupled str	iplines a	nd microstrip lines. Stripline	and mi	icrostri	ip disco	ontinuity. L	osses of m	icrostrip	ines
and frequency	effects.	Review of scattering, ABCD, i	mpedar	nce and	I admit	tance matr	ices for two	o port	CO1
networks.		_	-					-	
UNIT-II	Micro	waves Integrated Circuits Cor	nponen	ts		Periods: 9)		
Design of lump	ed elem	nents, design of inductors, cap	pacitors	and re	sistors	. Resonatoi	rs: Resonate	or	
parameters, re	esonant	frequency, quality factor, re	ectangu	lar mio	crostrip	resonator	. Hybrids a	and couple	ers: cor
Basics of hybri	ds and o	couplers, types of hybrids and	d couple	ers, des	sign of	hybrids, di	rectional co	ouplers usi	ng
aperture coupl	ed lines	-							
UNIT-III	Active	and Passive Microwave Devi	ces			Periods: 9			I
Microwave tra	nsistor,	equivalent circuit .Basic ope	eration	princip	les of	FET, MESF	ET model,	power FET	Ś.
Introduction, e	quivalei	nt circuit and figure of merit c	of schot	tky bar	rier jur	ictions, var	actor diode	s, step	CO3
recovery diode	s and pi	n diodes.							
UNIT-IV	Micro	wave Semiconductor Sources	and Am	plifier	S	Periods: 9)		1
Oscillators: Int	roductio	on, concept of negative resista	ance, th	ree po	rt S-pai	rameter cha	aracterizati	on of	
transistors, os	cillation	and stability conditions, des	Ign of f	ixed tr	equend	cy oscillato	rs. Amplifie	ers: Iwo po	CO4
representation	of trans	sistor, stability consideration,	amplifie	er char	acteriz	ation, Non-	-linear bena	avior, blasi	ng
	Eabria	ation of MAC's (MANIC's				De uite al es 6	•		
UNIT-V	Fault	a mask lavouts and mask for	hricatio	n huk	vid MI	Periods: 5	, docian co	acidaration	~
design proceed	naterial	S, MASK Idyouts and Mask Id		n, nyt nice	oria ivii	C, Minnics-	design col	Isideration	is, CO5
		Tutoriol Deriode:	Sus IVIII	incs.			Total Davia	de. 45	
Lecture Period	5:45 ke	i utorial Periods: -	Pract	ical Pe	1005: -		i otal Perio	us: 45	
	"Micro	wave Integrated circuit" John	Wilov 9	2 Sone	109/				
2 Samuel V I	, iviicio iao "Mi	rowave Devices & Circuits"	r vyney (Chird Ed	ition D	, 1304. Prentice	Hall 1000			
3. G.D.Vende	lin. A.M	Pavio and U.L.Rohde. "Micro	wave ci	rcuits r	lesign	using linear	and non- li	inear techr	niques"
John Wilev	and Sor	ns. 1990.		Santa					inques ,
4. Ivan Knepp	o, J. Fab	ian, P. Bezousek. "Microwave	Integra	ted Cir	cuits."	Chapman 8	k Hall, 1993		
5. Hoffman R	K "Hand	book of microwave integrated	d circuit	s", Arte	ech Ho	use, Bostan	, 1987.		

Course: ECA209 Microwave Integrated Circuit Design

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	2	1	-	1	-	-	-	-	1	3	2
CO2	3	2	2	2	1	-	1	-	-	-	-	1	3	2
CO3	3	2	3	2	1	-	1	-	-	-	-	1	3	2
CO4	3	2	2	2	1	-	1	-	-	-	-	1	3	2
CO5	3	2	2	2	1	-	1	-	-	-	-	1	3	2
ECA209	3	2	2.2	2	1	-	1	-	-	-	-	1	3	2

Department :	Electron Engine	ics and Communication	Progr	amme	: B.Te o	ch. (EC)		Semester Exam Type: 1 Maximum Marks CA SE 25 75 25 75 selligent Networks and s d advantages of Distrib vice logic-Hosting and art intelligence-SS7 obile systems-ITU-T IN NA.				
Semester : S	Seventh		Cours	e Cate	gory C	ode: PEC	Semest	er Exam Type	: TY			
Course Code	C		Perio	ods / W	/eek	Credit	N	/laximum Mar	·ks			
Course Code	Cours	ename	L	Т	Р	С	CA	SE	TM			
ECA210	Intelli	gent Networks	3	-	-	3	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	studen	ts will	be abl	e to						
Course	CO1	Demonstrate the understar switching function.	nding of	f the f	undam	nentals of I	ntelligent N	letworks and	service			
Outcome	CO2	Illustrate the impact of Intel	lligence	in Sigr	nalling.	•						
	CO3	Summarize the Internationa	l Stand	ards fo	r IN							
	CO4	Analyze the effects of intel Intelligence.	ligence	in call	party	handling a	nd advanta	ges of Distr	ibuted			
	CO5	Analyze the IN services use	d in pra	ctice.								
UNIT-I	UNIT-I Introduction Periods: 9											
Basics of Intel	ligent N	etworks-Service Switching fu	nction-	Trigger	ing to	remote se	rvice logic-	Hosting and				
creating IN Ser	vices-Int	elligent peripheral-INAP-IN CS	1 imple	menta	tion is	sues.	-	-	CO1			
UNIT-II	Signal	ling Intelligence				Periods: 9)					
Introduction – signalling for IN	CCS-Lay N.	ered signaling model-Messag	e transf	er part	t-Telep	ohony user (oart intellig	ence-SS7	CO2			
UNIT-III	Intern	ational Standards for Intellige	ent Netv	vorkin	g	Periods: 9)		<u>i</u>			
Introduction-U CS-2-ITU-T IN C	S Stand	ards for IN-ITU-T IN CS-1-ETSI -T IN CS-4.	Core IN	NAP an	d CS-1	R- IN and n	nobile syste	ems-ITU-T IN	CO3			
UNIT-IV	Call Pa	arty Handling and Distributed	Intellig	ence		Periods: 9)					
Introduction-C	S-2 call n	nodel-Call party Handling-Dist	ributed	Intellig	ence-	Parlay API-T	INA.		CO4			
UNIT-V	Servic	e Examples			•	Periods: 9)					
Simple Numbe	r Transl	ation-Personal Numbering-Inc	oming	call scr	eenin	g-l east cost	routing_VP	N Service				
Example-Direc	torv end	uiry call completion service-C	all gapr	oing-Ac	tivate	Service filte	ering-Simple	CTI-CAMFL				
calls-IN contro	l for Inte	rnet dial up access.	611 94 PF		, in race				CO5			
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	riods:	-	Total Perio	ds: 45				
Reference Boo	ks:	i.	.i									
1. John Ander 2. Syed V. Aha	rson, "In amed, "I	telligent Networks: Principles ntelligent Networks", ELSEVIE	and App R, 2013	olicatio	ns", IE	T, 2002.						

Course: ECA210 Intelligent Networks

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	-	2	2	_	_	-	-	-	-	1	2	2
CO2	3	2	-	2	2	Ι	Ι	-	-	-	-	1	2	2
CO3	3	2	1	2	2	_	_	_	-	-	_	1	2	2
CO4	3	2	1	2	2	-	-	-	-	-	-	1	2	2
CO5	3	2	1	2	2	-	-	-	-	-	-	1	2	2
ECA210	3	2	1	2	2	_	_	_	_	_	_	1	2	2

Department :	Electronics and Communication Engineering	Programme : B.Tec	ch. (EC)						
Semester : S	Seventh	Course Category Co	ode: PEC	Semester Exam T	ype: TY				
	Course Norse	Periods / Week	Credit	Maximum I	Marks				
Course Code	Course Name	L T P	C	CA SE	ТМ				
ECA211	Cellular Mobile Communication	3	3	25 75	100				
Prerequisite	Analog and Digital Communication								
	Upon completion of the course, the	students will be able	e to						
	CO1 Demonstrate the understand	ding of the Cellular C	oncepts						
	CO2 Analyze the operations of Ce	ellular Communicatio	ons with Mobil	ity Management Pr	otocols.				
Course	CO3 Demonstrate the understand	ding of various wirele	ess standards.						
Outcome	CO4 Analyze different type of a network strategies.	applications for sma	art phones a	nd mobile devices	with latest				
	CO5 Analyze the performance of	Cognitive radio and	VANETs	•					
UNIT – I	Cellular Concept		Periods: 8						
Cellular Concept – Frequency Reuse – Channel Assignment Strategies – Interference – Co chan									
Interference a	nd System Capacity – Adjacent Channe	el Interference – Har	ndover – Call	Splitting – Cell	CO1				
Sectoring – Cov	verage Zone Concept – Multiple Anten	nas							
UNIT – II	Mobility Management and GSM		Periods: 12						
Handoff and R	oaming concept - concept and its type	es- Handoff detectio	n – channel A	ssignment techniqu	Jes -				
Radio link tra	insfer– hard handoff and soft han	doff- IS-41 signallir	ng, IS-41 Int	ersystem handoff	and co2				
Authentication	 cellular digital packet data GSM sy 	/stem overview –GSI	M Network si	gnaling GSM Mol	oility COL				
management -	GSM short message service.								
UNIT – III	GPRS, VoIP and WAP		Periods: 8						
International r	oaming for GSM – Introduction to GS	M operation, Admin	istration and	maintenance - Mo	bile				
number portai	bility's, VOIP service for mobile netw	orks – GPRS networ	rk architectur	e. WAP: WAP mod	ег- соз				
WAP Galeway	- WAP Protocol, WAP UAProl and Caci	ning - war develope	er loof kils – N	noblie station					
	26 46 & Boyond		Dorioda: 0						
	A air interface UNATS architecture U	MTS packat data E	renous. 9	of a LINATE chooch	call				
LIMTS core ne	A an interface- owns architecture- o	sion - AG features a	nd challenges	- Applications of A					
AG Technologi	es: Multicarrier Modulation Smart	antenna techniques	IMS Archite	acture ITE Advan	co4				
Broadband Wi	reless Access and Services, MVNO, Intr	oduction to 5G featu	ures, challeng	es and Technologie	S.				
UNIT – V	Software Defined Radios and VANE	T	Periods: 8						
Software defin	ed radio architecture and challenges-	Core cognitive radio	and MAC fun	ctions- MAC laver					
Evaluation - V	ehicular networks- Introduction. Ann	lication. Enabling or	rotocols. Stud	v on Mobi MESH a	nd CO5				
GLS.			,	,					
Lecture Period	s: 45 Tutorial Periods: -	Practical Periods: -	- To	otal Periods: 45					
Reference Boo	ks:		i						
1. Yi-Bing Lin a	nd Imrich Chlante, "Wireless and Mob	ile Network Archited	cture ", John V	Viley 2006.					
2. T.S. Rappap	ort, "Wireless and Mobile Communica	ition", Pearson Educa	ation, 2008						
					,				
3. Vijay Garg, "	Wireless Communications and Netwo	orking", First Edition,	Elsevier, 2007	7.					
 Vijay Garg, " Dipankar Ra 	' Wireless Communications and Netwo aychaudhuri, Mario Gerla, "Emerging	rking", First Edition, Wireless Technolog	Elsevier, 2007 gies and the F	7. uture Mobile Inter	net", ISBN:				

5. Clint Smith and Daniel Collins, 3G Wireless Networks, Tata McGraw Hill, second edition.

Course: ECA211 Cellular Mobile Communication

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1	1	1	-	1	-	-	-	-	1	2	2
CO2	3	2	1	1	1	-	1	-	-	-	-	1	2	2
CO3	3	2	1	1	1	-	1	-	-	-	-	1	2	2
CO4	3	2	1	1	1	-	1	-	-	-	-	1	2	2
CO5	3	2	1	1	1	-	1	-	-	-	-	1	2	2
ECA211	3	2	1	1	1	-	1	-	-	-	-	1	2	2

Department :	Electron Engine	ics and Co ering	mmur	nication	Progr	amme	: B.Tec	h. (EC)			
Semester : S	eventh				Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Type	e: TY
Course Code	Course	Nama			Perio	ods / V	Veek	Credit	N	1aximum Ma	rks
Course Coue	Course				L	Т	Р	С	CA	SE	ТМ
ECA212	Mobil Senso	e Adhoc r Networks	and	Wireless	3	-	-	3	25	75	100
Prerequisite	Knowl	edge in comi	munic	ation Engin	eering						
	Upon	completion of	of the	course, the	studen	ts will	be able	e to			
	CO1	Demonstra related issu	ite the Jes.	understan	ding of t	he ba	sic cono	cepts of Ad I	noc and Se	nsor network	and thei
Course	CO2	Outline the protocols.	e vario	ous layers c	of Ad ho	c Netv	work, c	hallenges, c	lassificatio	n and design	of MAC
Outcome	CO3	Demonstra with energ	ite the y effic	e understan ciency.	ding of	the de	sign iss	sues and rec	quirements	s of routing p	rotocols
	CO4	Analyze th with the us	e imp se of c	ortance of ost effectiv	Data d e and co	issemi ompac	nation t desig	with securi n architectu	ty and inte res	egrity	
	CO5	Demonstra	te the	e understan	iding of	advan	ced tec	chnology and	d its applica	ations.	
UNIT-I	UNIT-I Basic Concepts of MANETS Periods: 9										
Characteristics of Mobile Host	of MAN movem	ETs -Classific ents – Challe	ation nges i	of Mobile [n Ad hoc M	Data Nei lobile Ne	tworks etwork	s- Hete s- Ad	rogeneity in hoc wireless	Mobile de Internet.	vices – Types	⁵ CO1
UNIT-II	Challe	nges and MA	AC Pro	tocols				Periods: 9			Ĩ
Challenges in F Wireless Netwo Schedule-base	rovidin orks, Cla d protoc	g QoS in Ad ssifications o ols – LEACH	hoc W of MA protoc	'ireless Net C Protocols col.	works - - Conte	Issues ention-	s in des ·based	signing a MA protocols –	AC Protoco CSMA prot	l for Ad Hoc tocol -	CO2
UNIT-III	Routin	g Protocols						Periods: 9			
Issues in desigr	ning a Ro	outing Proto	col for	Ad Hoc Wi	reless N	letwor	ks – Cla	assifications	of Routing	g protocols –	
Table–Driven Distance Vecto	Routing r Routin	Protocols – g (AODV) – D	· Dest ynam	ination Sec ic Source Re	quenceo outing (d Dista DSR) –	ance V Locatio	ector(DSD) on Aided Rou	/)– Ad ho uting (LAR)	c On–Dema	nd CO3
UNIT-IV	Wirele	ss Sensor Ne	etworl	ks				Periods: 9			
Need for Wire Ad hoc Networ Energy scaveng	less Sens rks - Sen ging - Da	sor Network sor node aro ta Gathering	s- Cha chitect and D	racteristic ture –Physi Disseminatio	requirer cal laye on.	ments r and t	for WS transce	SN - Challeng iver design	ges for WS considerat	Ns – WSN vs ions in WSNs	5 – CO 4
UNIT-V	Advan	ced Technol	ogies	and its App	lication	S		Periods: 9			
Basic wireless 802.15.4–Oper	sensor te rating En	echnologies- vironment -	-Hard\ Energy	ware and So y usage pro	oftware file-Con	- Adva nmerci	anced F ally ava	Radio conce ailable sensc	ots –The IE or nodes.	EE Standard	CO5
Lecture Period	s: 45	Tuto	rial Pe	eriods: -	Practi	ical Pe	riods: -	Т	otal Perio	ds: 45	i
Reference Boo	ks:	k						i			
 C. K. Toh, ". Charles E. F Holger Kar 2006. 	Ad Hoc N Perkins, ' I, Andrea	Aobile Wirele Ad Hoc Netv as Willig, "Pr	ess Ne vorkin otoco	tworks Pro ng", Addison I and Archi	tocols a n Wesle [,] tecture	nd Sys y, 2000 for W	tems",). ireless	Prentice Ha	ll, PTR, 200 vorks", Joh	1. In Wiley Pub	lication,

Course: ECA212 Mobile Adhoc and Wireless Sensor Networks

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	3	2	2	-	1	-	-	-	-	1	3	3
CO2	3	3	3	2	2	-	1	-	-	-	-	1	3	3
CO3	3	3	3	2	2	-	1	-	-	-	-	1	3	3
CO4	3	3	3	2	2	-	1	-	-	-	-	1	3	3
CO5	3	3	3	2	2	-	1	-	-	-	-	1	3	3
ECA212	3	3	3	2	2	-	1	-	-	-	-	1	3	3

Department :	Electro Engine	nics and Communication	Progr	amme	: B.Tec	ch. (EC)						
Semester : S	eventh	5	Cours	e Cate	gory Co	ode: PEC	Semester Exam Type: TY it Maximum Marks CA SE TM 25 75 100 oplications of various compone ol stack. in developing next generat n the design, management a :9 near effects. Optical Amplifiers, C C :9 ucture -SONET/SDH layers. C or Broadcast and select C :9 C :9 C :9 C :9 C :9 C :9 C :9 icion, Contention <td>/pe: TY</td>		/pe: TY			
	_	•.	Perio	ods / V	Veek	Credit	N	1aximum N	⁄Iarks			
Course Code	Cours	e Name	L	T	Р	С	FEC Semester Exam Type: TY Credit Maximum Marks C CA SE TN 3 25 75 10 ind applications of various component orotocol stack. works. trotocol stack. vorks. stching in developing next generations ces in the design, management eriods: 9 Ion-Linear effects. Optical s and Filters, Optical Amplifiers, griods: 9 frastructure -SONET/SDH layers. gies for Broadcast and select ntroduction to linear light wave eriods: 9 elength conversion-wavelength and source based multicast tree eriods: 9 oronization, Contention Networks - FTTC and PON eriods: 9 itter, receiver, Optical amplifiers, oronization, Contention Networks - FTTC and PON eriods: 9 itter, receiver, Optical amplifiers, nonnica manag					
ECA213	Optica	al Networks	3	-	-	3	25	75	100			
Prerequisite	Optica	al Communication	.1	1		<u>.</u>		.ii.				
	Upon	completion of the course, the	studen	ts will	be abl	e to						
		Demonstrate the understan	ding of	the o	peratio	on and applic	ations of	various co	omponents			
	CO1	used in opticalnetworks.	U		•				•			
Course	CO2	Analyze the optical network	archite	ectures	s and th	ne protocol st	ack.					
Outcome	CO3	Outline the issues in wavele	ngth ro	uted c	ptical I	networks.						
	<u> </u>	Apply the principle of optic	al pack	et and	burst	switching in a	developin	g next	generation			
	CO4	networks.	-			_	-	_	_			
	CO5	Demonstrate the understa	inding	of the	e diffe	rences in th	ne design	n, manage	ment and			
	05	protection methods for optic	cal netv	vorks.	rks.							
UNIT-I	Optica	al System Components	ts Periods: 9									
Light propagati	on in ol	ptical Fibers-System limitation	ns-loss,	disper	sion ar	nd Non-Linear	effects.	Optical				
Network Comp	ponents	- Couplers, Isolators and C	Circulat	ors, N	lultiple	exers and Filt	ters, Opti	ical Ampli	fiers, CO1			
Switches and W	/avelen	gth Converters.										
UNIT-II	Optica	al Network Architectures		-	-	Periods: 9		-				
Introduction to	SONE	T / SDH- multiplexing –elem	ients o	f SON	ET/SDF	l infrastructu	re –SON	ET/SDH la	yers.			
Concepts of W	/DM an	d DWDM. Broadcast and Sel	lect Ne	twork	s – Top	pologies for E	Broadcast	and selec	^t co2			
networks. Way	elengtr	n Routing Architecture –WDI	M netw	ork e	lement	ts- Introducti	on to lin	ear light v	wave			
networks.		leasth Deutine Network				Deutedes 0						
	wave		••••	NI		Periods: 9	· · · · · ·	1				
Issues in wave	lengtn do arch	routed networks. RWA algor	itnms -	Need	it octur	wavelength c	onversion	-waveleng	tn troo CO2			
generation	ue arci	intectures. Optical multicasti	ig nou		itectur	es and source	le baseu	municasi				
UNIT-IV	Packe	t Switching and Access Netwo	orks			Periods: 9						
Photonic Packe	t Switc	hing - OTDM Multipleving an	n No Na Dami	ultinla	ving Sv	nchronizatio	n Conter	tion				
Resolution O	RS nod	e architecture-burst switch	ing nr	ntocol	s Δrr	ess Network	rs – FTT	C and Pi	ON CO4			
architectures.	55 1100			010001	J. 7100		5 111					
UNIT-V	Netwo	ork Design and Management				Periods: 9						
Transmission S	ystem E	Engineering – System model,	Power	penalt	y - tra	nsmitter, reco	eiver, Opt	ical ampli	fiers,			
crosstalk, dispe	ersion, N	Wavelength stabilization, Ove	rall des	sign co	nsider	ations. Contro	ol and Ma	anagemen	t —			
Network mar	lageme	nt functions, Configuratior	n man	agem	ent, F	Performance	manage	ment, Fa	ult CO5			
management.												
Lecture Period	s: 4 5	Tutorial Periods: -	Pract	ical Pe	riods: -	- To	otal Perio	ds: 45				
Reference Boo	ks:											
1. Rajiv Rama	swami,	Kumar N. Sivarajan and G.H.	Sasaki,	"Opti	cal Net	works – A Pr	actical pe	erspective"	, Elsevier,			
Third Editio	n, 2010											
2. C. Siva Ram	n Moort	hy and Mohan Gurusamy, "W	/DM Op	otical N	letwor	ks: Concept,	Designan	d Algorithr	ns",			
Prentice Ha	II of Ind	lia, 2002.										
3. Biswanath I	Mukher	jee, "Optical WDM Networks",	, Spring	er Seri	es, 200	6.						
4. Gerd Keiser	, "Optic	al Fiber Communications", Tat	a McGr	aw Hil	l, Fifth	Edition, 2013	5. F					

5. Govind P. Agrawal, "Fiber-Optic Communication Systems", Wiley, Third Edition, 2015.

Course: ECA213 Optical Networks

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	2	1	1	2	Ι	1	-	Ι	_	Ι	1	3	1
CO2	2	3	2	2	2	_	1	-	-	-	_	1	3	1
CO3	2	2	2	2	2	_	1	-	-	_	_	1	3	1
CO4	2	2	2	2	2	_	1	-	-	-	_	1	3	1
CO5	2	2	2	2	2	Ι	1	_	Ι	-	Ι	1	3	1
ECA213	2	2.2	1.8	1.8	2	_	1	_	-	_	_	1	3	1

Department : Electronics and Communication Engineering			Programme : B.Tech. (EC)								
Semester : S	Course Category Code: PEC Semester Exam Tv						vpe: TY				
			ods / W	veek	Credit Maximum		, 1aximum N	Marks			
Course Code	Course Name	L	T	P	С	CA	SE	TM			
ECA214	Cryptography and Network				n	25	75	100			
	Security	3	-	-	3	25	/5	100			
Prerequisite	Wireless Communication										
	Upon completion of the course, the students will be able to										
	CO1 Analyse the design of Symmetric Key cryptography algorithms										
	CO2Analyse the PKC algorithms for secured communication.CO3Develop Network Security Protocols.										
Course											
OutcomeCO4Determine the threats and notable attacks to provide security solutions.CO5Evaluate the vulnerabilities across any Wireless Systems.											
UNIT-I	Basics of Cryptography and Finite Fields Periods: 9										
The OSI Secur	The OSI Security Architecture, Security Attacks, Services and Mechanisms-Symmetric Key Cryptography-										
Block and Strea	am Ciphers, Block Cipher Principles,	DES Algo	orithm	-Basic	Concepts of	Finite Fiel	ds, Euclide	an			
Algorithm, Mo	lular Arithmetic, Groups, Rings and	Fields, P	olynor	nial Ar	ithmetic-AES	Algorithm	n- Block Ci	^{pher} CO1			
Modes and its (Operation-Basics of hardware design	for Secu	rity alg	gorithn	ns						
UNIT-II	Number Theory, PKC, Data	a Inte	grity	and	Periods: 9						
	Authentication	lava Th	~ ~ ~ ~ ~ ~	a Chi	 	dar Thaa		ata			
Introduction to	Number Theory, Fermat's and Eu	ners in	eorem	s, Chir	nese Remain	ider Theor	rem, Discr	ete			
Algorithms H	sh and MAC Eulertions Digital Sign	n Key E	Criang	e, KSA als for	Kov manag	omont on	d Dictribu	tion CO2			
Authentication	Kerberos VA	atules-r	101000		Key manag	ement an	u Distribu	1011-			
	Network Security		Periods: 9								
Secure Sockets	Laver and Transport Laver Security-	Flectror	ic Mai	l Secur	ity Pretty G	ood Privac	v -IP Secur	itv-			
Overview. IP s	ecurity Architecture. ESP and Authe	nticatio	n Head	der For	rmats-Intrude	ers. Intrus	ion Detect	ion			
System, Passw	ord Management- Viruses, Worms-F	irewalls	and it	s type	s -Trusted Sv	ystems-Ba	sics of Clo	ud CO3			
security.											
UNIT-IV	s-Part I			Periods: 9			<u>.</u>				
WLAN Vulnerabilities and Threats-IEEE 802.11i Wireless LAN security, Wireless Transport Laver Security.											
WAP End- to	End Security-Vulnerabilities, Threa	its and	Attac	ks in	Cellular Sys	tems-Mob	oile Malwa	are-			
Prevention Tec	hniques in Cellular Systems-Intrusior	Detecti	on in V	Vireles	s Communica	ations-GSN	И, UMTS a	nd CO4			
LTE-Security Ar	chitecture, Attacks and Security Mo	del, LTE-	- AKA (Authe	ntication and	l Key Agre	ement)				
Protocols.											
UNIT-V	Security of Mobile Communication	s-Part II			Periods: 9						
Security and	Authentication in Ad Hoc Networl	ks- Secu	ire Ele	ectroni	c Transactio	n, Securit	y of Mob	oile			
Payments, Privacy and Anonymity in Electronic Payment, Mobile Payment Systems-Securing Copyright in											
Mobile Networks-Heterogeneous architecture- Authentication and Cryptography in heterogeneous CO5											
networks							•				
Lecture Periods: 45 I utorial Periods: - Practical Periods: - Total Periods: 45											
Ketterence Books: 1 William Challings (Constants on a Natural Constitution in Loss of Density (Constants) and Constitution 2017											
1. william Stallings, "Cryptography and Network Security-Principles and Practice", Pearson, /" Edition, 2017.											
 Nouredume Boudinga, Security or informet Communications, CRC Press, Taylor& Francis Group, 2010. T.S. Pappaport, "Wireless and Mobile Communication" Program Education, 2009. 											
5. I. 5. happaport, Wireless and Woolle Communication, Pearson Education, 2008. A Bruce Schneier "Annlied Chintography" John Wiley & Sons and Edition, 1996											
4. Bruce Schn	floogor, Shari Lawronce, "Socurity in	ney & So	ns, 2n ים ״ם	u Ealti	UII, 1996. UII of India	Third Cal	tion 2000				
5. Charles P. P	neeger, Shari Lawrence, "Security in	comput	ing , P	rentice	e mail of India	, i nira Edr	uon, 2006.				
Course: ECA214 Cryptography and Network Security

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	3	3	2	1	2	Ι	-	Ι	1	2	2
CO2	3	3	2	3	3	2	1	2	Ι	-	Ι	1	2	2
CO3	3	3	2	3	3	2	1	2	-	-	-	1	2	2
CO4	3	2	1	3	2	2	1	2	_	-	-	1	2	2
CO5	3	1	1	3	2	2	1	2	_	_	_	1	2	2
ECA214	3	2.4	1.6	3	2.6	2	1	2	_	_	_	1	2	2

Department :	Electronics Engineerir	and Commun 1g	ication	Progra	amme	: B.Tec	h. (EC)					
Semester : S	Seventh			Cours	e Cate	gory Co	ode: PEC	Semest	er Exam Type	e: TY		
	N			Peric	ods / W	/eek	Credit	N	laximum Ma	rks		
Course Code	Course Na	ime		L	Т	Р	С	CA	SE	TM		
ECA215	LTE Tech Design	nnology and	Network	3	-	-	3	25	75	100		
Prerequisite	Cellular M	obile Communi	ication									
	Upon com	pletion of the o	course, the	studen	ts will	be able	e to					
A A A A	CO1 In	terpret the LTE	Technolog	ies and	Netwo	ork Arch	nitectures.					
Course	CO2 Co	ompare LTE Pro	tocols and	procedu	ures us	sed in u	plink and do	wnlink.				
Outcome	CO3 III	ustrate OFDM a	and MIMO (techniq	ues.		-					
	CO4 Ex	amine the sign	al structure	and de	tectio	n mech	anisms used	in downli	nk and uplinl	design.		
UNIT-I	Introducti	on					Periods: 9					
Motivation to LTE - Evolution of Architecture – Standardization process in 3GPP –Technologies for LTE,												
Network Architecture - Core Network – Access Network – Roaming Architecture – Protocol Architecture – CO1												
Quality of service and EPS Bearers - S1 and X2 E-UTRAN Network Interfaces.												
UNIT-II	Control Pl	ane and User P	lane Proto	cols			Periods: 9					
Radio Resourc	e Control -	- PLMN and C	Cell Selection	on – Pa	aging,	User F	Plane Protoc	ol Stack	– Packet Da	ta CO2		
Convergence P	rotocol – Ra	dio Link Contro	ol – Medium	n Access	Contr	ol.						
UNIT-III	Orthogon MIMO Teo	al Frequency chniques	Division	Multiple	e Acc	ess &	Periods: 9					
History of OFD	M Developn	nent – OFDMOI	FDMA– Par	ameter	Dimer	nsionin	g. Fundamer	itals of Mu	ıltiple	CO3		
antenna theory	/ – MIMO Się	gnal Model – Si	ngle User N	1IMO, N	1ultiUs	ser MIN	/10 – MIMO 9	Schemes ir	n LTE.			
UNIT-IV	Downlink	Design					Periods: 9					
Transmission F Synchronizatio	lesource Str n sequences	ucture – Signal and cell search	l Structure n in LTE – Co	– Dowr pherent	ilink o Vs No	peratio n-Cohe	on. Synchron rent Detectio	ization an on.	d Cell Search	– CO4		
UNIT-V	Uplink De	sign					Periods: 9					
Uplink Physical Layer Design - SC- FDMA Principle –SC-FDMA Design in LTE. Uplink Physical channel structure – Physical uplink shared Data channel Structure – Uplink control channel Design – Multiplexing of control signaling – ACK/NACK Reception, Uplink transmission procedures- Timing Control – Power control.												
Lecture Period	Lecture Periods: 45 Tutorial Periods: - Practical Periods: - Total Periods: 45											
Reference Boo	Reference Books:											
1. Stefania Se	esia, Issam	Toufik and Ma	itthew Bak	er, "LTE	E – Th	e UMT	S Long Terr	n Evolutio	on: From The	eory to		
Practice", J	ohn Wiley &	Sons, 2011.	·		-			-				
2. Christophe	r Cox, "An ir	ntroduction to l	LIE – LTE, L	TE-Adva	anced,	SAE ar	nd 4G Mobile	e Commun	ications", Jo	nn Wiley		
& Sons, 20	12. <i>(1)</i> - -		40.14									
 3. Moray Run 2013. 	nney, "LIE a	na Evolution to	4G Wirele	ss: Desi	gn and	Weasu	irement Cha	lienges", A	igilent Lechn	ologies,		

Course: ECA215 LTE Technology and Network Design

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	3	2	-	1	-	-	-	-	1	3	2
CO2	3	1	1	3	2	-	1	-	-	-	-	1	2	1
CO3	3	2	1	3	2	-	1	-	-	-	-	1	1	1
CO4	3	2	-	3	2	-	1	-	-	-	-	1	2	2
ECA215	3	1.75	1	3	2	-	1	-	-	-	-	1	2	1.5

Department : I	Electron Engine	ics and Communication	Progra	amme	: B.Tec	:h. (EC)							
Semester : S	eventh	U	Cours	e Cate	gory Co	ode: PEC	Semest	er Exam T	vpe: TY				
	I		Peric	ods / V	Veek	Credit	N	laximum l	Marks				
Course Code	Course	e Name	L	T	P	С	СА	SE	TM				
ECA216	Cognit	tive Radio Networks	3	-	-	3	25	75	100				
Prerequisite	-		.1		1	<u>.</u>	i	L					
•	Upon	completion of the course, the	studen	ts will	be able	e to							
	CO1	Demonstrate the understand	ding of c	liffere	nt cogr	nitive radio n	etwork (CF	RN) paradi	gms.				
_	CO2	Compare different methods	of spec	trum	sensing	and their ag	plications	in CRN.					
Course	CO3	Summarize the fundamenta	l constr	aints a	and pro	perties of a	cognitive r	adio netw	vork.				
Outcome	CO4	Implement cognitive radio r	network	(CRN) archit	ectures.							
	CO5	Analyze the security threats	to CR n	etwor	, ks.								
UNIT-I	Cognit	ive Radio Technology			_	Periods: 9							
Introduction - S	Softwar	e-Defined Radio - Cognitive R	adio – S	Spectr	um po	licy - Applica	tions of co	ognitive ra	adio -				
Cognitive radio	o netwo	rk design - Hardware and sy	vstem d	lesign	consid	lerations - S	pectrum c	oexistenc	e –				
Standardization	ו - Cogn	itive radio network paradigm	, s -perfc	orman	ce limit	ts of wireless	networks	- Interfei	ence co1				
channels.	0	1 0	•						01				
UNIT-II Propagation Issues for Cognitive Radio Periods: 9													
Introduction - Generic channel response - path loss - Path loss models - Small-scale fading and the Ricean <i>K</i> -													
factor - Small-scale fading and the Doppler spectrum - Delay dispersion - Angle dispersion – Polarization - CO1													
Special environments - key model parameters.													
UNIT-III Spectrum Management Periods: 9													
Spectrum sens	sing an	d identification - Introducti	ion - P	rimar	y Signa	al Detectior	- Detec	ting Spec	trum				
Opportunities	- Trade	offs - Spectrum access and	sharing	– Int	roducti	ion - Unlicer	nsed Spect	rum Shai	ring -				
Licensed Spect	rum Sha	aring - Secondary Spectrum A	ccess -	Non-F	Real-Tir	ne SSA - Rea	ll-Time SSA	A – Dynar	nic CO2				
Spectrum acces	ss – wat	er filling – game theory.											
UNIT-IV	Cognit	ive Radio Communication Tec	chnique	s		Periods: 9							
Radio frequen	cy spec	trum and regulation – Spec	trum -	Emer	ging R	egulatory Ch	allenges a	and Actio	ns -				
Regulatory Iss	ues of	Cognitive Access - Digital	comm	unicat	ion fu	ndamentals	for cogn	itive radi	o —				
Introduction -	Data Tr	ansmission - Digital Modulat	ion Tec	hniqu	es - Pr	obability of	Bit Error -	Multicar	rier CO3				
Modulation - N	Aulticar	rier Equalization Techniques	- Inters	ymbol	Interf	erence – Pul	se shaping	g -Agile					
transmission te	chnique	25.											
UNIT-V	Cognit	ive Radio Network Architectu	ires and	Secur	ity	Periods: 9							
Fundamentals	of comr	nunication networks – Archit	ecture	and B	uilding	Blocks - Nev	w Challeng	ges in Wir	eless				
Networks - Mo	bility M	odeling - Power Control and	Multius	er Div	ersity	- Multiple Ad	cess Sche	mes - Rou	iting,				
Energy Efficien	cy, Netv	work Lifetime Congestion Cor	ntrol. Co	ognitiv	e Radi	o Network A	rchitectur	es - Topo	logy-				
Aware CRN A	rchitect	tures - Publish-Subscribe C	RN Arc	chitect	ure C	ognitive rac	lio netwo	rk securi	ty – CO4				
Introduction - Primary-User Emulation Attacks- Security Vulnerabilities in IEEE 802.22 - Security Threats to CO5													
the Radio Software.													
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -	· T	otal Perio	ds: 45					
Reference Boo	ks:			_		-							
1. Ezio Biglieri	Andrea	j .Goldsmith LarryJ .Greenstein	Naraya	n B .M	andaya	im & H. Vince	nt, "Poor P	rinciples o	of Cognitive				
Radio", Can	nbridge l	University Press.			+1. / - D -	dia Camara i	options	ا م ا م ا م ا	o Dutic attal				
2. Alexander N	vi. vvygli v″ Acad	nski, iviaziar Nekovee, Y. Thoma	as nou, '	Cogni	иvе ка	ulo communi	cations and	a network	s Principles				
	to "Coo	ennic Mess. Initivo Padio Tachaology" Novy	nocoubl	lication									
Δ Yan 7hang	lun 7ha	ng& Hsian-Hwa Chen "Cogniti	ve Radio		is. Iorke A	rchitectures	Protocols	and Stand	lards" CRC				
Press.			ve naun			i eniteetui es,	0.000013,						

Course: ECA216 Cognitive Radio Networks

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со	P01	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	2	2	_	1	-	_	-	_	1	1	1
CO2	3	2	2	2	2	_	1	-	_	_	_	1	1	1
CO3	2	2	2	2	2	_	1	-	_	-	_	1	1	1
CO4	3	3	3	2	2	_	1	-	_	-	_	1	1	1
CO5	3	2	2	2	2	_	1	-	_	-	_	1	1	1
ECA216	2.8	2.2	2.2	2	2	_	1	_	_	_	_	1	1	1

Department :	Electror Engine	nics and Communication eering	Progr	amme	: B.Tec	h. (EC)						
Semester :	Seventh		Cours	e Cate	gory Co	ode: PEC	Semeste	er Exam Type:	TY			
Course Code	Cours	o Namo	Perio	ods / V	Veek	Credit	Μ	laximum Marl	٢S			
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	тм			
ECA217	Multi	media Compression	3	-	-	3	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	e studen	ıts will	be able	e to						
	CO1	Determine the performance	e of diffe	erent c	oding S	Schemes for	digital mul	timedia.				
Course	CO2	Identify the performance o	of dictior	hary te	chniqu	es for file co	ompression	•				
Outcome	CO3	Demonstrate the understan	ding of v	variou	s Vocoo	der.						
	CO4	Compare the various lossles	ss comp	ressio	n links.							
	CO5	Compare the various lossy of	compres	ssion li	nks.							
UNIT-I Text Data Periods: 9												
Individual Samples - Huffman Coding: Basic Huffman - Adaptive Huffman- Golomb code- Tunstall code -												
Applications; A	rithmet	ic Coding: Basic Arithmetic Cod	ding - Ac	laptive	e arithn	netic coding	- Applicatio	ns;	CO1			
UNIT-II	Dictio	nary coding				Periods: 9						
Static dictiona	ry-Diagr	am coding - Adaptive Dictiona	ary- LZ7	7-LZ78	- LZW.	Block of Sa	mples- Vect	or	CO2			
Quantization-	Basic Alg	sorithm-				-						
UNIT-III	Audio	Data				Periods: 9						
Speech produce Exploiting Corr	ction: Ex elation-	<pressing l<br="" source-="" vocoders-="">Basic DPCM- Adaptive DPCM-</pressing>	.PC – CE - Delta N	ELP - Si Aodula	inusoid ntion – J	lal Coders - Applications	Wide band	Compressior	^{;;} CO3			
UNIT-IV	Lossle	ess Compression				Periods: 9						
Hearing percenter compression: (eption: Calic - JPI	Masking-MPEG Audio codi EG LS - Progressive Transmissio	ng- Ad on-Facs	vance imile E	d Aud Incodin	io Coding. Ig	Image da	ita: Lossless	CO 4			
UNIT-V	Lossy	Compression				Periods: 9						
DCT - Walsh Ha	adamarc	- Wavelet - JPEG 2000, Video	data - I	H.261-	MPEG	1 - MPEG 2	- MPEG 4.		CO5			
Lecture Period	s: 45	Tutorial Periods: -	Pract	ical Pe	riods: -		Fotal Period	ls: 45				
Reference Boo	ks:											
1. Khalid Sayo 2010.	od, "Intr	roduction to Data Compressio	n" Third	Editio	n, Mor	gan Kauffma	ann Publish	ers, Inc. Califo	ornia,			
2. Mark Nelso	n, Jean L	ouf Goilly, "The Data Compres	ssion Bo	ok", Bl	PB Publ	lications, 19	96.					
3. Rafel C.Gon	zalez, "C	Digital Image Processing", Add	ison We	sley, 1	998.							
4. Darrel Hank	kerson, G	Greg A Harris, Peter D Johnson	, "Introd	luction	to Info	ormation Th	eory and Da	ata Compressi	on"			

Second Edition, Chapman and Hall ,CRC press company, 2007.

Course: ECA217 Multimedia Compression

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	3	2	1	3	Ι	Ι	Ι	Ι	Ι	Ι	1	2	2
CO2	3	3	2	1	3	Ι	Ι	Ι	Ι	Ι	Ι	1	2	2
CO3	3	3	2	1	3	-	-	-	-	-	-	1	2	2
CO4	3	2	1	1	2	Ι	-	-	-	-	-	1	2	2
CO5	3	1	1	1	2	_	_	_	-	_	_	1	2	2
ECA217	3	2.4	1.6	1	2.6	_	_	_	-	-	-	1	2	2

Department : I	Electror Engine	nics and Communication	Progra	amme	: B.Tecl	h. (EC)							
Semester : S	eventh		Cours	e Cate	egory Co	de: PEC	Semest	er Exam Ty	/pe: TY				
	_	. .	Perio	ds / \	Veek	Credit	N	1aximum N	/arks				
Course Code	Cours	e Name	L	Т	Р	С	CA	SE	ТМ				
ECA218	Radar	and Navigational Aids	3	-	-	3	25	75	100				
Prerequisite	-		.1					ii					
	Upon	completion of the course, the	studen	ts will	be able	to							
	CO1	Demonstrate the understand	ding of t	he fu	ndamen	tal concepts	of Radar.						
Course	CO2	Illustrate the mathematical	model a	and pe	erforma	nce of Radar							
Outcome		Demonstrate the understand	ding of t	he Do	nnler fr	equency shi	ft and the	design of l	Digital MTI				
	CO3	Doppler signal processor.			ppier ii	equency sim		acongnion	BiBitai Mili				
	CO4	Summarize the different ty	pes of R	adar t	racking.								
	CO5	Demonstrate the understand	ding of t	he fu	nctions	of Radar ante	enna						
UNIT-I	Basics	of Radar				Periods: 9							
Introduction M	lavimur	n Unambiguous Range Radar	Wayofo	rmc	Definitio	ns with resp	ect to nul	so wavofor	m				
- PRF, PRI, Duty Cycle, Peak Transmitter Power, Average transmitter Power. Simple form of the Radar													
Equation, Radar Block Diagram and Operation, Radar Frequencies, Applications of Radar, The Origins of CO1													
Radar, Illustrative Problems.													
UNIT-II Radar Equation Periods: 9													
Prediction of Range Performance, Detection of signal in Noise, Minimum Detectable Signal, Receiver Noise,													
SNR. Modified Radar Range Equation. Envelope Detector — False Alarm Time and Probability. Probability of													
Detection. Rada	ar Cross	Section of Targets: simple ta	rgets –	spher	e. cone-	-sphere. Trar	nsmitter P	ower. PRF	and CO1				
Range Ambigui	ties, Sys	stem Losses (qualitative treatm	nent), Ill	ustrat	ive Prot	olems.		,					
UNIT-III	MTI a	nd Pulse Doppler Radar				Periods: 9			i				
Introduction, P	rinciple	Doppler Frequency Shift, Sir	mple CV	V Rac	lar. Swe	en to Sweer	subtract	ion and De	av				
Line Canceler.	MTI Rad	dar with – Power Amplifier Tr	ransmit	ter. D	elav Line	e Cancelers	— Freque	ency Respo	nse				
of Single Delay	- Line C	anceler, Blind Speeds, Clutter	Attenu	ation,	MTI Im	provement F	actor, N-	Pulse Dela	iy- CO2				
Line Canceler. I	Digital N	VITI Processing – Blind phases	, I and C) Chai	nnels, Di	igital MTI Do	ppler sigr	nal process	or,				
Moving Target	Detecto	or- Original MTD.				0		•					
UNIT-IV	Tracki	ing Radar				Periods: 9							
Tracking with F	Radar- T	ypes of Tracking Radar System	ms, Mo	nopul	se Track	king- Amplitu	ude Comp	arison					
Monopulse (on	e-and t	wo-coordinates), Phase Comp	arison I	Nono	pulse. Se	equential Lol	bing, Coni	cal Scan	CO3				
Tracking, Block	Diagran	n of Conical Scan Tracking Rad	ar, Tracl	king ir	n Range,	Comparison	of Tracke	rs.					
UNIT-V	Radar	Antenna				Periods: 9							
Functions of th	e Radar	Antenna, Antenna Parameter	s, Refle	ctor A	ntennas	and Electro	nically Ste	ered Phase	ed				
array Antenna	s. Rada	ar Receiver - Receiver Nois	se Figui	re, Su	iper He	eterodyne R	eceiver, [Duplexers	and				
Receivers Protectors, Radar Displays.													
Lecture Periods	s: 45	Tutorial Periods: -	Practi	cal Pe	eriods: -	Тс	otal Period	ds: 45					
Reference Bool	ks:												
1. M.I. Skolnik,	"Introdu	uction to Radar System", McGra	aw Hill, ⁻	Third	Edition,	2001.							
2. N. S. Nagaraj	a, "Elen	nents of Electronic Navigation S	Systems	", Tat	a McGra	aw-Hill, Seco	nd Edition	, 2001.					
3. Sen & Bhatta	charva.	"Radar Systems and Radio Aid	s to Nav	vigatio	on", Kha	nna publishe	rs, Sixth E	dition, 198	57.				
4. Peyton Z. Pee	ebles, "F	Radar Principles", John Wiley, 1	2004.	0	,		,	,					
5. J.C Toomay,	"Princip	oles of Radar", Second Edition,	PHI, 20	04.									

Course: ECA218 Radar and Navigational Aids

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	1	Ι	1	Ι	1	Ι	Ι	_	Ι	1	2	1
CO2	3	2	1	Ι	1	Ι	1	Ι	Ι	_	Ι	1	2	1
CO3	3	2	1	Ι	1	Ι	1	Ι	Ι	_	Ι	1	2	1
CO4	3	2	1	Ι	1	Ι	1	1	Ι	-	Ι	1	2	1
CO5	3	2	1	Ι	1	Ι	1	-	-	_	-	1	2	1
ECA218	3	2	1	-	1	_	1	-	-	_	-	1	2	1

Department: Electronic Communic	cs and cation E	ngineering	Prog	ramm	ne: B.Tech.	Programme: B.Tech.							
Semester : Seventh		<u> </u>	Cours	se Cat	egory Code:	PEC	Sem T	iester /pe: T	Exam Y				
Course Code	Course	e Name		Perio	ods/Week	Credi	t Ma	ximur	n Marks				
			L	Т	Р	С	CA	SE	ТМ				
ECA219	Intern	et of Everything	3	-	-	3	25	75	100				
Prerequisite	-												
	Upon c	ompletion of the co	ourse,	the st	udents will b	e able to							
	CO1	Demonstrate the u	unders	tandir	ng of IOE laye	red archite	cture.						
Course Outcome	CO2	Develop models/p	rotocc	ls for	different laye	ers of IOE.							
	CO3	Examine the proto	cols of different layers in IOE.										
	rent layers us	ed in IOE.											
	CO5	Demonstrate the u	tandir	ng of the appl	ications of	IOE							
	CO6	Design solution for	r real t	ime p	roblems using	g IOE.							
UNIT-I IOE Introduction and Fundamentals Periods:9													
Evolution of Internet of Everything-Benefits/Challenges of deploying an IoE, IoE													
components: Digital Signal Processing, Data transmission, Choice of channel (wired/wireless),													
back-end data analysis.	IOE Arc	hitectures: IoI - A,	- Tol	RA, IE	EEP 2413, C	ISCO Refere	nce IV	lodel	CO1				
and Reference IOT Lay	ered Arc	hitecture – IOE and	א -IA נ	og, Eo	age and Clou	id in Ioe –	Funct	ional	COI				
DIOCKS OF AN IOE ECOSYST	em												
UNIT-II	Signals	, Sensors, Actuator	s and I	nterfa	aces		Peric	ds:9	<u>.</u>				
Introduction to sensors	and trar	nsducers, Introducti	ion to	electr	odes and bio	sensors, Di	fferen	t					
types of sensors, Select	ion crite	ria's for sensors / t	ransdu	icers,	Signal condit	ioning mo	dules c	of IoE	CO2				
system, Energy and	power d	considerations, Int	roduct	tion t	o actuators	, Different	type:	s of	CO3				
actuators, Interfacing cl	nallenge	s, Modules of data a	acquis	ition s	ystem.				C04				
UNIT-III	IoE Pro	otocols					Peric	ods:9	r				
IoE Access Technologie	es: Phys	ical and MAC laye	ers, To	polog	y and Secur	ity of IEEI	802.	15.4,					
802.15.4g, 802.15.4e,19	901.2a,8	02.11 ah and LoRa	WAN	Netw	ork Layer: IP	Versions, C	onstra	ined	CO2				
Nodes and Constrained	Netwo	rks – Optimizing IP	for lo	T: Froi	m 6LoWPAN	to 6Lo, Ro	outing	over	CO3				
Low Power and Lossy N	letworks	i							CO4				
Application Transport N Protocols: CoAP and M	/lethods: QTT.	Supervisory Contro	ol and	Data A	Acquisition	– Applica	ition l	ayer					
UNIT-IV	loE Da	ta analytics and Sec	curity:				Peric	ods:9					
loE Data Analytics. Crypt	ographic	algorithms, Analys	sis of L	ight v	veight Crypto	ographic so	lutions	s, IoE	CO2				
security, Key exchange u	sing Ellip	otical Curve Crypto	graphy	, Com	parative ana	lysis of Cry	ptogra	aphic	CO3				
Library for IoE.									CO4				
UNIT-V	loE Ap	plications					Peric	ds:9					
Smart Lighting-Smart P	arking –	Smart Traffic Cor	ntrol-	Home	Intrusion D	etection-Sr	nart G	irids-	CO5				
Smart Payments-Smart I	rrigatior	-Health and Fitness	s moni	toring	-Industry 5.0				CO6				
Lecture Periods:45		Tutorial Periods: -	Prac	tical F	Periods:-	То	Total Periods: 45						
DeferenceBeeke		i				i							

- 1. David Hanes, Gonzalo Salgueiro, Patrick Grosse tete, Rob Barton and Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", Cisco Press, 2017.
- 2. B.K.Tripathy and J.Anuradha, "Internet of Things– Technologies, Applications, Challenges and Solutions", Taylor& Francis, CRC Press, 2018.
- 3. Qusay F.Hassan, Attaur RehmanKhan, Sajjad A.Madani, "Internet of Things Challenges, Advances, and Applications", Taylor & Francis, CRCPress, 2017.
- 4. Arshdeep Bahga, Vijay Madisetti, "Internet of Things–Ahands on approach", Universities Press, 2015.

Course: ECA219 Internet of Everything

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	2	-	-	-	-	-	-	-	-	2	-	-	3	3
CO2	2	3	2	1	-	-	-	-	-	-	-	-	1	1
CO3	2	3	1	1	-	-	-	-	-	-	I	-	1	2
CO4	2	2	1	1	-	-	-	-	-	-	-	-	2	-
CO5	3	1	2	2	-	-	-	-	2	2	-	-	1	2
CO6	2	2	2	3	2	-	2	1	3	3	-	-	2	3
ECA219	2.17	2.2	1.6	1.6	2	-	2	1	2.5	2.33	-	-	1.67	2.2

Department: Electro	onics and Engine	Communication eering	Pro	gram	ime: B.Te	ch.					
Semester : Seve	nth		Cou	rse (Category (Code: Pl	EC	Seme	ster Exa	m Type:	: TY
			Pe	riods	/Week	Cre	dit		Maxim	um Mark	ks
Course Code	Course	Name -	L	Т	Р	С		CA	SE	TM	1
ECA220	Advance Mobile	ed Communications	3	-	-	3		25	75	100	C
Prerequisite	-										
	Upon coi	mpletion of the course, the	e stu	dent	s will be a	ble to		<u> </u>			
	CO1	Summarize the evolution the years.	n of	mob	ile comm	nunicatio	on st	andaro	ds deve	loped o	over
Course	CO2	Demonstrate the understa criteria.	ndin	g of	5G archite	ecture, i	its co	mpone	ents and	1 functio	onal
Outcome	CO3 Outline the in-depth functioning of 5G radio access technologies. CO4 Demonstrate the understanding of device to device (D2D) communication and standardization. CO5 Evaluate the use of advanced techniques in cellular communications. Mobile Communications Overview Periods:9										
	CO4	Demonstrate the underst	andir	ng o	f device	to devic	ce (D	2D) co	ommun	ication a	and
	CO5	Fyaluate the use of advance	ed te	chni	aues in ce	ellular co	omm	unicati	ons		
UNIT I		Mobile Communication	s Ov	ervie	9465 11 60 W	Perio	ds:9	unicati	01101		
Evolution from 1G	to 5G Ana	alog voice systems in 1G c	ligita	l rad	io system	s in 2G	voice	e and r	nessagi	nσ	
services. TDMA base	ed GSM. (CDMA. 2.5G (GPRS). 2.750	i (FD	GF):	IMT2000	. 3G UN	ATS.	W-CDN	ЛА. HSF	PA.	
HSPA+. 3G services	and data	a rates. IMT Advanced.	4G. I	LTE.	Volte.) SC C.	MIM	D. LTE	Advanc	ed c	-01
Pro (3GPP Release 13	3+), IMT2(020, enhancements in com	paris	son t	o IMT Ad	vanced		- /			.01
UNIT II		Introduction to 5G Comm	unica	atior)			Per	iods:9	I	
Building Blocks of 5	G. 5G Arc	chitecture, 5G for IoT App	licati	ons	.5G poter	ntial and	d apr	olicatio	ns. Usa	ge	
scenarios, enhanced mobile broadband (eMBB), ultra reliable low latency communications (URLLC),											
massive machine type communications (MMTC), D2D communications, V2X communications,											
Spectrum for 5G,	spectrun	n access/sharing, millim	neter	W	ave com	munica	tion,	chan	nels a	nd C	02
signals/waveforms in	n 5G,carrie	er aggregation, small cells,	dua	l con	nectivity.						
UNIT III		5G Network						Per	iods:9		
New Radio (NR), S	tandalone	e and non-standalone me	ode,	non	-orthogoi	nal mul	tiple	acces	s (NOM	1A) <i>,</i>	
massive MIMO, be	am form	ation, PHY API Specifica	ation	, fle	exible fra	ime str	uctur	re, Sei	rvice D	ata	
Adaptation Protoco	ol (SDAP),	centralized RAN, oper	n RA	N, I	multi-acce	ess edg	ge co	omputi	ng (Ml	EC);	
Introduction to sof	tware de	fined networking (SDN),	netw	ork	function	virtualiz	atior	ו (NFV), netw	ork C	:03
slicing; restful API fo	r service-l	pased interface, private ne	etwor	ks		1					
UNIT IV		5G Evaluation & Applicati	ons					Per	iods:9	<u> </u>	
MTC, D2D Comm	unication,	Multihop D2D, Multi-	carri	er (D2D: Ma	chine-ty	pe	comm	unicatio	ons:	
Fundamental techni	ques for	MTC – Massive MTC – UI	tra-re	eliab	le low-lat	ency M	TC –	Device	e-to-dev	vice	
(D2D communicatio	ons – Mu	Ilti-hop D2D communicat	tions	- 1	Aulti-ope	rator D	2D c	commu	nicatio	n – c	04
Simulation methodo	logy: Eval	uation methodology – Cali	brati	on –	New chal	lenges i	n the	5G mc	odeling.		
UNIT V	davalara	Current state and Challen	ges a	hea	d aaa in la			Per	iods:9		
stronger backbaul	require	a countries; deployment	. UNA	men	s and us	w-mua ano of	ue If	ancod	countr	ies,	
contracting radio re	source re	auirements large cell usa	in di Ige l	MIC	noscihlz	age ui solutio	anne me fr	anseu ar conr	apecini apertivity	v in	
rural areas (Bharat	Net. TVW	S Long range WiFi. FSO):	non	-terr	estrial fro	onthaul	/ ha	ckhaul	solutio	ons:	05
LEOs, HAP/UAV.							,		0010.00		.05
Lecture Periods:45		Tutorial Periods:-	F	ract	ical Perio	ds:-	Tota	l Perio	ds:45		
Reference Books:											
1. Mobile Communic	ations by	Jochen Schiller Pub: Finan	cial Ti	mes	/ Imprint	ot Pear	son			row 11:11	
∠. Nobile Cellular I Education	elecomm	unications: Analog and L	Jigita	зу	SLEITIS DY	vviiiai	in Le	e, Pul	J. IVICG	iaw Hill	I
3 Mobile Communic	ations De	sign Fundamentals by Will	iam L	ee, F	ub: Wiley	/ India P	vt. Lt	d.			

- 4. Wireless Communications: Principles and Practice by Theodore S. Rappaport, Pub: Pearson
- 5. Harri Holma, Antti Toskala, LTE for UMTS: Evolution to LTE-Advanced, John Wiley and Sons, 2011
- 6. 5G Technology Evolution Recommendations, 4G Americas, 2015
- 7.5G Mobile and Wireless Communications Technology, Afif Osseiran, Jose F. Monserrat, Patrick Marsch Cambridge University Press, Second Edition, 2011
- 8. 5G NR: The Next Generation Wireless Access Technology, Erik Dahlman, Stefan Parkvall, Johan Sko Ï d Elsevier, First Edition, 2016
- 9. Fundamentals of 5G Mobile Networks Jonathan Rodriguez Wiley First Edition ,2010

Course: ECA220 Advanced Mobile Communication

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	1	1	3	1	-	1	-	-	-	-	1	3	2
CO2	3	1	1	3	1	-	1	-	-	-	-	1	3	2
CO3	3	1	1	3	1	-	1	-	-	-	-	1	3	2
CO4	3	1	1	3	1	-	1	-	-	-	-	1	3	2
CO5	3	1	1	3	1	-	1	-	-	-	-	1	3	2
ECA220	3	1	1	3	1	-	1	-	-	-	-	1	3	2

Open Elective Courses

Department :	Electron Engine	ics and Communication	Progr	amme	: B.Tec	:h.			
Semester :	4 /5/6/	7	Cours	e Cate	gory Co	ode: OEC	Semest	er Exam Type:	ТҮ
Course Code	Course	Nama	Perio	ods / W	/eek	Credit	N	laximum Mark	S
Course Coue	Course	ename	L	Т	Р	С	CA	SE	ТМ
ECA301	Consu	mer Electronics	3	-	-	3	25	75	100
Prerequisite	-								
	Upon (completion of the course, the	studen	ts will	be able	e to			
Course	CO1	Classify various faults in Hor	ne elect	tronic o	devices	5.			
Outcome	CO2	Demonstrate the understan	ding of	washir	ng mac	hine and a	ir condition	er operation.	
Outcome	CO3	Interpret various componer	nts of th	ne digit	al devi	ces for ho	me applicati	ons.	
	CO4	Demonstrate the understan	ding of	variou	s digita	al set boxe	s.		
UNIT-I	Micro	wave Ovens				Periods:	9		
Microwaves (R chip controller,	ange use Types o	ed in Microwave ovens), Micro f Microwave oven, wiring and	owave o safety i	oven bl instruc	lock dia tions, (agram, LCI Care and C	D timer with leaning.	alarm, Single	CO1
UNIT-II	Washi	ng Machines				Periods:	9		
Electronic contr	oller for	washing machines, washing	g machi	ne har	dware	and softv	vare, Types	of washing	
machines - Fuzzy	/ logic w	ashing machines, Features of	washin	g mach	ines.				COZ
UNIT-III	Air Coi	nditioners and Refrigerators				Periods:	9		
Air Conditionin conditioning sy	ng, Com stems, L	ponents of air conditioning Initary and central air conditio	systen	ns, All stems,	water Split ai	r air cond ir conditio	litioning sys ners.	tems, All air	CO2
UNIT-IV	Home	Office Digital Devices				Periods:	9		
Facsimile macl calculator, Serv	hine, Xe vicing ele	rographic copier, calculators ectronic calculators, Digital clo	, Struct ocks, Blo	ture of ock diag	facal gramo	culator, Ir f a digital (nternal orga clock.	nization of a	СО3
UNIT-V	Digital	Access Devices				Periods:	9		
Digital comput decoder, Elect Video on dema	er, Inter ronic Fu nd.	net access, online ticket rese nd Transfer, Automated Tel	rvation ler Mac	, functi chines	ions ar (ATMs	nd networ s), Set-Top	ks, barcode boxes, Dig	scanner and ital cable-TV,	CO4
Lecture Period	s: 45	Tutorial Periods: -	Practi	ical Per	iods: -		Total Perio	ds: 45	
Reference Boo	ks:								
 S.P.Bali, "Co M. L. Anano Phillip Hoff, R. G. Gupta 	onsumer I, "Consu Phillip H , " Audic	Electronics", Pearson Educati umer Electronics", Khanna Pub Ierbert Hoff, "Consumer Electr and Video systems", Tata Mc	on, 200 olicatior ronics fo :Graw H	5. ns, 2012 or Engii Iill, 200	1. neerinį 14.	g", Cambri	dge Press,19	98.	

Course: ECA301 Consumer Electronics

Regulation: 2022-23

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со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	1	1	-	1	-	1	1	-	-	1	2
CO2	3	2	2	-	1	-	2	-	-	1	1	-	1	2
CO3	3	2	2	1	1	-	1	-	-	1	1	1	1	1
CO4	3	2	2	-	1	1	2	-	-	1	-	1	1	2
ECA301	3	2	2	1	1	1	1.5	-	1	1	1	1	1	1.75

Department :	Electror Engine	nics and Communication	Progra	amme	: B.Tec	h.			
Semester :	4/5/6	5/7	Course	e Cate	gory Co	ode: OEC	Semest	er Exam Type	: TY
Course Code	Cours	o Namo	Peric	ods / W	/eek	Credit	N	1aximum Ma	rks
Course Coue	Cours	ename	L	Т	Р	С	CA	SE	ТМ
ECA302	Comn	nunication Engineering	3	-	-	3	25	75	100
Prerequisite	-								
	Upon	completion of the course, the	studen	ts will	be able	e to			
Course	CO1	Demonstrate the understand	ding of A	Amplit	ude Mo	odulation Sys	stems.		
Outcome	CO2	Analyse Angle Modulation S	System						
outcome	CO3	Summarize the Baseband M	lodulatio	on Sys	tems				
	CO4	Analyse Digital Modulation	Systems	and S	ynchro	nization Tec	hniques.		
	CO5	Compare various Wireless t	technolo	ogies.					
UNIT-I	Ampli	tude Modulation Systems				Periods: 9			
Need for Mod Demodulation	ulation of AM, [Amplitude Modulation - Sp DSBSC, SSB and VSB Signals-Pri 	ectra a inciple c	nd Pov of FDM	wer Eq	uations for	AM - Gen	eration and	CO1
UNIT-II	Angle	Modulation Systems				Periods: 9			
Frequency and	l Phase	Modulation - Narrow band an	nd Wide	band I	M- Tra	ansmission B	andwidth	- Generation	602
and Demodula	tion of F	M Signal-Operation of FM rec	eivers.						
UNIT-III	Baseb	and Modulation Systems				Periods: 9			
Sampling Theo	orem, Ba	sics of PAM, PWM and PPM,	Base Ba	and tra	nsmiss	sion - Wave	form repr	esentation of	:
Binary Digits -	PCM, D	PCM, DM and ADM systems-	Principl	e of T	DM-Co	rrelation Red	ceiver-Mu	ltilevel Base	CO3
Band PAM Syst	em-Inte	r Symbol Interference - Eye Pa	attern.						
UNIT-IV	Digita	I Modulation Systems and Syr	nchroniz	ation		Periods: 9			
Transmitter ar Operation of D	nd Rece PSK and	iver of Coherent BASK, BPSI Non coherent FSK-Need for Sy	K, BFSK, ynchron	QPSk izatior	ζ, QAN 1.	1 and MSK s	systems -	Principle and	CO4
UNIT-V	Wirele	ess Communication Systems				Periods: 9			
Wireless Comn	nunicati	on Systems: Cellular Mobile C	ommun	icatior	i-Systei	m Mode-Free	quency Re	use-Handoff-	
Interference ar	nd Capa	city-GPRS-EDGE-UMTS-HSPA-I	Bluetoot	h and	PAN- Ir	ntroduction t	o loT.		CO5
Lecture Period	s: 45	Tutorial Periods: -	Practi	cal Pe	riods: -	T	otal Perio	ds: 45	
Reference Boo	ks:								
1. George Ker Education	nnedy, E (India) P	Bernard Davis and S.R.M. Prass rivate Limited, Fifth edition, 2	anna, "E 011.	lectro	nic Cor	nmunication	systems"	, Mc. Graw H	ill
2. Simon Hayl	kin, "Cor	nmunication Systems", John W	Viley & s	ons, N	ew Yor	rk, Fourth Edi	ition, 2001	L.	
3. Theodore 2003.	S. Rapp	aport, "Wireless communica	tion-Prir	nciple	and pr	ractices", PH	I, second	edition, Nev	v Delhi,
4. Bernard Sk	lar and F	abitra Kumar Ray, "Digital Cor	nmunica	ation",	Pearso	on, Second E	dition, 200)9.	

5. Wayne Tomasi, "Electronic Communication Systems", Pearson Education, Fifth edition.

Course: ECA302 Communication Engineering

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	2	2	2	1	-	-	-	-	-	-	1	2	2
CO2	3	2	2	2	1	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	1	-	-	-	-	-	-	1	2	2
CO4	3	2	2	2	1	-	-	-	-	-	-	1	2	2
CO5	3	2	2	2	1	-	-	-	-	-	-	1	2	2
ECA302	3	2	2	2	1	-	-	-	-	-	-	1	2	2

Department : I	Electron Engine	ics and Communication eering	Progr	amme	: B.Te o	ch.						
Semester :	4/ 5/ 6	/7	Cours	e Cate	gory Co	ode: OEC	Semest	er Exam T	ype: T	Y		
Course Code	Caura		Peri	ods / W	Veek	Credit	N	1aximum	Marks	5		
Course Code	Course	ename	L	Т	Р	С	CA	SE	Т	M		
ECA303	CMOS	VLSI Design	3	-	-	3	25	75	1	.00		
Prerequisite	-											
	Upon	completion of the course, the	e studen	ts will	be abl	e to						
	CO1	Demonstrate the understan	ding of I	MOS Fa	abricat	ion Process.						
Course	CO2	Design the combinational le gate and BiCMOS	ogic circ	cuits us	sing sta	andard CMOS	, Pass tra	nsistor, t	ransm	ission		
Outcome	CO3	Design the sequential logic	circuits	and m	emory	elements usi	ng CMOS.					
	CO4	Demonstrate the understan	ding of I	low po	wer di	ssipation usin	g various	technique	es.			
	CO5	Design of logic circuits using	g VHDL.									
UNIT-I	Techn	ology Introduction				Periods: 9						
Introduction to	IC Tech	nology –Fabrication Process	Flow, C	MOS r	-well f	Process – Lay	out Desig	n Rules –	Full			
Custom Mask L	.ayout D	esign – MOS Transistor Struc	ture and	d Opera	ation –	- MOSFET Cur	rent Volta	age				
Characteristics	– MOSF	ET Scaling – MOSFET Capacita	ances –	MOS I	nverte	rs – Static Cha	aracteristi	cs – Resis	tive	CO1		
Load – Inverter	Dad – Inverters with n-Type MOSFET Load – CMOS Inverter. NIT-II Switching Characteristics and Interconnect Effects of Pariods: 0											
UNIT-II	Switch CMOS	ning Characteristics and Inter Combinational Logic Circuits	rconnec	t Effec	ts of	Periods: 9						
Introduction –	Delay T	ime Definitions – Calculation	of Dela	y Time	s – Inv	erter Design	with Dela	y Constra	ints			
-Estimation of	Interco	onnect Parasitic – Calculatio	n of Int	erconr	ect De	elay – Switch	ing Powe	er Dissipa	tion	CO2		
of CMOS Inver	rters - I	MOS Logic Circuits with Dep	oletion	nMOS	Load	– CMOS Log	ic Circuit	s – Com	olex	CO4		
LogicCircuits –	CMOS T	ransmission gates and Pass Tr	ansisto	r.		*						
UNIT-III	Seque Using	ntial MOS Logic Circuits and CMOS	d Array	Subsy	stem	Periods: 9						
Introduction –	Behavio	or of Bistable Elements – SR	Latch (Circuits	– Clo	cked Latch ar	nd Flip Flo	op Circuit	s —			
CMOS D-Latch	and Edg	ge Triggered Flip-flop – Dynan	nic Logi	c Circu	its – Vo	oltage Bootsti	rapping –	Synchron	ous	CO3		
Dynamic Circuit	t Techni	ques – Dynamic CMOS Circuit	Technic	jues – I	High Pe	erformance D	ynamic Cl	MOS Circu	iits	05		
- DRAM – SRAN	1 – Non-	Volatile Memory – Flash mem	nory – Fe	erroele	ctric R	andom Acces	s Memory	/ (FRAM)				
UNIT-IV	Low P Circuit	ower Techniques and Designers	n of BiC	MOS	Logic	Periods: 9						
Overview of I	Power	Consumption – Low Power	r Desig	n Thro	ough N	Voltage Scali	ng – Est	imation	and			
Optimization o	f Switch	ning Activity – Reduction of S	Switche	d Capa	citance	e – Adiabatic	Logic Cire	cuits – Ba	isic	CO4		
BICMOS Circuit	s – NOT	, NAND and NOR – Static and S	Switchir	ng Dela	y Char	acteristics.						
UNIT-V	Design	n of Logic Circuits using VHDL				Periods: 9	-		. 1			
RTL Design – si	imulatic	in and synthesis - Combinatio	onal log	ic – Ty	pes – (Operators – F	ackages -	– Sequent	tial ,			
CIRCUIT - SUD-	program	is – Test benches. (Examp	les: ad	aers,	counte	ers, flipflops,	FSIVI, IV	luitipiexei	rs /	CO5		
Demultiplexers). 	Tutorial Daviada	Droot	ical Da	uiada.	.	tal Daria	da. 45				
Poforonco Boo	5:43 kc:	Tutorial Periods	Pract		nous: -	·		us: 45				
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2. Neil H F \	Neste I	David Harris and Avan Baner	iee. "C	NOS V	LSI deg	sign - A circui	its and Sv	stems Pe	rsnec	tive"		
Dorling Kin	derslev	(India) Pvt Ltd. 2009.	,, . .						spec	,		
3. Volnei.A.Pe	droni, "	Circuit Design with VHDL", Pre	entice H	Iall of I	ndia, T	hird Edition, 2	2005.					

Course: ECA303 CMOS VLSI Design

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C01	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO2	3	3	3	3	2	-	-	-	-	-	-	2	3	1
CO3	3	3	3	3	2	I	-	I	I	-	-	2	3	1
CO4	3	3	3	3	2	I	-	-	-	-	-	2	3	1
CO5	2	2	2	2	2	ŀ	-	-	-	-	-	2	3	1
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Semester :	4/5/6	5/7	Cours	e Cate	gory Co	ode: OEC	Semest	er Exam T	ype: T	Y	
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Course Code	Cours	e Name	L	T	Р	С	CA	SE	Т	M	
ECA304	Intern	et of Things	3	-	-	3	25	75	1	00	
Prerequisite	-		<u>.</u>			<u>.</u>					
	Upon	completion of the course, the	studen	ts will	be abl	e to					
	CO1	Demonstrate the understand	ding of I	oT laye	ered a	rchitecture.					
Course	CO2	Develop models/protocols f	or diffe	, rent la	yers of	f IoT.					
Outcome	CO3	Design and development of	loT pro	tocols.							
	requisite - - - - - rse CO1 Demonstrate the understanding of IoT layered architecture. - - come CO2 Develop models/protocols for different layers of IoT. - - come CO3 Design and development of IoT protocols. - - CO4 Evaluate the security issues in IoT. - - CO5 Demonstrate the understanding of the applications of IoT. - - CO6 Design solution for real time problems using IoT. - - T-I Fundamentals of IoT Periods: 9 - ution of Internet of Things - Enabling Technologies – IoT Architectures: IoT – A, IoT – RA, IEEE P2413, o Reference Model and Reference IoT Layered ArchitectureIoT and AI- Fog, Edge and Cloud in IoT – CO1 ctional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects. CO2 T-II IoT Protocols Periods: 9 - Access Technologies: Physical and MAC layers, Topology and Security of IEEE 802.15.4, 802.15.4g, CO2 CO3 tsrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy works – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer iocols: CO4 and MOTT.										
Prerequisite - Course Upon completion of the course, the students will be able to Curse CO1 Demonstrate the understanding of IoT layered architecture. Curse CO2 Develop models/protocols for different layers of IoT. CO3 Design and development of IoT protocols. CO4 Evaluate the security issues in IoT. CO5 Demonstrate the understanding of the applications of IoT. CO6 Design solution for real time problems using IoT. UNIT-I Fundamentals of IoT Periods: 9 Periods: 9 Evolution of Internet of Things - Enabling Technologies – IoT Architectures: IoT – A, IoT – RA, IEEE P2413, CO1 Cisco Reference Model and Reference IoT Layered ArchitectureIoT and AI- Fog, Edge and Cloud in IoT – CO1 Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects. CO1 IOT Access Technologies: Physical and MAC layers, Topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4g											
	CO6	Design solution for real time	proble	ms usi	ng loT	•					
UNIT-I	Funda	mentals of IoT				Periods: 9					
CO6 Design solution for real time problems using IoT. UNIT-I Fundamentals of IoT Periods: 9 Evolution of Internet of Things - Enabling Technologies – IoT Architectures: IoT – A, IoT – RA, IEEE P2413, Cisco Reference Model and Reference IoT Layered ArchitectureIoT and AI- Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects. CO1 CO2 UNIT-II IoT Procols Periods: 9 CO2 IoT Access Technologies: Physical and MAC layers, Topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4g, 802.15.4g, 19∪1.2a, 8∪2.11ah and LoRa WAN – Network Layer: IP Versions, Constrained Nodes and CO3 CO3											
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Constrained No	etworks	- Optimizing IP for IoT: From	n 6LoW	PAN to	o 6Lo,	Routing over	Low Pov	ver and Lo	ossy	CO4	
Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer											
Protocols: CoAl	Protocols: CoAP and MQTT.										
UNIT-III	Desig	and Development				Periods: 9					
Naming Service	, Objec	tive Naming Service, Efficient I	Naming	, Addre	essing,	and Profile Se	ervices in	IoT Senso	ry	CO2	
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4. ArshdeepBahga, Vijay Madisetti, "Internet of Things – A hands-on approach", Universities Press, 2015.

Course: ECA304 Internet of Things

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	2	-	-	3	3
CO2	2	3	2	1	-	-	-	-	-	-	-	-	1	1
CO3	2	3	1	1	-	-	-	-	-	-	-	-	1	2
CO4	2	2	1	1	-	-	-	-	-	-	-	-	2	-
CO5	3	1	2	2	-	-	-	-	2	2	-	-	1	2
CO6	2	2	2	3	2	-	2	1	3	3	-	-	2	3
ECA304	2.17	2.2	1.6	1.6	2	-	2	1	2.5	2.33	-	-	1.67	2.2

Department :	Electronics and Communication Engineering	Progra	amme	: B.Tec	h.			
Semester :	4/ 5/ 6/ 7	Cours	e Cate	gory Co	de: OEC	Semest	er Exam Type	: TY
Course Code	Course Name	Peric	ods / W	/eek	Credit	N	/laximum Mar	ks
Course Coue		L	Т	Р	С	CA	SE	TM
ECA305	Wireless Communication Networks	3	-	-	3	25	75	100
Prerequisite	-							
	Upon completion of the course, the	e studen	ts will	be able	e to			
Course	CO1 Outline the evolution of teo	chnologi	cal tre	nds in v	wireless con	nmunicatio	on.	
Outcome	CO2 Demonstrate the understan	nding of	the co	ncepts	in wireless o	communica	ation technolo	ogy.
Outcome	CO3 Demonstrate the seamless	s impro	vemer	nt in th	ne various g	generation	s of cellular n	etworks.
	CO4 Identify suitable architectu	re for u	pcomiı	ng appl	ication.			
	CO5 Apply new communication	concept	ts in di	verse a	pplication d	omains.		
UNIT-I	Introduction				Periods: 9			
Transmission f	undamentals – signals, analog and d	igital da	ita trai	nsmissi	ion, channel	capacity,	Transmission	
Media. Commu	nication Networks – switching Techni	ques, A	TM. Pr	otocols	and TCP/IP	suite.		CO1
UNIT-II	Wireless Communication Technolog	gy			Periods: 9			
Antennas and	propagation – antennas, propagatior	n modes	, LOS	transm	ission, Fadir	ng. Spread	spectrum –	
Frequency hop	oping, Direct sequence, CDMA, spr	reading	seque	nces. (Coding and	Error co	ntrol – Error	CO2
detection, Erro	r correction codes, ARQ mechanisms.			Ĩ				
					Periods: 9			1
Principles of c	ellular network, First generation, sec	cona gei	heratio	on, thir	d generatio	n wireless	systems and	CO3
UNIT-IV	Short Range Radio Access Network	S			Periods: 9			
Architecture o	f WiFi, Bluetooth, ZigBee. Ultra wide	band, C	ordles	s syste	ms – DECT,	Infra-Red	transmission,	
Wireless Senso	r networks, 6Lowpan, Adhoc Network	ks.						CO4
UNIT-V	Latest Developments and Application	ons			Periods: 9			<u>.</u>
Technology and	d features of 4G LTE, IEEE802.16, Ev	olution	of 5GT	echnol	logy, wireles	ss Body Ar	ea Network.	
Software Define	ed Radio, IoT and IoE, Telemedicine, S	mart Gr	id tech	nnology	<i>.</i>			CO5
Lecture Period	s: 45 Tutorial Periods: -	Practi	cal Pe	riods: -	T	otal Perio	ds: 45	
Reference Boo	ks:	<u>.</u>						
 William Sta 	llings, "Wireless Communications and	Networ	'ks", Pr	entice	Hall, Second	l Edition, 2	005.	
 William Sta Theodre Ra 	llings, "Wireless Communications and ppaport, "Wireless communication: P	Networ rinciples	'ks", Pr s and P	entice Practice	Hall, Seconc ", Pearson E	l Edition, 2 ducation,	005. 2009.	
 William Sta Theodre Ra T.L.Singal, ' 	llings, "Wireless Communications and ppaport, "Wireless communication: P "Wireless Communications", Tata McC	Networ rinciples Graw-Hil	ks", Pr and P ll educ	entice Practice ation, 2	Hall, Seconc ", Pearson E 2010.	l Edition, 2 ducation,	005. 2009.	

5. P.Muthu chidambaranathan, "Wireless Communication", PHI Learning, 2008.

Course: ECA305 Wireless Communication Networks

Regulation: 20	22	-23
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со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1	1	2	2	-	1	-	-	-	-	1	2	2
CO2	3	1	1	2	2	-	1	-	-	-	-	1	2	2
CO3	3	1	1	2	2	-	1	-	-	-	-	1	2	2
CO4	3	1	1	2	2	-	1	-	-	-	-	1	2	2
CO5	3	1	1	2	2	-	1	-	-	-	-	1	2	2
ECA305	3	1	1	2	2	-	1	-	-	-	-	1	2	2

Department :	Electro Engine	nics and Communication	Programme : B.Tech.									
Semester :	4/5/6	/7	Cours	e Cate	gory C	ode: OEC	Semest	Semester Exam Type: TY				
	6	- NI	Perio	ods / W	/eek	Credit	N	laximum l	Marks			
Course Code	Cours	ename	L	Т	Р	С	CA	SE	TM			
ECA306	Cyber	Security	3	-	-	3	25	75	100			
Prerequisite	-											
	Upon	completion of the course, the	e studen	ts will	be abl	e to						
	CO1	Demonstrate the understan	ding of t	he bas	ics of	cyber securi	ty					
Course	CO2	Analyze vulnerabilities in cy	ber secu	urity.								
Outcome	CO3	Analyse the security in serve	ers and	web ap	plicat	ions.						
	CO4	Implement operational met	hodolo	gies to	condu	ict cyberspa	ce operatio	ns.				
	CO5 Outline the concepts of cyber forensics and its techniques for investigations.											
UNIT-I	Cyber Security Periods: 9											
Overview of Cy	ber Sec	urity– Challenges and Constra	aints, Cy	ber Th	reats:	- Cyber War	fare-Cyber	Crime, Cy	ber			
terrorism, Cybe	er Espio	nage, Cyber Operations, Cybe	er Weap	onry,	Cyber	world, Adva	anced Persi	stent Thre	eat-			
Need for a Co	mprehe	nsive Cyber Security Policy,	Need fo	or a No	dal A	uthority, Ne	ed for an	Internatio	nal CO1			
convention on	Cybersp	ace.										
UNIT-II	Cyber Safegi	Security Vulnerabilities ar uards	nd Cybe	er Sec	urity	Periods: 9						
Cyber Security	Vulnera	bilities-Overview, vulnerabilit	ties in so	oftware	e, Syst	em adminis	tration and	Open Acc	ess			
to Organizatio	nal Data	a, Unprotected Broadband co	ommuni	cation	s, Poo	or Cyber Sec	urity Awar	eness. Cy	ber con			
Security Safeg	uards- C	Overview, Security Services a	and Me	chanisr	n, Au	dit, Denial o	of Service	Filter, Eth	ical CO2			
Hacking.												
UNIT-III	Securing Web Application, Services and Servers Periods: 9											
Introduction, E	asic see	curity for HTTP Applications	and Ser	vices, I	Basic S	Security for	SOAP Serv	ices, Iden	tity			
Management	and We	eb Services, Authorization P	atterns,	Secu	rity- I	ntrusion, Pl	nysical The	ft, Abuse	of			
Privileges, Una	uthorize	ed Access by Outsider, Malw	are infe	ection,	Intrus	sion detection	on and Pre	vention	CO3			
Techniques, Ar Integrity Valida	nti-Malv ntion.	vare software, Security Inforr	nation I	Manag	ement	t, Network S	Session Ana	ilysis, Syst	em			
UNIT-IV	Cyber	space and the Law				Periods: 9						
Introduction t	o Cybe	erspace environment and i	ts char	acteris	tics, (Cyberspace	Operation	s –Netw	ork			
Operations (NI	ETOPS),	Defensive Cyberspace Operation	ations (DCO),	Offen	sive Cybers	bace Opera	ations (OC	:O),			
Operational m	ethodol	ogies to conduct cyberspace	operat	ions, C	Cyber	Security Re	gulations, F	Roles of	CO4			
International L	.aw, the	e state and Private Sector i	in Cybe	rspace	, Cybe	er Security	Standards.	The IND	AN			
Cyberspace, Na	tional C	Cyber Security Policy 2013.	-	-	-							
UNIT-V	Cyber	Forensics										
Introduction to	ר ר Cvher	Forensics Sovware and Ad	lware H	Handlir	g Pre	liminary Inv	vestigations	s Control	ling			
an Investigatio	n Cond	lucting disk-based analysis	s Invest	igating	Info	ormation-hid	ling Scruti	nizing F-m	hail			
Validating F-m	ail hea	der information. Tracing Int	ernet a	ccess.	Tracir	ng memory	in real-tim	ne. Biome	tric cor			
security System).			,					05			
Lecture Period	s: 45	Tutorial Periods: -	Practi	ical Per	iods:	-	Total Perio	ds: 45				
Reference Boo	ks:											
1. Jefferv carr	et al. "In	side Cyber Warfare: Mapping	the Cvb	er Und	erwor	rld." O'Reillv	Publicatio	n Decembe	er 2012.			
2. George K.Kostopoulous, Cyber Space and Cyber Security, CRC Press, 2013.												
3. Martti Lehto, Pekka Neittaanmäki, "Cyber Security: Analytics, Technology and Automation edited", Springer												
International Publishing Switzerland, 2015.												
4. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, "Security in Computing", 5th Edition, Pearson												
Education, 2015.												
5. Nelson Phillips and Enfinger Steuart, "Computer Forensics and Investigations", Cengage Learning, New Delhi,												
2009.												

Course: ECA306 Cyber Security

со	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2	2	-	2	-	-	-	1	2	2
CO2	3	3	3	3	2	2	-	2	-	-	-	1	2	2
CO3	3	3	3	3	2	2	-	2	-	-	-	1	2	2
CO4	3	3	3	3	2	2	-	2	-	-	-	1	2	2
CO5	3	3	3	3	2	2	-	2	-	-	-	1	2	2
ECA306	3	3	3	3	2	2	-	2	-	-	-	1	2	2