KNOWLEDGE INSTITUTE OF TECHNOLOGY

(An Autonomous Institution)

Approved by AICTE, Affiliated to Anna University, Chennai.

Accredited by NBA (CSE, ECE, EEE & MECH), Accredited by NAAC with 'A' Grade KIOT Campus, Kakapalayam – 637 504. Salem Dt., Tamil Nadu, India.



M.E. / M.Tech. Regulations 2023

M.E. - Embedded System Technologies

CURRICULUM and SYLLABI

(For the Students Admitted from the Academic Year 2023-24 Onwards)

Version: 1.0

Date: 09.09.2023

CHAIR PELOSON
Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology

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Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,

Salem-637 504

Salem - 637 504



KNOWLEDGE INSTITUTE OF TECHNOLOGY(AUTONOMOUS), SALEM -637504

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Website: www.kiot.ac.in

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M.E. / M.Tech. REGULATIONS 2023 (R 2023) CHOICE BASED CREDIT SYSTEM AND OUTCOME BASED EDUCATION

M.E. – Embedded System Technologies

VISION OF THE INSTITUTE

To be a world-class institution to impart value and need based professional education to the aspiring youth and carving them into disciplined world class professional who have the quest for excellence, achievement orientation and social responsibilities.

MISSIO	N OF THE INSTITUTE
Α	To promote academic growth by offering state-of-art undergraduate, postgraduate and doctoral programs and to generate new knowledge by engaging in cutting – edge research
В	To nurture talent, Innovation, entrepreneurship, all-round personality and value system among the students and to foster competitiveness among students
С	To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry
D	To pursue global standards of excellence in all our endeavors namely teaching, research, consultancy, continuing education and support functions

VISION OF THE DEPARTMENT

To produce technically competent Electrical and Electronics Engineers having exemplary skills with ethical and social values.

MISSION	OF THE DEPARTMENT
M1	To provide state-of-the art facilities in Electrical and Electronics Engineering for improving the learning environment and research activities
M2	To continuously enrich the knowledge and skill of students towards the employment and creation of innovative products for society
М3	To develop ethical, social-valued and entrepreneurship skilled Electrical and Electronics Engineers

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PROGRAI	M EDUCATIONAL OBJECTIVES (PEOs)
PEO 1	To provide students good foundation in mathematical, scientific, engineering fundamentals and hardware-software programming intelligence.
PEO 2	To develop among students, the ability to develop embedded systems based smart solutions for purpose of system automation.
PEO 3	To promote student awareness, for life-long learning and introduce them to professional ethics and code of practice.

PROGRA	AM OUTCOMES (POs)
PO 1	An ability to independently carry out research / investigation and development work to solve practical problems.
PO 2	An ability to write and present a substantial technical report / document.
PO 3	Student should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.
PO 4	Be able to design and develop Embedded system automation based on dedicated ICs that have computation, networking and control capacity.
PO 5	Skill to work on professional software languages, standard modeling and analysis tools & commercial packages with communication protocols and computation platforms for analysis and design of system automation.
PO 6	To involve in research on an industrial problem or develop an innovative smart system with automation as a consumer product through project management and finance with due concerned for socio economic values

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		M.E. EMBEDDED	SYSTEM T	ECHI	NOLO	GIES	5				
		Courses of Study and Schen	ne of Asses	sme	nt (R	egul	ation	s 202	3)		
SI.	Course			Pe	riods	/ W	eek		Maxi	imum I	Marks
No.	Code	Course Title	CAT	СР	L	Т	Р	С	IA	ESE	Total
		SE	MESTER I	I	,						
THE	ORY										
1	ME23ET310	IoT for Smart Systems	PC	3	3	0	0	3	40	60	100
2	ME23ET4XX	Professional Elective-III	PE	3	3	0	0	3	40	60	100
3	ME23ET4XX	Professional Elective-IV	PE	3	3	0	0	3	40	60	100
4	ME23XX5XX	Open Elective-II	OE	3	3	0	0	3	40	60	100
PRA	CTICAL		À 4								
5	ME23ET601	Project Work - Phase I	PW	12	0	0	12	6	60	40	100
		Total	TLITE	24	12	0	12	18	220	280	500
		SI	MESTER I	v (-
PRA	CTICAL										
1	ME23ET602	Project Work - Phase II	PW	24	0	0	24	12	60	40	100
		Total		24	0	0	24	12	60	40	100
							То	tal Nu	mber	of Cred	lits: 75

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		M.E. EMBEDDED SYSTEM TE		_							
SI.	Course	urses of Study and Scheme of Assess Course Title	ment	_			ns 20 Veek		М	laximı Mark	
No.	Code		CAT	СР	L	Т	Р	С	IA	ESE	Tota
		PROFESSIONAL ELEC		S			1	4		ang la	
		SEMESTER III (Professional Electives -		& IV)						
1	ME23ET409	Computer Vision	PE	3	3	0	0	3	40	60	100
2	ME23ET410	Multimedia Communications	PE	3	3	0	0	3	40	60	100
3	ME23ET411	Embedded Networking and Automation of Electrical System	PE	3	3	0	0	3	40	60	100
4	ME23ET412	Smart System Design	PE	3	3	0	0	3	40	60	100
5	ME23ET413	Embedded Computing	PE	3	3	0	0	3	40	60	100
6	ME23ET414	Embedded Systems Security	PE	3	3	0	0	3	40	60	100
7	ME23ET415	Robotics and Automation	PE	3	3	0	0	3	40	60	100
8	ME23ET416	Reconfigurable Processor and SoC Design	PE	3	3	0	0	3	40	60	100
9	ME23ET417	MEMS and NEMS Technology	PE	3	3	0	0	3	40	60	100
10	ME23ET418	Entrepreneurship and Embedded Product Development	PE	3	3	0	0	3	40	60	100
11	ME23ET419	Embedded System for Biomedical Applications	PE	3	3	0	0	3	40	60	100
12	ME23ET420	Python Programming for Machine Learning	PE	3	3	0	0	3	40	60	100
13	ME23ET421	Renewable Energy and Grid Integration	PE	3	3	0	0	3	40	60	100
14	ME23ET422	Electric Vehicles and Power Management	PE	3	3	0	0	3	40	60	100
15	ME23ET423	Smart Grid	PE	3	3	0	0	3	40	60	100

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ME23ET3	10	IOT FOR SMART SYSTEM	Version: 1.0				
Programn &Branch	ne	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	
Course Ob	bjecti	ves:					
1	To stu	udy about Internet of Things technologies and its role in real time	e appl	icati	ons		
2 To introduce the infrastructure required for IoT						-	
3	To far	miliarize the accessories and communication techniques for IoT.					
4	To pro	ovide insight about the embedded processor and sensors require	d for :	IoT			
5	To far	miliarize the different platforms and Attributes for IoT					
UNIT-I		INTRODUCTION TO INTERNET OF THINGS			9		
Overview(L driver(L2)s	L2), H s, Busi	lardware and software requirements for IOT(L2), Sensor and act iness drivers(L2), Typical IoT applications(L3), Trends and implic	uator	s, T	echr	nolog	
UNIT-II	:	IOT ARCHITECTURE			9		
Communica standards(ation, (L2), C	model and architecture (L2)-Node Structure(L2) - Ser Powering, Networking(L2) - Topologies(L2), Layer/Stack arc Cloud computing for IoT(L2), Bluetooth(L2), Bluetooth Low Energ PROTOCOLS AND WIRELESS TECHNOLOGIES FOR IOT	chitec	ture	(L2) s(L2). Ic	
UNIT- III	· I	PROTOCOLS:			9		
small cell(L	DA and L2). V	d RFID, Zigbee, MIPI, M-PHY, UniPro, SPMI, SPI, M-PCIe, GSM, Wireless technologies for IoT: WiFi (IEEE 802.11), Bluetootl	CDM/	A, L	TE,	GPRS	
ZigBee/Zig	Bee S	Smart, UWB (IEEE 802.15.4), 6LoWPAN, Proprietary systems-Rec	cent ti	rend	s. (I	L2)	
UNIT - IV Services/ <i>E</i>	Bee S / I Attrib	IOT PROCESSORS Lutes: Big-Data Analytics for IOT, Dependability, Interop	cent ti	rend	s. (I	L2)	
UNIT - IV Services/A Maintainabi Embedded	Attrib ility. (I	IOT PROCESSORS Lutes: Big-Data Analytics for IOT, Dependability, Interop	erabil	ity,	s. (I 9 Se	L2) curit	
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6.	Adrian McEwen and Hakim Cassimally, "Designing the Internet of Things", John Wiley and sons, 2014.
7.	Lingyang Song/DusitNiyato/ Zhu Han/Ekram Hossain,"Wireless Device-to-Device Communications and Networks, CAMBRIDGE UNIVERSITY PRESS,2015.
8.	OvidiuVermesan and Peter Friess (Editors), "Internet of Things: Converging Technologies for Smart Environments and I ntegrated Ecosystems", River Publishers Series in Communication, 2013.
9.	Vijay Madisetti , ArshdeepBahga, "Internet of Things (A Hands on-Approach)", 2014.
10.	Lars T.Berger and Krzysztof Iniewski, "Smart Grid applications, communications and security", Wiley, 2015.
11.	JanakaEkanayake, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama and Nick Jenkins, "Smart Grid Technology and Applications", Wiley, 2015.
12.	UpenaDalal,"Wireless Communications & Networks,Oxford,2015.
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1.	https://archive.nptel.ac.in/courses/106/105/106105166/
2.	https://www.geeksforgeeks.org/architecture-of-internet-of-things-iot/
ONLI	NE COURSES:
1.	https://onlinecourses.nptel.ac.in/noc22_cs53/
2.	https://www.udemy.com/course/internet-of-things-iot-fundamentals
VIDE	O REFERENCES:
1.	https://www.youtube.com/watch?v=WUYAjxnwjU4&list=PLE7VH8RC_N3bpVn-e8QzOAHziEgmjQ2qE
2.	https://www.youtube.com/watch?v=urUBLmXFKI0&list=PLgMDNELGJ1CaBrefq- 0eYatfOnoncW0y-
3.	https://www.youtube.com/watch?v=hdZzNOQV5vU

		Mapping	of COs with	POs		
60			PO			
со	PO1	PO2	PO3	PO4	PO5	PO6
CO1	1	2	1			
CO2	1	2	2.			
CO3	1	2		i	3	
CO4	2		3	3	3	
CO5	3	2	3	3	3	
Avg.	1.75	2	2.33	2.33	3	
	•	1-Low, 2	-Medium, 3-H	ligh.		

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ME23ET601 PROJECT WORK - PHASE I		1	/ers	sion	: 1.0	
Programme & M.E. EMBEDDED SYSTEM TECHNOLOGIES	C	Р	L	Т	Р	С
Branch M.E. EMBEDDED STSTEM TECHNOLOGIES	1	2	0	0	12	6

Course Objectives:

- 1 To identify relevant research problems by searching academic databases and literature.
- 2 To design and conduct preliminary studies to explore identified problems.
- 3 To compile and present research findings effectively.

COURSE CONTENT:

The Student will identify and select a problem based on comprehensive literature survey. The student should submit a proposal and get it approved by the Head of the department.

Three reviews will be conducted by Project review committee. Students will be evaluated by the committee during the review and suggestions will be offered by members.

The report for PHASE -I should be submitted by the students at the end of course

Cours Upon	BLOOM'S Taxonomy	
CO1	Identify the research problem.	L3 - Apply
CO2	Collect, analyze the relevant literature and finalize the research problem.	L4 - Analyze
CO3	Design the experiment, conduct preliminary experiment, analyze the data and conclude.	L4 - Analyze
CO4	Prepare project report and present.	L5 - Evaluate

	Mapping	of COs with	POs		
		PO			
PO1	PO2	PO3	PO4	PO5	PO6
2	3	3	1		
3	3	3	2	2	
3	3	3	3	2	
4	3 /	77/1			1
3	3	3	2	2	1
	PO1 2 3 3 3 3	PO1 PO2	PO PO1 PO2 PO3 2 3 3	PO1 PO2 PO3 PO4 2 3 3 1	PO PO1 PO2 PO3 PO4 PO5 2 3 1 1

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ME23ET602		23ET602 PROJECT WORK - PHASE II					
Proc	gramme &		СР	TP		С	
Brai	M.E. EMBEDDED STSTEM TECHNOLOGIES		24	0	0	24	12
Cou	rse Objective	es:					
1	To provide a l	nands on skills by training on domains of embedded systems tech	nologies	S			
2	To improve th	e design ability and the oral, written presentation skills of the stud	dents				
3	To provide an	insight of developing optimized embedded solution for system as	utomatio	n			
4	To emphasize	e the need of Hardware &Software design tools usage for real tim	e applic	ation	IS.		
5	To enhance of	apacity to compete for placement and developing ability for entre	preneur	ship	S.		

COURSE CONTENT:

It is the continuation of Phase I project Three reviews will be conducted by Project review committee. Students will be evaluated by the committee during the review and suggestions will be offered by members.

At least one paper should be published by the student in an international / national conference. The report should be submitted by the students at the end of course.

Course Upon (BLOOM'S Taxonomy	
CO1	Any of the listed Domains their Design, Development capability in Building Automation for a process through Hardware & Software Tools	L4 - Analyze
CO2	Interpreting Pre-Requisites insists choice of project title from the enlisted broad domain of research topics for Project work:	L3 - Apply
CO3	Demonstrate project work to enhance students' capacity to work in Research Areas of the Department interests or of Industrial importance	L5 - Evaluate
CO4	Demonstrate the skill in Oral and Written Communication as presented in the Thesis Book via Viva-Voce Examination	L3 - Apply
CO5	Improved Employability and entrepreneurship capacity due to knowledge up gradation with getting skilled up through learning & practicing in Design / development through simulation/ experimental analysis with project report submission (relevant to the candidates project area) by individuals	L5 - Evaluate

	. 7	Mapping	of COs with	POS delle		
			PO			
COs	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	3	3	3	3	3
CO2	3	,				
CO3	3					
CO4	3	3	3	3	3	3
CO5	2	3	3	3	3	3
Avg.	2.8	3	3	3	3	3
Avg.	2.0	1-Low, 2	-Medium, 3-I	High.		

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Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology

M.E./M.Tech. Regulations-2023

	COMPUTER VISION	Vers	on : :	L.O	
Programme & Branch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3			P (
Course Object	ives:				
1 To introdu	ce the fundamentals of Human and Computer Vision				
2 To introdu	ce the major ideas, concepts, methods and techniques in Co	ompute	er Visi	on.	
3 To impart	Computer Vision knowledge by way of learning related algor	rithms			
4 To make Images.	them familiar with both the Theoretical and Practical aspect	ts of C	ompu	ting	wit
5 To provid and algori	e the student with programming experience for implement	ing Co	mput	er V	isio
UNIT-I	INTRODUCTION TO COMPUTER VISION		9		
Steps in Digita Applications of Computer Visio Image Formati	rocessing (L2) – Various Fields that use Image Processing I Image Processing (L2) – Components of an Image Proc Computer Vision (L2) – Recent Research in Computer Vision n and Basic Concepts of Image Formation(L2): Introduction and Radiometry(L2) – Geometric Transformation (L2) nage Reconstruction from a Series of Projections(L2).	essing (L2). I ion an	Syste Introde	em. uctio	(L2 on to
UNIT-II	IMAGE PROCESSING CONCEPTS AND IMAGE FEATURES		9		
- Object Bound Histogram Orien UNIT- III Introduction to	rocessing(L2) – Mathematical Morphology(L2) – Image Segm Features: Texture Descriptors(L2) – Colour Features (L2)- ary and Shape Representation(L2) – Interest or Cornet Poted Gradients(L2) – Scale Invariant Feature Transform(L2) IMAGE PROCESSING WITH OPENCV OpenCV and Python: Setting up OpenCV(L2) – Image Base and Images(L2) – Constructing Basic Shapes in OpenCV(L2).	- Edge oint De	Detecto etecto 9	rs(L	(L2) 2) -
OpenCV(L2): Ir Thresholding Te	hage Processing Techniques(L2) – Constructing and Buildir	ng Hist	ogran	ns(L	ig ir 2) -
UNIT – IV	OBJECT DETECTION		9		
outputs(L2) – B	pes (L2)- Importance of Object Detection(L2). The Wasic Structure(L2) - Model Architecture Overview (L2)- Obj Cases and Applications: Video Surveillance(L2) - Se	ect De	tection	n on	the
Embedded Boa	rds: Connecting Cameras to Embedded Boards(L2) – Singles and Videos(L2).	mple a	ing C algorit	hms	L2) for
Embedded Boa processing Imag	ds: Connecting Cameras to Embedded Boards(L2) – Si	mple a	ing Calgorit	hms	L2) for
Embedded Boa processing Image UNIT-V Applications: Note that the second Segmentation (La)	rds: Connecting Cameras to Embedded Boards(L2) – Singles and Videos(L2).	in Me	9 edical ial Ex	Impres	for
Embedded Boa processing Image UNIT-V Applications: Note that the second Segmentation (La)	rds: Connecting Cameras to Embedded Boards(L2) – Sinces and Videos(L2). APPLICATIONS AND CASE STUDIES Tachine Learning algorithms and their Applications (2) – Motion Estimation and Object Tracking(L2) – Face and — Image Fusion(L2). Case Studies: Face Detection(L2) – O	in Me	9 edical ial Ex Tracir	Impres	nage sior 2) -
Embedded Boa processing Image UNIT-V Applications: N Segmentation(L Recognition(L2) Eye Tracking (L	rds: Connecting Cameras to Embedded Boards(L2) – Sinces and Videos(L2). APPLICATIONS AND CASE STUDIES Machine Learning algorithms and their Applications 2) – Motion Estimation and Object Tracking(L2) – Face and Linear Fusion(L2). Case Studies: Face Detection(L2) – C2) – Handwriting Recognition with HoG(L2).	in Mend Face Object Total BLOC	9 edical ial Ex Tracir : 45	Impres	nage sior 2) -
Embedded Boa processing Image UNIT-V Applications: Note that the second of the second	rds: Connecting Cameras to Embedded Boards(L2) – Singles and Videos(L2). APPLICATIONS AND CASE STUDIES Tachine Learning algorithms and their Applications (2) – Motion Estimation and Object Tracking(L2) – Face and – Image Fusion(L2). Case Studies: Face Detection(L2) – (2) – Handwriting Recognition with HoG(L2). Thes: On of this course the students will be able to: Indicate the detection of the computer vision of the major concepts and techniques in computer vision	in Mend Face Object Total BLOC Taxo	9 edical ial Ex Tracir	Impres	nage sior 2) -
Embedded Boaprocessing Image UNIT-V Applications: Note that the second image is a second image image. The second image is a second image image. The second image image is a second image. The second image is a second image is a second image. The second image is a second image is a second image. The second image is a second image is a second image. The second image is a second image is a second image. The second image is a s	rds: Connecting Cameras to Embedded Boards(L2) – Sinces and Videos(L2). APPLICATIONS AND CASE STUDIES Machine Learning algorithms and their Applications (2) – Motion Estimation and Object Tracking(L2) – Face and — Image Fusion(L2). Case Studies: Face Detection(L2) – (2) – Handwriting Recognition with HoG(L2). Thes: On of this course the students will be able to:	in Mend Face Dibject Total BLOC Taxo L2 -	9 edical ial Ex Tracir : 45 DM'S nomy	Impres	formage sion (2) -
Embedded Boa processing Image	rds: Connecting Cameras to Embedded Boards(L2) – Singles and Videos(L2). APPLICATIONS AND CASE STUDIES Machine Learning algorithms and their Applications (2) – Motion Estimation and Object Tracking(L2) – Face and – Image Fusion(L2). Case Studies: Face Detection(L2) – (2) – Handwriting Recognition with HoG(L2). Place: On of this course the students will be able to: Indee: The distribution of the major concepts and techniques in computer vision the processing	in Mend Facobject Total BLOC Taxo L2 -	9 edical ial Ex Tracir : 45 DM'S nomy	Impressing(Li	formage sior 2) -

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GGALL CARRY

CO4	Develop real-life Computer Visions Applications	L2 - Understand
CO5	Build design of a Computer Vision System for a specific problem.	L2 - Understand
REFE	RENCE BOOKS:	
1.	"Digital Image Processing", 4th Edition (Global Edition), Rafael C Gol Woods, Pearson Education Limited, 2018.	nzalez and Richard E
2.	"Computer Vision and Image Processing - Fundamentals and Applica Bhuyan, CRC Press, 2020.	tions", Manas Kamal
3.	"Mastering OpenCV 4 with Python", Alberto Fernández Villán, Packt P	ublishing, 2019.
4.	"Practical Python and Open CV: Case Studies", 3rd Edition, Adrian Search, 2016.	Rosebrock, PyImage
WEB	REFERENCES:	
1.	https://archive.nptel.ac.in/courses/106/105/106105216/	
2.	https://www.researchgate.net/publication/358823508_Computer- Vision_Based_Object_Detection_and_Recognition_for_Service_Robot ment	_in_Indoor_Environ
ONL	INE COURSES:	
1.	https://onlinecourses.nptel.ac.in/noc21_cs101	
2.	https://onlinecourses.nptel.ac.in/noc23_ee39	
VIDE	O REFERENCES:	
1.	https://www.youtube.com/watch?v=3LaVxEX3F0o&list=PLwdnzIV3og6gHv1QoAo	goVsma5GmBSsgJM
2.	https://www.youtube.com/watch?v=a4yd0Au8QLg&list=PLyqSpQzTEGFFEZIpKf	6M8X3Veh5ijSQ2U

		Mappi	ng of COs wi	th POs		
60			P	0		
со	PO1	PO2	P03	P04	PO5	P06
CO1	2	3	2		-	
CO2	2	2	2	2		
CO3	3	3	/ 3	3	3	
CO4	3	3 1	3	3 117	3	
CO5	3	3	3	3	3	
Avg.	2.6	2.8	2.6	2.75	3	

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ME23ET410	MULTIMEDIA COMMUNICATIONS		Ver	sion	: 1.	0
Programme & Branch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	С 3
Course Object	ives:					
1 To define t	he Multimedia Communication Models					
2 To explain	Multimedia Transport in Wireless Networks					
3 To Solve th	e Security issues in multimedia networks					
4 To Illustrat	e real-time multimedia network applications.					
5 To explain	different network layer based application					
UNIT-I	INTRODUCTION TO MULTIMEDIA COMMUNICATIONS			9		
Introduction (L	2), multimedia information representation(L2), mu	Itimed	ia	netv	vorks	(12)
multimedia app	ilcations(L2), Application and networking terminology/	12) r	atw	ork	QoS	and
application QoS(UNIT-II	COMPRESSION TECHNIQUES FOR TEXT AND	/ideo(L	2).			
Text and image	e compression(L2), compression principles(L2), text compression(L2)	mpro	scior	9	Junio	nath
numan, LZW	(LZ), Document Image compression using T2 and	T3c	odin	g(l2), i	mage
UNIT- III	COMPRESSION TECHNIQUES FOR AUIDO AND					
Audio and video	Compression (12) audio compression and (12) a			9		
and Linear pred	compression(L2), audio compression – principles(L2), [lictive coding(I2), Code-Excited LPC, Perceptual coding)PCM,	ADF	CM,	Ada	ptive
coders video cor	npression, video compression principles(L2).	()/			iiu i	2010
JNIT – IV	STANDARDS AND FRAMEWORK			9		
Video compress Reversible VLCs multimedia fram	ion standards: H.261, H.263, MPEG, MPEG 1, MPEG, MPEG 7 standardization process of multimedia contenework(L2).	2, N t desc	1PEC	6-4 ion,	(L2) MPE	and G 21
JNIT-V	SYNCHRONIZATION AND MANAGEMENT			9		
Notion of synchi Introduction to management tec	onization, presentation requirements(L2), reference mo SMIL(L2), Multimedia operating systems, Resource chniques(L2).	mana	gem	ent,	pro	ocess
Sauras Outsau					Per	iods
Course Outcom Jpon completion	on of this course the students will be able to:	BLO0 Taxo				
CO1 Deploy th	e right multimedia communication models.	L2 -	Und	ersta	and	
	oS to multimedia network applications with efficient echniques.	L2 -	Und	ersta	and	
Solve the	security threats in the multimedia networks	L2 - l	Jnde	ersta	ind	
CO4 Develop t	he real-time multimedia network applications	L2 - l	Jnde	ersta	ind	
CO5 Improve	to synchronize and manage the multimedia systems	L2 - I	Jnde	ersta	nd	
REFERENCE BO	T/A 68 4 - 0					
	all, "Multimedia Communications", Pearson education, 200		1	h	1	/.
		HAIR	PER	SO	N	and
n rear aparayanı	module of the B	oard o	f Stu			

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11

WEB REFERENCES:

https://archive.nptel.ac.in/content/storage2/courses/117105083/pdf/ssg_m1l1.pdf

https://archive.nptel.ac.in/courses/117/105/117105083/

ONLINE COURSES:

https://archive.nptel.ac.in/courses/105/107/105107160/

https://archive.nptel.ac.in/courses/117/105/117105083/

VIDEO REFERENCES:

https://www.youtube.com/watch?v=4-AsEtIpEWg

https://www.youtube.com/watch?v=Dz3Du5jod90

- Bulture India	基础。每三分型	маррі	ng of COs with			
со			PC)		
CO	PO1	PO2	PO3	PO4	PO5	PO6
CO1	2		1		3	
CO2	2		1	3	2	2
CO3	. 3					
CO4				2	3	2
CO5	2		ATUTO.			
Avg.	2.25		1	2.5	2.66	2

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Salem - 637 504

MOTE TURBALLO

ME	23ET411	EMBEDDED NETWORKING AND AUTOMATION OF ELECTRICAL SYSTEM	Vers	ion	: 1.	.0	
	ogramme Franch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P	C 3
Со	urse Objec	ctives:			o _l	U] 3
1	To discuss	the fundamentals building blocks of a digital instrument.					
2	Introduce	wired, WSN for configuring metering network					
3	Discuss red	quirements for grid automation using meters.					
4	To discuss	networking configuration to develop PAN					
5	To discuss	the functions of digital instrument Power quality monitorin	g		11		
UN	IT-I	BUILDING SYSTEM AUTOMATION			9		
Rel UN Em pro Inti	ays -Syster IT-II bedded New tocols(L2) roduction t	based data acquisition (L2)— uC for automation and processor based digital controllers for switching Actuator automation with multi-channel Instrumentation and interest and the controllers of the control	m- Co N bu	Sto	eppe 9 paris LIN	on of BUS	f bus (L2)-
sen	isor network	rgy efficient MAC protocols –SMAC –Data Centric routing ks(L2)- Database perspective on sensor networks- IoT App	ig(L2) licatio	- A	L2).	catior	ns of
		AUTOMATION OF SUBSTATION			9		
for Inte Ene	smart Sub eroperabilit ergy Storag	comation- Distribution SCADA system principles(L2) -role of station automation(L2)- Introduction to Role of IEC 61 y and IEC 61850(L2)-challenges of Substations in Smarge and Distribution Systems monitoring(I2) - Communication utility asset (L2).	850,I t Grid	EEE	C37	.118 llenge	std-
UN	IT – IV	METERING OF SMART GRID			9		
Cha for	allenges in S EV plug in	of Smart Grid- Generation by Renewable Energy Source Smart Grid and Microgrids(L2)- electrical measurements w electric vehicles power management(L2) -Home Area Net anagement applications(L2).	ith Al	۹I -	Sma	art me	eters
UN	IT-V	SMART METERS FOR PQ MONITORING		×	9		
Qua Tra	ality monito nsients – Po	issues of Grid connected Renewable Energy Sources -Sr ring and Control (L2)- Power Quality issues -Surges – Flic ower Quality Benchmarking – Power Quality Meters(L2)- M , communication enabled Power Quality metering(L2)	ker -	Int	erha	rmor	nics -
			To	tal	: 45	5 Per	iods
	urse Outco		BLC Tax				
CO	1 Demo	nstrate criteria of choice of sensors, components to build				stand	
CO	meter Illustration	ate the demand for BUS communication protocols are	L2 -	Un	ders	stand	
СО	11000	se the need and standards in Substation automation	L2 -	Un	ders	stand	_/
со	Deplo	yment of PAN for metering networked commercial	CLPA				1
200	Jappiic	ations eggetwon		1		idies lectro	

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CO5	Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded L2 - Understand
	The communications
REFE	RENCE BOOKS:
1.	Control and automation of electrical power distribution systems, James Northcote Green, Robert Wilson, CRC, Taylor and Francis, 2006
2.	Krzysztof Iniewski, "Smart Grid ,Infrastructure& Networking",TMcGH,2012
3.	Robert Faludi,"Building Wireless Sensor Networks,O'Reilly,2011
4.	Monammad Ilyas And ImadMahgoub, 'Handbook of sensor Networks: Compact wireless and wired sensing systems', CRC Processing
5.	Shih-Lin Wu,Yu-Chee Tseng,{"Wireless Ad Hoc Networking,PAN,LAN,SAN,Aurebach
6.	Sanjay Gupta, "Virtual Instrumentation, LABVIEW", TMH, New Delhi, 2003
7.	Ernest O. Doeblin and Dhanesh N Manik, "Measrement Systems – Application and Design", 5th Edn, TMH, 2007.
8.	BhaskarKrishnamachari, 'Networking wireless sensors', Cambridge press 2005
WEB R	EFERENCES:
1	https://genuspower.com/how-to-ensure-power-quality-monitoring-and-control-using- smart-metering-solutions
2	https://energy.ec.europa.eu/topics/markets-and-consumers/smart-grids-and-meter
ONLIN	E COURSES:
1	https://onlinecourses.nptel.ac.in/noc21_ee68/
2	https://onlinecourses.nptel.ac.in/noc21_ee32/
/IDEO	REFERENCES:
1	
2	https://www.youtube.com/watch?v=r_Job1rEbT0 https://www.youtube.com/watch?v=Q_OdV8m6cqk&list=PLLy_2iUCG87AjWoOk0A3y4 hpGQVTdtl6G

		Mappi	ng of COs w	ith POs		
со		1.7		PO		
	PO1	PO2	PO3	PO4	PO5	200
CO1	3	1	2	1	P05	P06
CO2	1		2	2	2	
CO3	3	1	2	2	3	
CO4	2	There is	7 2/	5/		
CO5	2	1	2	18 18 13 1/1/1	3	-
Avg.	2.2	1	2	2	2.66	

Board of Studies Faculty of Electrical & Electronics Engg Knowledge Institute of Technology KIOT Campus, Kakapalayam, Salem-637 504

M.E./M.Tech. Regulations-2023

West Follows

1E23ET412	SMART SYSTEM DESIGN	Ver	sior	on : 1.0		
Programme kBranch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	C 3
Course Objec						
1 To understa	and about the smart system technologies and its role in real time	app	licat	ions		
2 To expose	students to different open-source platforms and attributes					
3 To teach th	ne architecture and requirements of Home Automation					
4 To provide	an insight into smart appliances and energy management concep	ts.				
5 To familiar	ize the design and development of embedded system based syste	m d	esig	n.		
UNIT-I	INTRODUCTION			9		13
design(L2) - S (L2)- Data Ar (IFTTT &Thing	smart system(L2) - Design Requirements - Hardware and soft Smart sensors and Actuators(L2) - Communication protocols us halytics: Need & Types (L2)- Open-source Analytics Platform fo Ispeak) (L2)- Smart Microcontrollers - Embedded system for Sr L2) - Recent trends(L2).	r en	n si	nart Ided	syst	em
UNIT-II	HOME AUTOMATION			9		
Home Auton	nation(L2) - Design Considerations: Control Unit, Sen on(L2), Data Security(L2) - System Architecture(L2) - Essentia	sing al C	omp	equi	irem nts(l	ents
Linux and Ras	pberry Pi (L2) – Design and Real-Time implementation(L2) (L2).	_				
Linux and Ras	SMART APPLIANCES AND ENERGY MANAGEMENT	Τ		9		
Linux and Ras UNIT- III Energy Management(SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I ces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Meas	L2)	– S	g ignif	icano	ce o
Linux and Ras UNIT – III Energy Manae smart appliar Management(Smart Networ	smart appliances and Real-Time implementation(L2) (L2). SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I nces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES	L2) Plati	- S form	ignifons for Tec	icano er Er chnic	ce dinerg
Linux and Ras UNIT – III Energy Management(Smart Networ UNIT – IV Application of Selection of besides and points.	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I ces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundady sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable,	Platicurer cction	- S form ment	ignifications for the second of the second o	icano or Er chnic	ce on erg
Energy Management (Smart Network UNIT - IV Application of Selection of broad suitable compensation and selection are selection of broad suitable compensation are selection are selection.	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I compared to the compared to t	Platicurer cction	- S form ment	ignifications for the second of the second o	icano or Er chnic iremelecti eart-	ce on
Linux and Ras UNIT – III Energy Management (Smart Network UNIT – IV Application of Selection of besuitable commuted by the suitable commuted b	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I nees in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundady sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS Controllers components(L2) - Aerial Robotics (L2)- Mobile Robotics	L2) Platiurer ction cction ccolle	- S form nent nal r L2)	9 ignifins for Tequility 9 require Seg harmonics	icanor Erchnic	ce (nerg
Linux and Ras UNIT – III Energy Management (Smart Network UNIT – IV Application of Selection of besuitable commuted by the suitable commuted b	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I nces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundody sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS	L2) Platiurer ction ctiorm(colle	- S form ment nal r L2)	9 igniffins for Tender 9 require — Seg here	icanor Erchnic	ce (nerg
Energy Management (Smart Network UNIT - IV Application of Selection of b suitable comperature a UNIT - V Robots and Course Outcomes Course Out	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I ces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundody sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS Controllers components(L2) - Aerial Robotics (L2)- Mobile Robotics(L2) - Autonomous Hex copter System(L2).	L2) Platiurer ction crm(colle	- S form ment hal r L2) ectin	9 igniffins for Tender 9 require — Seg here	icanor Erremore delection - T	ents on bear
Energy Management (Smart Network UNIT - IV Application of Selection of builtable compensature and UNIT - V Robots and Course Outcourse O	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I coes in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2) - Fundody sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS Controllers components(L2) - Aerial Robotics (L2) - Mobile Robotics (L2) - Autonomous Hex copter System(L2). Somes: etion of this course the students will be able to: cand the concepts of smart system design and its present	L2) Platiurer ction ctiorm(colle	- S form ment hal r L2) ectin	9 igniff is for required to some service of the some service of th	icanor Erremore delection - T	ents on bea
Energy Management (Smart Network UNIT - IV Application of Selection of builtable compensure at the suitable compensure at the s	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I neces in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Measeks for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundody sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS Controllers components(L2) - Aerial Robotics (L2)- Mobile Robotics (L2) - Autonomous Hex copter System(L2). Comes: etion of this course the students will be able to: tand the concepts of smart system design and its present of the different embedded open-source and cost-effective technique	L2) Platiturer ctiorm(colle T E 1	- S form ment hal r L2) ectin	99 igniffns for Tender 99 require — Seg hor (L2) 1:4:	icanor Erremore delection - T	ents on bea
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Energy Management (Smart Network WNIT – IV) Application of Selection of builtable compensative and Course Outcompon complement (CO1 Underst develop CO2 Illustrate for develop CO3 Acquire system CO4 Infer all	SMART APPLIANCES AND ENERGY MANAGEMENT gement: Demand-side Load Management: Energy scheduling(I coes in energy management(L2) - Embedded and Integrated L2) - Smart Meters: Significance, Architecture & Energy Meases for Embedded Appliances - Security Considerations(I2). SMART WEARABLE DEVICES Smart Wearables in Healthcare & Activity Monitoring (L2)- Fundody sensors(L2), Hardware platform(L2), OS and Software platformunication protocol(L2). Case Study: Design of a wearable, and monitoring health status using a smartphone application(L2). EMBEDDED SYSTEMS AND ROBOTICS Controllers components(L2) - Aerial Robotics (L2)- Mobile Robotics(L2) - Autonomous Hex copter System(L2). Comes: etion of this course the students will be able to: tand the concepts of smart system design and its present of the concepts of smart system design and its present of the concepts of smart system design and its present of the concepts of smart system design and its present of the concepts of the different embedded open-source and cost-effective technique eloping solution for real time applications. Expensed the concepts of smart system design and its present open solution for real time applications. Expensed the concepts of smart system design and its present open solution for real time applications. Expensed the concepts of smart system design and infrastructure for Smart design open solution for real time applications. Expensed the concepts of smart system design and infrastructure for Smart design open solution for real time applications. Expensed the concepts of smart system design and infrastructure for Smart design open solution for real time applications.	L2) Platiturer Ction Cti	- Sformment hall resign	g horizonaria (L2) 1:4: OM': Und Und Und	icanor Errchnicor Errc	ents on bear and and and

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M.E./M.Tech. Regulations-2023

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ME23E	T413	EMBEDDED COMPUTING	Ver	sior	ı : 1	.0	
Progra &Branc		M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	C 3
Course			5 8		1.5	- Olympia	
1 To €	expose	the students to the fundamentals of Network communication te	chno	logi	es.		
2 To t	each th	ne fundamentals of Java , Internet and Java card					
3 To 0	develop	distributed embedded system with Java					
4 To t	each th	ne smart card and Apps development					
5 To i	nvolve ject for	Discussions/ Practice in familiarizing the concepts acquired or improved employability skills.	/er t	he 5	5 Un	its o	f th
UNIT-	[NETWORK INFRASTRUCTURE			9		
		ansmission facilities(L2) -Open Interconnection standards(L2) am(L2) -Network management (L2)- Network Security(L2) - Cl					
UNIT-		JAVA TECHNOLOGY FOR EMBEDDED SYSTEMS			9		
Threadi	ng – R	of Java(L2) - IO streaming(L2) - Object serialization(L2) MI (L2)- distributed databases(L2) Advantages and limitation are for embedded systems(L2) - security model for embedded s	ions	of I	nter	ng net ((L2)· (L2)·
UNIT-	III	SMART CARD TECHNIQUES			9		
compon	ents S	pasics(L2) – Java card technology overview(L2) – Java card SMART CARD MICROCONTROLLERS(L2) - Contactless Card sems(L2)– smart card Security Techniques(L2).	rd T s(L2	ype:) -	s(L2 Sm) - art	Card
UNIT -	IV	ANDROID FRAMEWORK			9		
commui	nication	L2) – Access to Hardware(L2) - Framework developmen(L2)-Android security design and architecture (L2) - Case study DEVELOPING DISTRIBUTED REAL-TIME SYSTEM	nt(L (L2)	2)-		er-to	-Pee
UNIT-\		APPLICATIONS		5	9		
		ATLAB Real-Time Targets(L2) - Using the xPC Target(L2) al Time Applications(L2).) -	Bui	ding	ı va	riou
	9	In good Throw linky	Т	otal	: 45	Pei	iod
Course		mes: tion of this course the students will be able to:		001	1'S omy		
CO1	Delive	r insight into involving JAVA concepts& internet based unication to establish decentralized control mechanism of					I
CO2		ret the software and hardware architecture for distributed	L2	- Un	ders	tand	i
CO3		op solution for smart card	L2	- Un	ders	tand	i
CO4	Develo	op Apps based on android SDK.	L2	- Un	ders	stand	i
CO5	knowle	ved Employability and entrepreneurship capacity due to edge up gradation on recent trends in embedded system uting environment.	L2	- Ur	ders	stand	i
REFER	ENCE E	BOOKS:					_
И(1. es 3 asmod	Time	vaGupta , Anil Kumar Chandra and Peter Luksch "Real-Time Systems Theory and Applications "CRC Press 2016 Interna er-13: 978-1-4665-9849-2 (eBook - PDF).	tion	al S	tand	ard	Roo
10112100 112,211	Wolfg	ang Rankl and Wolfgang Effing "Smart Card Handbook" John W	iley CHA Boa	IRF	ER	SON	i nir
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3.	Reto Meier "Professional Android application days
4.	Reto Meier "Professional Android application development" Wiley Publishing , Inc , 2009 Joshua " Android hacker's Handbook" John Wiley & sons , 2014 Dietel&Dietel "IAVA have been been been been been been been be
5.	Dietel&Dietel, "JAVA how to program", Prentice Hall 1999.
6.	SapeMullender, "Distributed Systems", Addison-Wesley, 1993
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2.	https://archive.nptel.ac.in/courses/106/106/106106156/
ONLIN	E COURSES:
1.	https://onlinecourses.swayam2.ac.in/nou21_ge41/
2.	https://onlinecourses.nptel.ac.in/noc22_cs47/
VIDEO	REFERENCES:
1.	https://www.youtube.com/watch?v=-foyVzTOf8o&list=PLJ5C_6qdAvBEJ6- TBzKoa1Ov21lwDzJfM
2.	https://www.youtube.com/watch?v=OjdT2I- EZJA&list=PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

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Begind Konstaly

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Pro	23ET414	EMBEDDED SYSTEMS SECURITY	Version : 1.0
	gramme & nch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP L T P C 3 3 0 0 3
Cou	rse Objectiv	es:	
1	To introduce	the fundamentals related to Cryptography and Data Security	.
2	To teach the	mathematical foundations for Cryptography.	
3	To impart kno	owledge about Embedded Cryptography and Data Protection	Protocols.
4	To make ther	n understand the practical aspects of Embedded System Sec	curity.
5		e students in Discussions/Tutorials/Programming to familia ployability skills.	arize the concepts fo
UN:	IT-I	BACKGROUND AND INTRODUCTION	9
or or uc res	damentals of Network Secu lidean Algorith ting for Primal	Security Attacks(L2) – Security Services (L2) – Security Security Design Principles(L2) – Attack Surfaces and Attack rity. Introduction to Number Theory: Divisibility and the Divisim – Modular Arithmetic – Prime Numbers – Fermet's and Eity(L2) – The Chinese Remainder Theorem – Discrete Logari SYMMETRIC CIPHERS	k Trees(L2) – A Mode vision Algorithm – The fuler's Theorems (L2)
	IT-II	tion Techniques: Symmetric Cipher Model – Substit	
Bloo Adv	k Cipher Stru anced Encryp	hniques(L2). Block Ciphers and the Data Encryption Standacture – The Data Encryption Standard – A DES Example – tion Standard: Finite Field Arithmetic – AES Structure – (ey Expansion – An AES Example – AES Implementation(L2)	Strength of DES(L2) - AES Transformation
	IT- III	EMPEDDED CYCTEMS CECUDITY	
	NAME OF TAXABLE PARTY.	EMBEDDED SYSTEMS SECURITY	9
Eml Con Eml Sys	pedded Secur siderations: pedded OS Se	l rity Trends – Security Policies – Security Threats(L2 The Role of Operating System – Microkernel versus M curity Requirements (L2)– Access Control and Capabilities tion(L2) – I/O Virtualization (L2)– Remote Management (L	 2). System Software Sonolithic (L2)
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CO3	Demonstrate thorough knowledge about the aspects of Embedded	
CO4	Delivers insight onto role of Security Aspects during Data Transfer and	L2 - Understand
CO5	Applying the Security Algorithms for Real-time Applications.	L2 - Understand
REFE	THE BOOKS!	L2 - Understand
1.	"Cryptography and Network Security Principles and Prosting "	
2.	Development", David Kleidermacher and Mike Kleidermacher Scheidermacher and Mike Kleidermacher and Mike Mike Mike Mike Mike Mike Mike Mike	oftware and Systen
3.	"Practical Embedded Security - Building Secure Resource-Constrained Stapko, Newnes (an imprint of Elsevier), 2008.	nes (an imprint
WEB F	REFERENCES:	Systems", Timoth
1.	https://www.geeksforgeeks.org/on.id	
2.	https://www.geeksforgeeks.org/cryptography-and-network-security-prin	ciples/
NLIN	https://blackberry.qnx.com/en/ultimate-guides/embedded-system-security	ity
	https://onlinecourses.nptel.ac.in/noc22_cs90/	
2.	https://nptel.ac.in/courses/106106199	
IDEO	REFERENCES:	
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1.	PgYtev https://www.youtube.com/watch?v=-dNsW2AOGYY&list=PLyqSpQzTE6M- 0Xgn0icEHvUS7WQxvenv	AuGal Cause

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CO2	3	2		1 -	1	100
CO3	1	3	2			
CO4	3	3		1		
CO5	3	1	2	3	1	
Avg.	2.2		3	2	3	
J .	2.2	1.8	2.33 v, 2 –Medium,	1.33	2.33	

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ME23ET	7415	ROBOTICS AND AUTOMATION		Vers	sion	: 1.0	J
Progran &Branc		M.E. EMBEDDED SYSTEM TECHNOLOGIES	СР	L 3	T 0	P 0	C 3
Course	Objec	tives:					
1 To te	each th	ne need of embedded system technology for robot building.					
2 To st	tudy th	ne Various Parts of Robots and Fields of Robotics.					
3 To si	tudy th	ne Various Kinematics and Inverse Kinematics of Robots.					
4 To s	tudy th	ne Trajectory Planning for Robot.					
5 To s	tudy th	ne Control of Robots for Some Specific Applications.					
JNIT-I	[INTRODUCTION TO ROBOTICS & AUTOMATION			9		
Hardwai Types o compon	re and of Robo ents o	Robotics & Automation(L2) – Principles and Strategies of Automation(L2) – Embedded Processors for Autots(L2) – Various Generations of Robots(L2) – Asimov's Laws of a robot(L2) - Design Criteria for Selection of a Robot (L2) otics and Automation (L2) - Recent trends(I2).	toma Of F	ation Robo	(L2) tics(l	-Diff 2) -	eren Ke
UNIT-I	II	SENSORS AND DRIVE SYSTEMS			9		
oraue.	Trictio	n co-efficient affect the design of a Robot(L2) - Determina	LIOIT	OI I	1000	111	all
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C04	Develop Program to Use a Robot for a Typical Application	L2 - Understand
CO5	Apply and improve Employability and entrepreneurship capacity due to knowledge upgradation on Embedded system based robot development	L2 - Understand
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CO2		3	1 1			
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CO4				2	3	1
CO5			2	1		3
Avg.	1	2.5	2	2	3	2

Board of Studies
Faculty of Electrical & Electronics Engg
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Salam 637 504

	ET416	RECONFIGURABLE PROCESSOR AND SoC DESIGN	Vers	ion	1.0)
rogra rancl	amme &	THE EMPEDDED CYCTEM TECHNOLOGIES	P L 3 3	T 0	P 0	<u>C</u>
ours	e Objective	s:	1			
		the need and role of Reconfigurable Processor for embedded syster	n appli	catio	ons	
		ne Reconfigurable Processor technologies				
3 To	o teach the s	alient features and architecture of FPGA				
4 To	o provide an	insight and architecture significance of SoC.				
5 To	o impart the	knowledge of Reconfigurable embedded Processor for real time app	olicatio	ns.		
NIT-			9			
ntrod	luction to re	configurable processor(L2)- Reconfigurable Computing-Programms for Reconfigurable Processors, ASIC design flow(L2)- Hardware/Soverview- recent trends in Reconfigurable Processor & SoC(L2).	ning el Softwar	eme re Co	nts o-de	and
INTT-	-TT	FPGA TECHNOLOGIES	9			
locks	(L2) - CLB \	ng technology (L2)- Alternative FPGA architectures: MUX Vs /s LAB Vs Slices(L2)- Fast carry chains(L2)- Embedded RAMs- Rout ectures for Low(L2)-Power FPGAs- Physical Design(L2).	ing roi	base FPC	ed GAs(L2)
	- III	FPGA ARCHITECTORE	9			
roces	ccor docian/	e overview-(L2) Challenges of FPGA processor design(L2)-Oppo L2)- Designing SoftCore Processors(L2) – Designing Hardcore e co simulation(L2)- FPGA to multi core embedded computing(L2) ystem(L2).	Proce	25501	S(L	۷)
	- IV	RECONFIGURABLE SOC PROCESSORS	9			
SoC C	Overview (L2 5- FPSLIC(L2)-Architecture and applications of Virtex II pro, Zynq-7000, Exc.)- Multicore SoCs(L2).	alibur,	Сус	lone	· V
UNIT		The state of the s				
		RECONFIGURABLE PROCESSOR AND SEC 70.1 === 7.11	9			
Recon High	nfigurable pro	ocessor-based DC motor control- digital filter design(L2)- mobile parameters Acquisition -Image Processing application(L2)-controller implementation(L3).	ohone entatio	n 10	r m	ODII
Recon High	ofigurable pro	ocessor-based DC motor control- digital filter design(L2)- mobile parameters Acquisition -Image Processing application(L2)-controller implementation(L3).	ohone entatio	45	Per	ODI
Recon High robot	nfigurable pro Speed Data - Crypto-pro	ocessor-based DC motor control- digital filter design(L2)- mobile particles acquisition -Image Processing application(L2)-controller implementation(L3).	ohone entatio	45 OM'S	Per	ODI
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Recondigh robot-	se Outcome Illustrate t design.	ocessor-based DC motor control- digital filter design(L2)- mobile pacessor (L2)-controller implementation (L2)-controller implementation (L3). See: In of this course the students will be able to: the need of reconfigurable computing and hardware-software co	ohone entatio Total BLOG Taxo	: 45 OM'S	Per S ny	riod
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https://www.youtube.com/watch?v=ht7nEjNydDU&t=3s
https://www.youtube.com/watch?v=PRQXzjTrCJY

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	PO1	PO2	PO3	PO4	PO5	PO6
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CO2		2	3			
CO3			2	1	2	
CO4		1	3			
CO5		V. V				3
Avg.	0	1.5	2.66	21	2	3

CHAIRPEASON

Board of Studies

Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-637 504

	ET417	MEMS AND NEMS TECHNOLOGY	Version: 1.0
Progi &Bra	ramme	M.E. EMBEDDED SYSTEM TECHNOLOGIES CP 3	L T P C 3 0 0 3
	se Object	ives:	-
1	To intro	duce the diverse technological and functional approaches of N	1EMS/NEMS and
2	To under	stand the microstructures and fabrication methods	
3	To provid	le an insight of micro and nano sensors, actuators.	
4	To emph	asis the need for NEMS techology	
5	To updat	e the ongoing trends and real time applications of MEMS and NEMS t	echnology.
UNIT		INTRODUCTION TO MEMS and NEMS	9
techr	view of M nologies(L NEMS. (L2	icro electro mechanical systems and Nano Electro mechanical syste 2), Laws of scaling(L2)- Survey of materials(L2)- Smart Sensors-App	ems, devices and lications of MEMS
UNI	Γ-II	MICRO-MACHINING AND MICROFABRICATION	9
Photo	olithograp	hy(L2)- Film deposition, Etching Processes(L2)- wafer bonding(con surface micro machining(L2)- LIGA process(L2).	(L2)- Bulk micro
UNI.	T- III	MICRO SENSORS AND MICRO ACTUATORS	9
Trans	sduction i	mechanisms in different energy domain(L2)- Micromachined capaciti and Electromechanical and thermal sensors/actuators and application	ve, Piezoelectric s(L2)
UNI	T – IV	NEMS TECHNOLOGY	9
Aton	nic scale	precision engineering(L2)- Nano Fabrication techniques (L2)- NEMS tion and systems design(L2).	in measurement
UNI		MEMS and NEMS APPLICATION	9
Intro	nduction 1	o Micro/Nano Fluids and applications- Bio MEMS- Optical NEMS- ecent trends in MEMS and NEMS(L2).	Micro and Nan
moto	ors(LZ)- K	T	otal : 45 Period
Cou	rse Outc	omes:	BLOOM'S Taxonomy
Upo CO1	Explai	etion of this course the students will be able to: In the material properties and the significance of MEMS and NEMS	
COI	TOP INC	Telle Macerial proposition	L2 - Understand
	Demo	ustrial automation.	
CO2	Demo	ustrial automation. nstrate knowledge delivery on micromachining and micro ation.	L2 - Understand
CO2	Demoi fabrica Apply	ustrial automation. Instrate knowledge delivery on micromachining and microstion. Ithe fabrication mechanism for MEMS sensor and actuators	L2 - Understand
-	Demoi fabrica Apply Apply	nstrate knowledge delivery on micromachining and micro ation. the fabrication mechanism for MEMS sensor and actuators the concepts of MEMS and NEMS to models ,simulate and process	L2 - Understand L2 - Understand L2 - Understand
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	Microengineering " (2nd ed.). CRC Press,2005.
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2.	https://mechheart.com/difference-between-mems-and-nems-devices/
ONL	NE COURSES:
1.	https://archive.nptel.ac.in/courses/108/108/108108113/
2.	https://nptel.ac.in/courses/117105082
VIDE	O REFERENCES:
1.	https://www.youtube.com/watch?v=j9y0gfN9WMg
2.	https://www.youtube.com/watch?v=Ak7Y-vIWbnA&t=1s

T		ыарріп	g of COs with	103		
со	PO1	PO2	P03	PO4	PO5	P06
CO1	3	2	3	ef.	2	
CO2	3	3	2		2	
CO3	3	3	3	3		
CO4	3	3	3		3	
CO5	3	2	3	2	3	
Avg.	3.2	6	2.8	2	2.4	

Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-637 504

4E2	3ET418	ENTREPRENEURSHIP AND EMBEDDED PRODUCT DEVELOPMENT	1	Vers	ion	: 1.0	0		
Prog Bran	gramme &	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	C 3		
Cour	rse Objectiv	es:							
1	To develop ar	n understanding on business promotion process.							
2	To expose stu	udents on the skills required for success in business.							
3	To impart em	bedded system technology-based entrepreneurship. Archite	ecture	9					
4	Creative thin	king in developing automation into consumer products of m	g in developing automation into consumer products of market value						
5	Developing a	n embedded product with hardware-software components.							
	T-I	INTRODUCTION TO ENTREPRENEURSHIP			9				
moti rewa	ivation (12)-	STATE OF THE PROPERTY OF THE P	nation	and	chall	eilige	ence		
	II-TI	RESPONSIBILITIES IN ENTREPRENEURSHIP a small industry -selection of type of organization(L2) -Ir			9				
noor	cihilities(12)-	equirements for sales tax, CST, Excise Duty -Power incentives for exports (L2)-import of capital goods a	nd ra	aw r	nate	eriais	(LZ)		
Entr	repreneurship nomy(L2).	development programmes in India(L2)- Role and Ir	nprov	eme	ent	in I	ndia		
Entr Ecor UNI	repreneurship nomy(L2). IT- III	development programmes in India(L2)- Role and In	nprov	eme	ent	in I	ndia		
Entr Ecor UNI Gen Con	repreneurship nomy(L2). IT- III neric product ncept Genera	CONCEPTS OF PRODUCT DEVELOPMENT Development Phases(L2)- Product Development Process ation(L2)-Five Step Method(L2)- Creative thinking mean concepts- Product Architecture-(L2) component stand	s Flow	ws(L ds	2)- and	Basi pro	cs obler		
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CO3	Apply and Relate Key concepts underpinning entrepreneurship and its application in the recognition and exploitation of product/ service/ process opportunities
CO4	Interpret various aspects of design such as industrial design, design of Consumer specific product , its Reverse Engineering manufacture L3 – Apply .economic analysis through
CO5	Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded systems L2 - Understand design.
REFER	RENCE BOOKS:
1.	Kuratko, Entrepreneurship: A Contemporary Approach, Thomson Learning, 2001.
2.	Thomas Zimmerer et.al., Essentials of Entrepreneurship and small business Management 3rd Ed. Pearson Education, 2002
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7.	George E.Dieter, Linda C.Schmidt, "Engineering Design", McGraw-Hill International
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2.	https://www.techtarget.com/searchcio/definition/product-development-or-new-product-development-NPD
ONLI	INE COURSES:
1.	https://onlinecourses.nptel.ac.in/noc21_mg70/
2.	https://onlinecourses.nptel.ac.in/noc21_me83/
VIDE	O REFERENCES:
1.	https://www.youtube.com/watch?v=Tzzfd6168jk&list=PLyqSpQzTE6M8EGZbmNUuUM7Vh2 GkdbB1R
2.	https://www.youtube.com/watch?v=Hgj_kRrvbhQ&list=PL7oBzLzHZ1wXW3mtolxV5nIGn48 NLKwrb

		Mapping	of COs with	POs		
	- 3	In 1/8 piel	PO	With diffe		
со	PO1	PO2	PO3	PO4	PO5	P06
CO1	3	2				
CO2	3	3				
CO3	3	3				
CO4	3	3		1	-4	-
CO5	3	2	3	2	3	
Avg.	3.2	6	3	1.5	3	
		1-Low, 2	-Medium, 3-l	High.		

CHAIRPERSON
Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-637 504
M.E./M.Tech. Regulations-2023

ME23ET419 EMBEDDED SYSTEM FOR BIOMEDICAL APPLICATIONS					ion	1.0)	
	gramme &	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	C 3	
Cou	rse Objectiv	es:						
1	To Introduce	Fundamentals of Biomedical Engineering						
2	To understan	d the concept of wearable health devices						
3	To study the	hardware for image processing applications						
4	To have a bas	To have a basic knowledge of Embedded system in diagnostic applications						
5	To study abou	ut the various assist devices used in the hospitals.						
UN:	IT-I	INTRODUCTION TO BIOMEDICAL ENGINEERING		1	9			
cha	racteristics ar	ential and its propagation(L1)- Resting and Action Potential and Types of electrodes (L1)- Types of transducers and a pes of recorders components of a biomedical system(L2)	al(L2 appli) - catio	Bio ns(l	sig -2)-	nals Bio-	
	IT-II	WEARABLE HEALTH DEVICES			9			
Bios	sensors L(I2)- diac pacemak	rable technology in health care (L2)-Components of wea Blood glucose sensors (L2) - Head worn- Hand worn- Body w ers (L2)- Hearing aids and its recent advancements-wear	orn-	oulse	e ox	yme	ter-	
	IT- III	EMBEDDED SYSTEM FOR MEDICAL IMAGE PROCESSING			9			
DOW	er consumption	embedded image processing (L1). ASIC vs FPGA I(L) - me on- parallelism(L2) - Design issues in VLSI implementation	of In	nage	pro	eme	ent-,	
		- interfacing. Hardware implementation of image pro-	cessi	ng	algo	rith	ms:	
Seg		- interfacing. Hardware implementation of image produced compression (L2) EMBEDDED SYSTEM FOR DIAGNOSTIC APPLICATIONS	cessi	ng	algo 9	rith	ms:	
Seg UN ICC	IT - IV U patient mor	- interfacing. Hardware implementation of image produced compression (L2) EMBEDDED SYSTEM FOR DIAGNOSTIC APPLICATIONS intering system (L2) – ECG-EEG-EMG acquisition system(I2) – Marketing System (L2) – ECG-EEG-EMG acquisition system(I2) – Marketing System (I2) – Marke			algo 9	rith	ms:	
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3.	Khandpur R.S, Handbook of Biomedical Instrumentation, Tata McGraw Hill, New Delhi, 3rd Edition, 2014.
4.	L.A Geddes and L.E.Baker, Principles of Applied Biomedical Instrumentation, 3rd Edition, John Wiley and Sons, Reprint 2008
5.	Richard S.Cobbold, Transducers for Biomedical Measurements; Principle and applicationsJohn Wiley and sons, 1992.
WEB	REFERENCES:
1.	https://www.dedicatedcomputing.com/markets/healthcare/
2.	https://www.intechopen.com/chapters/75395
ONLI	NE COURSES:
1.	https://onlinecourses.nptel.ac.in/noc22_bt34/
2.	https://onlinecourses.nptel.ac.in/noc21_bt50/
VIDE	O REFERENCES:
1.	https://www.youtube.com/watch?v=TpPXxJ7fPDs&list=PLyqSpQzTE6M_ZBtBMkhFNMg6RA8vsBdBk
2.	https://www.youtube.com/watch?v=f08efmygAlM&list=PLyqSpQzTE6M9wr5IpP7WZxP9trrHht3N5

			PO			
со	PO1	PO2	P03	PO4	PO5	PO6
CO1	1	2	3			
CO2		3	2	-3		
CO3	4		2		3	
CO4	3	1	1	24	2	
CO5	1	3	3		-	
Avg.	1.66	2.25	2.2	3	2.5	

CHAIRPERSON Board of Studies

Faculty of Electrical & Electronics Engg Knowledge Institute of Technology KIOT Campus, Kakapalayam, Salem-637 534

	PYTHON PROGRAMMING FOR MACHINE LEARNING	V	ers	ion	: 1.0	1.0	
Programme		СР	L	Т	Р	С	
& Branch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	3	3	0	0	3	
Course Objecti	ves:		1	1-1			
variable, con	understand and be able to use the basic programming principles ditionals, loops, recursion and function calls. I learn how to use basic data structures such as List, Dictior ext files and images						
	students familiar with machine learning concepts & techniques.						
4 Students will machine lear	I understand the process and will acquire skills necessary to ening problem and implement it using Python. iscussions/ Practice/Exercise onto revising & familiarizing the contents.						
the 5 Units of	f the subject for improved research/employability skills			_			
UNIT-I	INTRODUCTION TO MACHINE LEARNING AND PYTHON Machine Learning: Significance, Advantage and Applications			9			
Python3 Installa Operators, Rea Statements(L3)	- Difference between C, C++ and Python Languages; Compiler a ation & Running (L2)- Basics of Python Programming Syntax: \ding Input from User (L2)- Arrays/List, Dictionary and Section - Control Flow and loop control statements(L3) PYTHON FUNCTIONS AND PACKAGES	√aria	ble '	Type	es, B nditi	asi	
UNIT-II	Reading and Writing Data(L2) – Errors and Exceptions Handlin		21			_	
Slicing, Multi-D and Loading No Object Oriented	Installing the Numpy Library and exploring various operations imensional Arrays, Joining Numpy Arrays, Array intersection and umpy Arrays – Introduction to SciPy Package & its functions(I Programming with Python(L1) IMPLEMENTATION OF MACHINE LEARNING USING PYTHO	nd Di L2) -	ffere	rodu	, Sa	vin	
UNIT- III			Date			oto	
Description of		IILSI	Date	aset,	Loc	isti	
Housing Datase Regression with Python Applicat	Standard Datasets: Coco, ImageNet, MNIST (Handwritten Diget (L2)— Introducing the concepts of Regression — Linear, Polynomial understanding (L2)— Introduction to SciPy Package ion of Linear Regression and Polynomial Regression using SciPy Underfitting concepts & examples using SciPy(L2)	& its	fur	nctio	115(L	۷)	
Housing Datase Regression with Python Applicat Overfitting and UNIT – IV	et (L2)— Introducing the concepts of Regression — Linear, Para analytical understanding (L2)- Introduction to SciPy Package ion of Linear Regression and Polynomial Regression using SciPy Underfitting concepts & examples using SciPy(L2) CLASSIFICATION AND CLUSTERING CONCEPTS OF ML	& its y(L2)	fur - I	nctio inter	pola 9	tior	
Housing Datase Regression with Python Applicat Overfitting and UNIT - IV Introduction to (L2) - Support scikitlearn(I1) - fitting, Multiclase data from csv(Algorithm & H	et (L2)— Introducing the concepts of Regression — Linear, Panalytical understanding (L2)— Introduction to SciPy Package ion of Linear Regression and Polynomial Regression using SciPy Underfitting concepts & examples using SciPy(L2) CLASSIFICATION AND CLUSTERING CONCEPTS OF ML ML Concepts of Clustering and Classification (L1)— Types of Clavector Machines (SVM)— Decision Tree—Random Forest(L2)— Interpretable of SciPy(L2)— Interpretable of Clustering & pred is fitting (L2)— Implementation of SVM using Blood Cancer Datase (L3) Types of Clustering Algorithms & Techniques(I2)— K-means Rierarchical Clustering Algorithm(L2)— Introduction to Python Plotting 2— dimensional, 3-dimensional graphs; formatting of data in same graph(L2)— Implementation of K-means Algorithm(L2)	assification Viaxis	cation ction	n Al n to terpon T n, M izationes; d M	gorit ML u olati ree u ean on u plo	tior thmusin on usin Shi	
Housing Datase Regression with Python Applicat Overfitting and UNIT – IV Introduction to (L2) – Support v scikitlearn(I1) – fitting, Multiclase data from csv(Algorithm & H Matplotlib(L1): multiple rows Algorithm using	et (L2)— Introducing the concepts of Regression — Linear, Panalytical understanding (L2)— Introduction to SciPy Package ion of Linear Regression and Polynomial Regression using SciPy Underfitting concepts & examples using SciPy(L2) CLASSIFICATION AND CLUSTERING CONCEPTS OF ML ML Concepts of Clustering and Classification (L1)— Types of Clavector Machines (SVM)— Decision Tree—Random Forest(L2)— Interpretation of SVM using Blood Cancer Datases iterarchical Clustering Algorithms & Techniques(I2)— K-means Hierarchical Clustering Algorithm(L2)— Introduction to Pytho Plotting 2— dimensional, 3-dimensional graphs; formatting of data in same graph(L2)— Implementation of K-means Algorithms and Introduction of K-means A	& its y(L2) assification iction et, De Algor n Vi axis rithm	cation ction, in ecision value and an	n Al n to terpon Ti n, M izationes;	gorit ML u olati ree u ean on u plo ean	tion thmusin on usir Shi usir ttir	

	To	otal: 45 Periods
Cours	e Outcomes: completion of this course the students will be able to:	BLOOM'S Taxonomy
CO1	Develop skill in system administration and network programming by learning Python.	L3 - Apply
CO2	Demonstrating understanding in concepts of Machine Learning and its implementation using Python	L2- Understand
CO3	Relate to use Python's highly powerful processing capabilities for primitives, modelling etc	L2- Understand
CO4	Improved Employability and entrepreneurship capacity due to knowledge up gradation on recent trends in embedded systems design	L3 - Apply
CO5	Apply the concepts acquired over the advanced research/employability skills	L3 - Apply
REFE	RENCE BOOKS:	
1.	Mark Lutz,"LearningPython,Powerful OOPs,O'reilly,2011.	
2.	Zelle, John "M. Python Programming: An Introduction to Computer Science." Associates, 2003	
3.	Andreas C. Müller, Sarah Guido, "Introduction to Machine Learning with Pytho	on", O'Reilly,2016
4.	Sebastian Raschka , VahidMirjalili, "Python Machine Learning - Third Edition" 2019	, Packt, Decembe
WEB	REFERENCES:	
1.	https://www.edureka.co/blog/install-numpy/	
2.	https://aws.amazon.com/what-is/neural-network/	
ONL	INE COURSES:	
1.	https://www.udemy.com/course/machinelearning	
2.	https://onlinecourses.nptel.ac.in/noc19_cs52/	
VIDI	O REFERENCES:	
1.	https://www.youtube.com/watch?v=xbYgKoG4x2g&list=PL53BE265CE4A6C0)56
2.	https://www.youtube.com/watch?v=eoPsX7MKfe8&list=PLIdgECt554OVFKXFycO	кро_китихриQкк

		Mapping o	f COs with	POs		
		7	PO			
со	PO1	PO2	PO3	PO4	PO5	P06
CO1	4	The ope not	2 //	111/11/31/11	3	
CO2	3	1	3		3	
CO3	2	1	2		3	
CO4	3	2	3	3	3	
CO5					3	
Avg.	2.66	1.33	2.5	3	3	
		1-Low, 2 -	Medium, 3-	High.		

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CHAIRPERSON
Board of Studies
Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-037 504

	RENEWABLE ENERGY AND GRID INTEGRATION		n : 1.0				
rogramme Branch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP L 1	P C 0 0 3				
ourse Objective							
1 To provide kn	owledge about the stand alone and grid connected renewable	energy sy	stems.				
ronowahle en	equip with required skills to derive the criteria for the design of power converters for newable energy applications						
Solar energy	nd comprehend the various operating modes of wind electrosystems Ferent power converters namely AC to DC, DC to DC and AC to						
renewable en	ergy systems		-				
5 To develop m	aximum power point tracking algorithms.						
JNIT-I	INTRODUCTION		9				
onversion(L2), ir ountries(L2). Ba Qualitative analys	renewable energy systems(L1), environmental aspects in pacts of renewable energy penetration to grid(L2). Grid Code asic power electronic converters for renewable energy is is (L2) -Boost and buck-boost converters, three phase AC volters, PWM Inverters, Grid Interactive Inverters-matrix converters.	ntegratior tage conti	n to grid				
JNIT-II	PHOTO VOLTAIC ENERGY CONVERSION SYSTEMS		9				
cell characteristi	Photo Voltaic (PV) effect, Solar Cell, Types(L2), Equivalent of (I/V) and P/V) for variation of insolation(L2), temper PV system(L2), Grid connected PV system(L2), Design rray sizing, selection of converter/inverter, battery sizing(L2).	of PV s	u Shauin				
1	9						
UNIT- III Introduction(L1),	Power contained in wind, Efficiency limit in wind, types of	wind turb	ines, Win				
Introduction(L1), control strategies Electrical mac Generator(PMSG)	Power contained in wind, Efficiency limit in wind, types of a Power curve and Operating area, Types of wind generate	gnet S	pines, Win n based o ynchronou				
Introduction(L1), control strategies Electrical mac Generator(PMSG)	Power contained in wind, Efficiency limit in wind, types of s, Power curve and Operating area, Types of wind generator innes(L2)-Induction Generator and Permanent Mag, Grid Connected-Single and Double output system, Self-	gnet S	pines, Win n based o ynchronou				
Introduction(L1), control strategies Electrical mac Generator(PMSG) Induction Genera UNIT – IV	Power contained in wind, Efficiency limit in wind, types of s, Power curve and Operating area, Types of wind generator innes(L2)-Induction Generator and Permanent Man, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2).	gnet S excited o	oines, Win n based o ynchronou peration				
Introduction(L1), control strategies Electrical mac Generator(PMSG) Induction Genera UNIT – IV Case studies of P	Power contained in wind, Efficiency limit in wind, types of S, Power curve and Operating area, Types of wind generator nines(L2)-Induction Generator and Permanent Mac, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems and GRID MANAGEMENT	gnet Sexcited o	oines, Winn based of ynchronou peration 9				
Introduction(L1), control strategies Electrical mac Generator(PMSG) Induction General UNIT – IV Case studies of Punit-V	Power contained in wind, Efficiency limit in wind, types of S, Power curve and Operating area, Types of wind generator nines(L2)-Induction Generator and Permanent Mac, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid Systems(L2), Featur	gnet Sexcited o	oines, Winn based of ynchronou peration 9				
Introduction(L1), control strategies Electrical mac Generator(PMSG) Induction General UNIT – IV Case studies of Punit-V	Power contained in wind, Efficiency limit in wind, types of S, Power curve and Operating area, Types of wind generator nines(L2)-Induction Generator and Permanent Mac, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems and GRID MANAGEMENT	gnet Siexcited o stem(L2) I Systems Total:	oines, Winn based of ynchronou peration 9 (L2), Rangel (L2), Rangel (L2)				
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Introduction(L1), control strategies electrical mac Generator(PMSG) induction General UNIT – IV Case studies of Punit – V Energy Storage stand types of Hyber Course Outcom Upon completion Relate the	Power contained in wind, Efficiency limit in wind, types of Sp. Power curve and Operating area, Types of wind generator innes(L2)-Induction Generator and Permanent Man, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid systems (Wind-Diesel, PV-Diesel and Wind-PV)(L2), es: on of this course the students will be able to: e power generation of different renewable energy sources to	stem(L2) I Systems Total: BLOOM Taxono	oines, Winn based of ynchronou peration 9 (L2), Ranger (S) my				
Introduction(L1), control strategies Electrical mac Generator(PMSG) Induction General UNIT – IV Case studies of PUNIT-V Energy Storage sand types of Hyb Course Outcom Upon completic General Electrical Relate the grid impace	Power contained in wind, Efficiency limit in wind, types of S, Power curve and Operating area, Types of wind generator anines(L2)-Induction Generator and Permanent Mac, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid systems (Wind-Diesel, PV-Diesel and Wind-PV)(L2), es: On of this course the students will be able to: One power generation of different renewable energy sources to ct and grid codes	stem(L2) I Systems Total: BLOOM Taxono	oines, Winn based of ynchronou peration 9 (L2), Range (S) my erstand				
ntroduction(L1), control strategies Electrical mac Generator(PMSG) Induction Genera JNIT – IV Case studies of P UNIT-V Energy Storage s and types of Hyb Course Outcom Upon completic CO1 Relate the grid impac CO2 Explain the	Power contained in wind, Efficiency limit in wind, types of Sp. Power curve and Operating area, Types of wind generator innes(L2)-Induction Generator and Permanent Man, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid systems (Wind-Diesel, PV-Diesel and Wind-PV)(L2), es: on of this course the students will be able to: e power generation of different renewable energy sources to	gnet Sexcited of excited of stem(L2) I Systems Total: BLOOM Taxono L2- Under	oines, Winn based or ynchronou peration 9 (L2), Rangers of Services of Servi				
introduction(L1), control strategies electrical mac Generator(PMSG) induction Generator (PMSG) inducti	Power contained in wind, Efficiency limit in wind, types of s, Power curve and Operating area, Types of wind generator and Permanent Man, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid systems (Wind-Diesel, PV-Diesel and Wind-PV)(L2), es: on of this course the students will be able to: extra and grid codes e design principles of solar energy management systems ind the power conversion system of wind generators	stem(L2) I Systems Total: BLOOM Taxono L2- Unde	oines, Winn based of ynchronou peration 9 (L2), Range of Section (Section) 45 Period (Section) erstand				
Introduction(L1), control strategies electrical mac Generator(PMSG) Induction General UNIT – IV Case studies of PUNIT-V Energy Storage sand types of Hyb Course Outcom Upon completion CO1 Relate the grid impact of	Power contained in wind, Efficiency limit in wind, types of s, Power curve and Operating area, Types of wind generator innes(L2)-Induction Generator and Permanent Man, Grid Connected-Single and Double output system, Self-tor and Variable Speed PMSG(L2). STANDARDS AND FRAMEWORK V-Maximum Power Point Tracking (MPPT) and Wind Energy systems(L2), Need for Hybrid Systems(L2), Features of Hybrid systems (Wind-Diesel, PV-Diesel and Wind-PV)(L2), es: on of this course the students will be able to: e power generation of different renewable energy sources to ct and grid codes e design principles of solar energy management systems	stem(L2) I Systems Total: BLOOM Taxono L2- Und L3- Appl L2- Und	oines, Winn based of ynchronou peration 9 (L2), Range of Section (Section) 45 Period (Section) erstand				
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	2009.					
3.	Haitham Abu-Rub, Mariusz Malinowski and Kamal Al-Haddad, "Power Electronics for Renewable Energy Systems, Transportation and Industrial Applications", IEEE Press and John Wiley & Sons Ltd Press, 2014.					
4.	Rashid .M. H "power electronics Hand book", Academic press, 2001					
5.	Gray, L. Johnson, "Wind energy system", prentice hall linc, 1995.					
6.	Non-conventional Energy sources B.H.Khan Tata McGraw-hill Publishing Company, New Delhi.					
WEB	REFERENCES:					
1.	https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA- ETSAP_Tech_Brief_Power_Grid_Integration_2015.pdf					
2.	https://www.nrel.gov/docs/fy15osti/63033.pdf					
ONL	INE COURSES:					
1.	https://www.coursera.org/learn/renewable-power-electricity-systems					
2.	https://nptel.ac.in/courses/103103206					
VIDE	O REFERENCES:					
1.	https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk					
2.	https://www.youtube.com/watch?v=cGHIV0EavaQ					

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CHAIR SON

Board of Studies

Faculty of Electrical & Electronics Engg
Knowledge Institute of Technology
KIOT Campus, Kakapalayam,
Salem-637 504

	E23ET422 ELECTRIC VEHICLES AND POWER MANAGEMENT						Version: 1.0			
Bran	ramme &	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P 0	С 3			
our	se Objective	es:								
1	To discuss the	e fundamentals building blocks of a digital instrument								
2	Introduce wir	ed, WSN for configuring metering network								
3	Discuss requi									
4	To discuss ne	tworking configuration to develop PAN		,						
5	To discuss the	e functions of digital instrument Power quality monitoring								
JNI.	T-I	ELECTRIC VEHICLES AND VEHICLE MECHANICS		=	12					
vith	ric Vehicles (internal comb	EV)(L2), Hybrid Electric Vehicles (HEV) (L2), Engine ratings oustion Engine vehicles(L2)- Fundamentals of vehicle mechanic ARCHITECTURE OF EV'S AND POWER TRAIN COMPONENTS	- Co (L2)	mpa	12		of EV			
		V's and HEV's (L2)- Plug-n Hybrid Electric Vehicles (PHEV sizing, Gears, Clutches, Transmission and Brakes(L2).	/) (1	L2)-	Pov	wer	trair			
JNI	T- III	POWER ELECTRONICS AND MOTOR DRIVES			12					
drive	s(L2) - Ind	mponents (L2)- Power electronic switches(L2)- four quadra uction motor and permanent magnet synchronous motor-b witched reluctance motor (SRM) drives(L2)- EV motor sizing(L2	oase	ope d v	ratio ecto	n of	f DC ntro			
	T – IV	BATTERY ENERGY STORAGE SYSTEM	12							
3atte	ery Basics(L2 eling(L3)-Des)- Different types- Battery Parameters-Battery life & safety ign of battery for large vehicles(L2).	imp	acts	(L2)-Ba	ttery			
	T-V	ALTERNATIVE ENERGY STORAGE SYSTEMS			12					
(PEM	1) fuel cell	el cell(L1) – Types, Operation and characteristics(L2)- proton for E-mobility(L2)- hydrogen storage systems(L2) –Si plications(L2)	excl uper	hang ca	ge m apac	itors	rane fo			
.r urre	sportation ap	***	To	tal	: 60	Per	riods			
Cou	rse Outcome	es: n of this course the students will be able to:	BLOOM'S Taxonomy							
CO1		the concept of electric vehicle and energy storage systems.	L2 ·	- Ur	ders	stand	t			
CO2	Describe t Electric Vel	he working and components of Electric Vehicle and Hybrid nicle	L2 – Understand							
CO3		principles of power converters and electrical drives	L2	– Ur	nder	stand	d			
CO4	Illustrate t	he operation of storage systems such as battery and super	L3 – Apply							
CO5	Analyze the various energy storage systems based on fuel cells and 13 - Understand					d				
REF	EDENCE BOO	OKS:								
	Iqbal Huss	ain, "Electric and Hybrid Vehicles: Design Fundamentals, Secon								
1.	Taylor & Francis Group, Second Edition (2011). Ali Emadi, Mehrdad Ehsani, John M.Miller, "Vehicular Electric Power Systems", Special 63									
2.		ion, Marcel dekker, inc 2010.		1	4 -	a a b '				
	Indian Edit	hsani, YiminGao, Sebastian E. Gay, Ali Emadi, 'Modern Electri ehicles: Fundamentals, Theory and Design', CRC Press, 2004. and K.T. Chau, 'Modern Electric Vehicle Technology', OXFO			V //	, ,				

	2001
5.	Wie Liu, "Hybrid Electric Vehicle System Modeling and Control", Second Edition, John Wiley & Sons, 2017.
WEB	REFERENCES:
1.	https://archive.nptel.ac.in/courses/108/106/108106182/
2.	https://archive.nptel.ac.in/courses/108/106/108106170/
ONLI	NE COURSES:
1.	https://onlinecourses.nptel.ac.in/noc22_ee53/
2.	https://onlinecourses.nptel.ac.in/noc21_ee112/
VIDE	O REFERENCES:
1.	https://www.youtube.com/watch?v=UgtjRob5qMg&list=PLyqSpQzTE6M9spod-UH7Q69wQ3uRm5thr
2.	https://www.youtube.com/watch?v=V004WUdpHeA&list=PLIYm0-AHZdZRLYSylFinxkspWmcgNvbtl

		Mapping	of COs with	POs		
со		2	A PO			
CO	PO1	PO2	PO3	PO4	PO5	PO
CO1	3	3	3	2	3	
CO2	3	3	3	2	3	
CO3	3	3	3	2	3	
CO4	3	3	3	2	3	
CO5	3	3	3	2	3	
Avg.	3	3	3	2	3	

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MEZ	23ET423	SMART GRID	١.	/ers	ion	: 1.0
Pro Bra	gramme & nch	M.E. EMBEDDED SYSTEM TECHNOLOGIES	CP 3	L 3	T 0	P C 0 3
Cou	rse Objective					
1	To Study ab infrastructure	out Smart Grid technologies, different smart meters and .	adv	ance	d n	netering
2	To know abou	t the function of smart grid				
3	To familiarize	the power quality management issues in Smart Grid				
4	To familiarize	the high performance computing for Smart Grid applications				
5	To get familia	rized with the communication networks for Smart Grid application	ons			
UNI	T-I	INTRODUCTION TO SMART GRID			9	
Grid in Si	tions, opporti (L2), Compari mart Grid, Sm	ric Grid(I2), Concept, Definitions and Need for Smart Grid(I2), unities, challenges and benefits(I2), Difference between co son of Micro grid and Smart grid(I2), Present development & I art Grid Initiative for Power Distribution Utility in India(I2) – Cas	nven	tiona	al &	Smart
	T-II	SMART GRID TECHNOLOGIES			9	
area Dete Distr	mation(L2), F monitoring(L ection(L2), Ise ribution Trans	s, Smart Integration of energy resources(L2), Smart substate feeder Automation(L2), Transmission systems: EMS, FACTS at 2), Protection and control, Distribution systems: DMS(L2), Voolation and service restoration(L2), Outage management(formers(L2), Phase Shifting Transformers(L2), Plug in Hybrody Grid to Vehicle and Vehicle to Grid charging concepts(L2)	nd F olt/Va (2)	IVDO Ir co Hia	ntro), Wide ol, Fault
	T- III	SMART METERS AND ADVANCED METERING INFRASTRUCTURE			9	
Unit resp	protocols, sta (PMU) & their	nart Meters(L1), Advanced Metering infrastructure (AMI) drive ndards and initiatives(L2), AMI needs in the smart grid(L2), Fapplication for monitoring & protection(L2). Demand side mana- ns(L2), Demand pricing and Time of Use, Real Time Pricing	haso	r Me	easu	rement
UNI	T – IV	POWER QUALITY MANAGEMENT IN SMART GRID			9	
Sour	ces(L2), Pov	MC in Smart Grid(L2), Power Quality issues of Grid connected ver Quality Conditioners for Smart Grid(L2), Web bas wer Quality Audit (L2)	d Rei sed	newa Pow	able er	Energy Quality
UNI	T-V	HIGH PERFORMANCE COMPUTING FOR SMART GRID APPLICATIONS			9	
Netw	vork (WAN), B	Standards(L2) -Local Area Network (LAN), House Area Networ roadband over Power line (BPL), PLC, Zigbee, GSM, IP based F d CLOUD Computing(L2), Cyber Security for Smart Grid(L2).	k (H	AN), cols(Wid (L2),	de Area Basics
						eriods
	and the same of th		BLO Tax			
CO1	Relate with the smart resources, smart meters and other smart devices.			L1 - Remember		
CO2	Explain the function of Smart Grid		L2 - Understand			and
CO3	Experiment	the issues of Power Quality in Smart Grid.	L2 -	Unc	derst	and
CO4	Analyze the	performance of Smart Grid	L2 -	Und	lerst	and
CO5	Recommend	I suitable communication networks for smart grid applications	L2 F	///	, ,	and

REF	ERENCE BOOKS:
1.	Stuart Borlase 'Smart Grid: Infrastructure, Technology and Solutions', CRC Press 2012.
2.	JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, 'Smart
3.	Mini S. Thomas, John D McDonald, 'Power System SCADA and Smart Grids' CRC Press, 2015
4.	Grids', Springer, 2014 Grids', Springer, 2014
5.	SMART GRID Fundamentals of Design and Analysis, James Momoh, IEEE press, A John Wiley & Sons, Inc., Publication.
WEE	REFERENCES:
1.	https://www.researchgate.net/publication/224078022_Power_Quality_and_EMC_in_Smart_Grid
2.	https://amity.edu/icactm/Proceeding/Paper%20Index%20Content/24%20T4%20P9%20ID%209.pdf
ONL	INE COURSES:
1.	https://onlinecourses.nptel.ac.in/noc21_ee68
2.	https://onlinecourses.nptel.ac.in/noc23_ee124/
VIDI	O REFERENCES:
1.	https://www.youtube.com/watch?v=KgVFJnmJvKk&list=PLSJzHGpGe6IP5biCvZrtQdHf80tnSXRBr
2.	https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-ee65/

co			PO			
	PO1	PO2	PO3	PO4	P05	P06
CO1	3	2	1	2	2	
CO2	3		2	2		-
CO3	2		1	2		-
CO4	1		1 - 1	3	3	-
CO5		2	2	3	3	
Avg.	2.25	· 2	1.66	2.25	2.3	

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ROOM Services, Sakapolayan Selam-207 564

WEB REFERENCES:					
	Publisher	Website link	Type of Content		
1.	Web reference	https://www.tutorialspoint.com/	Reading Material		
2.	w3schools	https://www.w3schools.com/	Reading Material		
3.	javatpoint	https://www.javatpoint.com/	Reading Material		

VIDEO REFERENCES:

	Video Details	Name of the Expert	Type of Content	Video Link
1.	NPTEL	Prof. Partha Pratim Das IIT Kharagpur	Lecture	http://www.digimat.in/nptel/courses /video/106105151/106105151.html
2.	NPTEL	Prof. Debasis Samanta IIT Kharagpur	Lecture	https://archive.nptel.ac.in/courses/ 106/105/106105191/
3.	NPTEL	Prof. Debasis Samanta IIT Kharagpur	Lecture	https://www.youtube.com/playlist?list= PLfn3cNtmZdPOe3R_wO_h540QNfMkCQ0ho

		0		N.	Мар	ping	of CO	s with	n POs	and P	SOs				
-		POs											PSOs		
COs	P01	PO2	РОЗ	P04	P05	P06	P07	P08	P09	PO10	P011	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2					r 1			2	2	2	
CO2	3	2	2	2	(1)				1		6)	2	2	2	
CO3	3	2	2	2	-,1				1		97	2	2	2	
CO4	3	2	2	2					1			2	2	2	
CO5	3	2	2	2	-		5	911	:Π	- 44		2	2	2	
Avg.	3.0	2.0	2.0	2.0		3			1.0	100		2.0	2.0	2.0	
				•	123	1-L	ow,2-	Mediu	m,3-1	High.					
				4	7) _e				+/		religi	7			

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BE23EE411		ELECTRICAL MACHINES - II LABORATORY	Version: 1.0					
Program	ıme	B.E. – ELECTRICAL AND ELECTRONICS ENGINEERING	СР	L	T	Р	С	
& Brancl	& Branch							
Course (Object	tives:						
1		pose the students to the operation of synchronous machines ar ive them experimental and analysis skills.	nd ind	uctio	on m	otor	S	
		LIST OF EXPERIMENTS						
1.	Regula	ation of three-phase alternator by EMF and MMF methods.						
	Predet Metho	termination of voltage regulation of three-phase salient pole alt	ernat	or b	y Blo	nde	l's	
3.	Plottir	ng V and inverted V curve of three-phase synchronous motor.						
4.	Load 1	test on three-phase Slip ring induction motor.						
5.	No Lo	ad and Blocked Rotor test on three-phase squirrel cage induction	on mo	tor.				
6.	Separ	ration of No-load losses of three-phase induction motor.						
7.	Speed	d control of three-phase slip ring induction motor.						
8.	Load	test on single-phase induction motor.						
9.	Perfo	rmance Analysis of an Induction Machine under Variable Freque	ency D	rive	s (V	FD).		
			Tota	1:60	Pei	riod	s	

Course Upon o	BLOOM'S Taxonomy	
CO1	Apply Voltage Regulation Techniques on Alternators	L3- Apply
CO2	Identify appropriate motor types for specific applications.	L3- Apply
CO3	Implement various Speed Control Techniques on Induction Motor and Analysis Performance.	L3- Apply

	Mapping of COs with POs and PSOs															
	POs													PSOs		
COs	PO1	PO2	PO3	PO4	P05	P06	P07	P08	P09	PO10	P011	PO12	PSO1	PSO2	PSO3	
CO1	3	3	1	1					1			3	1			
CO2	3	3	1	1					1			3	1			
CO3	3	3	1	1					1			3	1			
Avg.	3	3	1	1					1			3	1			
	1-Low,2-Medium,3-High															

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