Sharnbasva University, Kalaburagi

Scheme of Teaching and Examination 2018-19

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018-19)

VII SEMESTER B.Tech (E & CE)

Sl. No.	Course Code		Course Title	Teaching Department	Teaching Hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	PCC	18EC71	Computer networks		3	1		3	50	50	100	04
2	PEC	18EC72X	Professional elective -4		3			3	50	50	100	03
3	PEC	18EC73X	Professional elective -5		3			3	50	50	100	03
4	OEC	18XX74X	Open elective -2		3			3	50	50	100	03
5	PCC	18ECL75	Computer networks Lab				2	3	50	50	100	01
6	PEC	18ECL76X	Professional elective -4 Lab				2	3	50	50	100	01
7	PEC	18ECL77X	Professional elective -5 Lab				2	3	50	50	100	01
8	PRJ	18PRJ78	Project – 7				2	3	50	50	100	01
9	HSMC	18HSM79	Industrial Psychology and Organizational Behavior	Humanities	1		2	3	50	50	100	01
Total					**13**	**1**	**08**	**27**	**450**	**450**	**900**	**18**

Note:- Project 7-Real life problem solving project / Research Project/ Field Project

PCC-Professional Core, PEC- Professional Elective, OEC- Open Elective, PRJ- Project, HSMC-Humanity and Social Science

PROFESSIONAL ELECTIVE-4			
COURSE CODE UNDER 18EC72X	**COURSE TITLE**	**COURSE CODE UNDER 18ECL76X**	**COURSE TITLE**
18EC721	Power Electronics	18ECL761	Power Electronics Lab
18EC722	Image And Video Processing	18ECL762	Image And Video Processing Lab
18EC723	Low Power VLSI Circuits	18ECL763	Low Power VLSI Circuits Lab
18EC724	Programming In Python	18ECL764	Programming In Python Lab
PROFESSIONAL ELECTIVE-5			
COURSE CODE UNDER 18EC73X	**COURSE TITLE**	**COURSE CODE UNDER 18ECL77X**	**COURSE TITLE**
18EC731	DSP Algorithms And Architectures	18ECL771	DSP Algorithms And Architectures Lab
18EC732	Optical Communication Network	18ECL772	Optical Communication Network Lab
18EC733	Smart Agriculture	18ECL773	Smart Agriculture Lab
18EC734	Cryptography & Network Security	18ECL774	Cryptography & Network Security Lab
OPEN ELECTIVE-2			
COURSE CODE UNDER 18XX74X	**COURSE TITLE**		
18EC741	Robotics		
18EC742	Embedded Systems		
18EC743	IOT &its Application		
18EC744	Signal Processing		

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VIII SEMESTER B.Tech (E & CE)

Sl. No.	Course Code		Course Title	Teaching Department	No of Weeks	Examination				Credits
					Training / Learning / Practice / Implementation	Duration in hours	CIE Marks	SEE Marks	Total Marks	
1	Project	18PRJ81	Research Project / Field Project -8		4	3	50	50	100	08
2	Internship	18ECI82	Internship		12	3	50	50	100	13
Total					16	**6**	**100**	**100**	**200**	**21**

Note: Project 8-Manufacturable and marketable project / Research Project/ Field Project

COMPUTER NETWORKS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC71	CIE Marks	50
Number of Lecture Hour/Week	3L+1T	SEE Marks	50
Total Number of Lecture Hours	48 Hours	Exam Hours	03

CREDITS-04

Course Objectives: This course will enable students to:

- Understand the layering architecture of OSI reference model and TCP/IP protocol suite.
- Understand the protocols associated with each layer.
- Learn the different networking architectures and their representations.
- Learn the various routing techniques and the transport layer services.

Modules	Teaching Hours
Module -1	
Introduction: Data Communications: Components, Representations, Data Flow. **Networks**: Physical Structures, Network Types: LAN, WAN, Switching, The Internet. **Network Models:** Protocol Layering: Scenarios, Principles, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP. Text 1: 1.1,1.2,1.3,2.1,2.2,2.3. **RBT Levels: L1, L2 and L3**	10 Hours
Module -2	
Data-Link Layer: Introduction: Nodes and Links, Services, Categories' of link, Sublayers, Link Layer addressing: Types of addresses, ARP. **Data Link Control (DLC)**: services, Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking. **Media Access Control:** Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA. Controlled Access: Reservation, Polling, Token Passing, Channelization. Text 1: 9.1,9.2,11.1,11.2,12.1,12.2,12.3. **RBT Levels: L1, L2 and L3**	10 Hours
Module -3	
Connecting Devices: Hubs, Switches, Routers. **Virtual LANs:** Membership, Configuration, Communication between Switches and Routers, Advantages. **Network Layer:** Introduction, Network Layer services: Packetizing, Routing and Forwarding, Other services, Packet Switching: Datagram Approach, Virtual Circuit Approach, IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label. Text 1: 17.1, 17.2,18.1,18.2,18.4,18.5 **RBT Levels: L1, L2 and L3**	10 Hours
Module -4	
Network Layer Protocols: Internet Protocol (IP): Datagram Format, Fragmentation, Options, Security of IPv4 Datagrams, ICMPv4: Messages, Debugging tools, ICMP checksum. Mobile IP: Addressing, Agents, Three Phases,	10 Hours

Unicast Routing: Introduction, Routing Algorithms: Distance Vector Routing, Link State Routing, Path vector routing, Unicast Routing Protocol: Internet Structure, Routing Information Protocol, Open Shortest Path First, Border Gateway Protocol Version 4. Text 1: 19.1,19.2,19.3, 20.1,20.2,20.3 **RBT Levels: L1, L2 and L3**	
Module-5	
Transport Layer: Introduction: Transport Layer Services, Connectionless and Connection oriented Protocols, **Transport Layer Protocols:** Simple protocol, Stop and wait protocol, Go-Back-N Protocol, Selective repeat protocol, **User Datagram Protocol**: User Datagram, UDP Services, UDP Applications, **Transmission Control Protocol:** TCP Services, TCP Features, Segment, Connection, State Transition diagram, Windows in TCP, Flow control, Error control, TCP congestion control. Text 1: 23.1, 23.2,24.1, 24.2, 24.3 **RBT Levels: L1, L2 and L3**	08 Hours
Course Outcomes: At the end of the course, the students will be able to: CO1- Demonstrate the fundamental principles of computer networking and the significance of layered network architecture in facilitating communication. CO2- Identify and analyze the protocols and services associated with the Data Link layer in networking. CO3- Describe the protocols and functions of the Network layer and their impact on data transmission and routing. CO4- Analyze and design routing protocols, and evaluate the packet routing process using various routing algorithms. CO5- Recognize the protocols and services of the Transport layer, and explain their role in supporting communication processes across the network.	
Text Books: 1. Data Communications and Networking, Forouzan, 5th Edition, McGraw Hill, 2016 ISBN: 1-25-906475-3	
Reference Books: 1. Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013, ISBN: 0-273-76896-4 2. Introduction to Data Communication and Networking, WayarlesTomasi, Pearson Education, 2007, ISBN:0130138282	

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	1	-	-	-	-	-	-	-	-	-	-	3	-	-

POWER ELECTRONICS [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-VII			
Subject Code	18EC721	CIE Marks	50
Number Lecture Hour/Week	03	SEE Marks	50
Number of Lecture Hours	40	Exam Hours	03
CREDITS-03			

Course Objectives The objectives of the course is to enable students to:

- Understand the working of various power devices.
- Study and analysis of thyristor circuits with different triggering techniques.
- Learn the applications of power devices in controlled rectifiers, converters and inverters.
- Study of power electronics circuits under different load conditions.

Modules	Teaching Hours
Module -1	
Introduction - Applications of Power Electronics, Power Semiconductor Devices, Control Characteristics of Power Devices, types of Power Electronic Circuits. **Power Transistors**: Power BJTs: Steady state characteristics. Power **MOSFETs**: device operation, switching characteristics, IGBTs: device operation, output and transfer characteristics. (Text 1) **RBT Levels: L1, L2**	08 Hours
Module -2	
Thyristors - Introduction, Principle of Operation of SCR, Static Anode-Cathode Characteristics of SCR, Two transistor model of SCR, Gate Characteristics of SCR, Turn-On Methods, Turn-OFF Mechanism. Turn-Off Methods: Natural and Forced Commutation . Gate Trigger Circuit: Resistance Firing Circuit, Resistance capacitance firing circuit.(Text 2) **RBT Levels: L1, L2 and L3**	08 Hours
Module -3	
Controlled Rectifiers - Introduction, principle of phase controlled converter operation, Single phase full converters, Single phase dual converters. **AC Voltage Controllers** - Introduction, Principles of ON-OFF Control, Principle of Phase Control, Single phase control with resistive and inductive loads. (Text 1) **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
DC-DC Converters - Introduction, principle of step-down operation and it'sanalysis with RL load, principle of step-up operation, Step-up converter witha resistive load, Performance parameters, Converter classifications. (Text 1) **RBT Levels: L1, L2**	08 Hours
Module-5	
Pulse Width Modulated Inverters-Introduction, principle of operation, performance parameters, Single phase bridge inverters, voltage control of single phase inverters, current source inverters, Variable DC-link inverter. (Text 1) **RBT Levels: L1, L2**	08 Hours

Course Outcomes: After studying this course, students will be able to:

CO1- Analyze the I-V characteristics of SCR, DIAC and TRIAC.

CO2- Analyze the characteristics of MOSFET, IGBT and UJT.

CO3- Construct and demonstrate the operation of AC voltage controller and differentiate its various configurations.

CO4- Design controllers for dc-dc converters in voltage and peak-current mode

CO5- Apply the different modulation techniques to pulse width modulated inverters and identify the harmonic reduction methods.

Text Books :

1. Mohammad H Rashid, Power Electronics, Circuits, Devices and Applications, 3rd/4th Edition, Pearson Education Inc, 2014, ISBN: 978-93-325-1844-5.
2. M.D Singh and K B Khanchandani, Power Electronics, 2nd Edition, Tata Mc- Graw Hill, 2009, ISBN: 0070583897.

Reference Books :

1. L. Umanand, Power Electronics, Essentials and Applications, John Wiley India Pvt. Ltd, 2009.
2. Dr. P. S. Bimbhra, "Power Electronics", Khanna Publishers, Delhi, 2012.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	**3**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**3**	**3**	**3**	**-**	**-**	**-**	2	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	**3**	**3**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

IMAGE AND VIDEO PROCESSING

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC722	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- To study the image fundamentals and mathematical transforms necessary for image Processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- 4. To study the image compression procedures.

Modules	Teaching Hours
Module -1	
Fundamentals of Image Processing and Image Transforms: Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing. Introduction, need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms. **RBT Levels: L1, L2 and L3**	08 Hours
Module -2	
Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing's partial filters, Sharpening spatial filters. Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering. Image Restoration: Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution. **RBT Levels: L1, L2 and L3**	08 Hours
Module -3	
Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards. **RBT Levels: L1, L2 and L3**	08 Hours

Module -4	
Basic Steps of Video Processing: Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations. **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding. **RBT Levels: L1, L2 and L3**	08 Hours

Course outcomes: After studying this course, students will be able to:

CO1-Review the fundamental concepts of a digital image processing system and Analyze images in the frequency domain using various transform.

CO2-Analyze the techniques for image enhancement and image restoration

CO3-Analyze various image segmentation techniques.

CO4-Apply different methods and models for video processing.

CO5-Apply different methods and models for motion estimation.

Text Books:

1. Digital Image Processing – Gonzaleze and Woods, 3rdEd., Pearson.
2. Video Processing and Communication – Yao Wang, JoemOstermann and Ya–quin Zhang.1st Ed.,
   PH Int.
3. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, TataMcGraw Hill publishers, 2009

Reference Books:

1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – ScotteUmbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.
3. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH, 2009.
4. Multidimentional Signal, Image and Video Processing and Coding – John Woods, 2ndEd, Elsevier.
5. Digital Image Processing with MATLAB and Labview – Vipula Singh, Elsevier. 6.Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5tEd., Elsevier

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

LOW POWER VLSI DESIGN

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC723	CIE Marks	50
Number Lecture Hour/Week	03	SEE Marks	50
Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Know the basics and advanced techniques in low power design which is a hot topic in today's market where the power plays a major role.
- Describe the various power reduction and the power estimation methods.
- Explain power dissipation at all layers of design hierarchy from technology, circuit, logic, architecture and system.
- Apply State-of-the art approaches to power estimation and reduction.
- Practice the low power techniques using current generation design style and process technology

Modules	Teaching Hours
Module -1	
Introduction: Need for low power VLSI chips, charging and discharging capacitance, short circuit current in CMOS leakage current, static current, basic principles of low power design, low power figure of merits. **RBT Levels: L1, L2**	08 Hours
Module -2	
Simulation Power Analysis: SPICE circuit simulation, discrete transistor modeling and analysis, gate level logic simulation, architecture level analysis, data correlation analysis in DSP systems, Monte Carlo simulation. **RBT Levels: L2, L3**	08Hours
Module -3	
Probabilistic Power Analysis: Random logic signals, probability & frequency, probabilistic power analysis techniques, signal entropy. **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
Circuit: Transistor and gate sizing, equivalent pin ordering, network restructuring and reorganization, special latches and flip flops, low power digital cell library, adjustable device threshold voltage. **RBT Levels: L1, L2, L3 and L4**	08 Hours
Module -5	
Logic: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic (Text 1). **Architecture and System:** Power and Performance Management, Switching Activity Reduction, Parallel Architecture with Voltage Reduction, Flow Graph Transformation. **RBT Levels: L2, L3**	08 Hours

Course outcomes After studying this course, students will be able to

CO1- Identify the various sources of power dissipation in CMOS circuits

CO2- Analyze power using simulation-based approaches and probabilistic Analysis.

CO3- Apply optimization and trade-off strategies to manage power dissipation in digital circuits

CO4- Design and optimize circuit networks by applying restructuring and reorganization techniques to meet low-power objectives.

CO5- Apply strategies to minimize switching activity for improved energy efficiency and design gate reorganization techniques to boost circuit efficiency and lower power consumption.

Text Book:

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", Kluwer Academic, 1998.

Reference Books:

1. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000
2. A.P.Chandrasekaran and R.W.Broadersen, "Low power digital CMOS design", Kluwer Academic,1995. 3. A Bellamour and M I Elmasri, " Low power VLSI CMOS circuit design", Kluwer Academic,1995.
3. Jan M.Rabaey, MassoudPedram, "Low Power Design Methodologies" Kluwer Academic, 2010.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	-	-	-	-	2	-	-	-	-	-	3	-	-
CO2	2	3	-	-	-	-	2	-	-	-	-	-	3	-	-
CO3	2	3	2	-	-	-	2	-	-	-	-	-	3	-	-
CO4	2	3	3	-	-	-	2	-	-	-	-	-	3	-	-
CO5	2	3	3	-	-	-	2	-	-	-	-	-	3	-	-

PROGRAMMING IN PYTHON

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC724	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Learn the syntax and semantics of Python programming language.
- Illustrate the process of structuring the data using lists, dictionaries, tuples, and strings.
- Illustrate the object-oriented programming concepts in Python and understand the database handling and creation of GUI.
- Understand how to handle exceptions and how to use different types of files.

Modules	Teaching Hours
Module -1	
Introduction to Python, use IDLE to develop programs, Basic coding skills, work with data types and variables, work with numeric data, work with string data, python functions, Boolean expressions, selection structure, iteration structure. **RBT Levels: L1, L2**	08 Hours (Text 1)
Module -2	
Working with lists, work with a list of lists, work with tuples, get started with dates and times, get started with dictionaries, recursion and algorithms. **RBT Levels: L1, L2**	08 Hours (Text 1)
Module -3	
An introduction to classes and objects, define a class, work with encapsulation, work with inheritance, Polymorphism. **RBT Levels: L1, L2**	08 Hours (Text 1)
Module -4	
An Introduction to relational databases, SQL statements for data manipulation, Use SQLite Manager to work with a database, Use Python to work with a database, Create a GUI that handles an event, work with components. **RBT Levels: L1, L2 and L3**	08 Hours (Text 1)
Module-5	
How to work with file I/O: An introduction to file I/O, how to use text files, CSV files, Binary files. How to handle exceptions: Single and multiple exceptions? **RBT Levels: L1, L2 and L3**	08 Hours (Text 1)

Course outcomes: After studying this course, students will be able to:

CO1-Interpret the basic principles of Python programming language.
CO2-Illustrate the process of structuring the data using lists, dictionaries, tuples and strings
CO3-Articulate the Object-Oriented Programming concepts.
CO4-Implement database and GUI applications.
CO5-Handling exceptions and using different types of files.

Text Books:

1. Michael Urban and Joel Murach," Python Programming", Shroff/Murach,2016.

Reference Books:

1. Mark Lutz, "Programming Python", O`Reilly, 4th Edition,2010
2. AlSweigart,"Automate the Boring Stuff with Python practical programming for total beginners",1stEdition, No Starch Press, 2015.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

DSP ALGORITHMS AND ARCHITECTURE

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER-VII

Subject Code	18EC731	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Figure out the knowledge and concepts of digital signal processing techniques.
- Understand the computational building blocks of DSP processors and its speed issues.
- Understand the various addressing modes, peripherals, interrupts and
- Pipelining structure of TMS320C54xx processor.
- Learn how to interface the external devices to TMS320C54xx processor in Various modes.

Modules	Teaching Hours
Module -1	
Architectures for Programmable Digital Signal – Processing Devices: Introduction, Basic Architectural Features, Classic DSP architecture characteristics, On-chip memories, DSP Computational Building Blocks, Address Generation Unit, Programmability and Program Execution, Features for External Interfacing, Speed Issues. **RBT Levels: L1, L2**	08 Hours
Module -2	
TMS320C54xx Architecture: Introduction, Architectural overview ofTMS320C54xx DSP, Central Processing Unit, Internal Memory Organization, Program Control, Detail study of TMS320C54x& 54xx instructions and programming: Arithmetic operations, logical operations, program control operations, load and store operations. **RBT Levels: L1, L2 and L3**	08 Hours
Module -3	
Implementation of Basic DSP Algorithms: Introduction, Number representation in DSP, FIR filters, IIR filters, Interpolation and Decimation Filters (One example in each case) **Implementation of FFT Algorithms:** Introduction, DFT & IDFT, Requirement of FFT algorithms, Computation involved in Butterfly implementation, Algorithm for DIT-FFT implementation **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
Memory and Parallel I/O in TMS320C54xx-Description and Interfacing: Introduction, Memory Space, Program Memory, Dual access memory and the pipeline, single access memory and the pipeline, Data memory, External Bus, External memory Interfacing, External memory signal generated by 54xx, Memory Address decoding, Interfacing Parallel and I/O Devices. **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
Interfacing and Applications of DSP Processors: Introduction, DSP based measurement system, Heart rate monitor, Speech Processing System. **RBT Levels: L1, L2 and L3**	08 Hours

Course Outcomes: At the end of this course, students would be able to

CO1- Explain DSP fundamentals, DSP architecture, Address Generation Units (AGU),DSP computational blocks and on-chip memory.

CO2- Comprehend architecture of TMS320C54XX DSP, instructions sets and Assembly language programming.
CO3- Analyze and design various filters, number representation and FFT algorithms.
CO4- Understand the various memory devices and I/O interfacing.
CO5- Understand DSP measurement and speech processing systems. Design heart rate monitors

Text Books:

1. "Digital Signal Processors" AndhePallavi and K.Uma Rao, Pearson-Education, 2012.

Reference Books:

1. "Digital Signal Processing: A practical approach", Ifeachor E. C., Jervis B. W Pearson-Education, PHI, 2002.
2. "Digital Signal Processors", B Venkataramani and M Bhaskar, TMH, 2nd, 2010
3. "Architectures for Digital Signal Processing", Peter Pirsch John Weily, 2008
4. "Digital Signal Processing", Avatar Singh and S. Srinivasan, Thomson Learning, 2004.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

OPTICALCOMMUNICATION AND NETWORKS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC732	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Learn the basic principle of optical fiber communication with different modes of light propagation.
- Understand the transmission characteristics and losses in optical fiber.
- Study of optical components and its applications in optical communication networks.
- Learn the network standards in optical fiber and understand the network architectures along with its functionalities.

Modules	Teaching Hours
Module -1	
Optical fiber Communications: Historical development, The general system, Advantages of optical fiber communication, Optical fiber wave guides: Ray theory transmission, Modes in planar guide, Phase and group velocity, Cylindrical fiber: Modes, Step index fibers, Graded index fibers, Single mode fibers, Cutoff wave length, Mode field diameter, effective refractive index. Fiber Materials, Photonic crystal fibers. **RBT Levels: L1, L2**	08 Hours (Text 2)
Module -2	
Transmission characteristics of optical fiber: Attenuation, Material absorption losses, Linear scattering losses, Nonlinear scattering losses, Fiber bend loss, Dispersion, Chromatic dispersion, Intermodal dispersion: Multimode step index fiber. **Optical Fiber Connectors:** Fiber alignment and joint loss, Fiber splices: Fusion Splices, Mechanical splices, Fiber connectors: Cylindrical ferrule connectors, Duplex and Multiple fiber connectors, Fiber couplers: three and four port couplers, star couplers, Optical Isolators and Circulators**.** **RBT Levels: L1, L2**	08 Hours (Text2)
Module -3	
Optical sources: Light Emitting diodes: LED Structures, Light Source Materials, Quantum Efficiency and LED Power, Modulation Laser Diodes: Modes and Threshold conditions, Rate equation, External Quantum Efficiency, Resonant Frequencies. **Photo detectors**: Physical principles of Photodiodes, Photo detector noise, Detector response time. **Optical Receiver:** Optical Receiver Operation: Error sources, Front End Amplifiers, Receiver sensitivity, Quantum Limit. **RBT Levels: L1, L2**	08 Hours (Text1)
Module -4	
WDM Concepts and Components: Overview of WDM: Operational Principles of WDM, WDM standards, Mach-Zehnder Interferometer Multiplexers, Isolators and Circulators, Fiber grating filters, Dielectric Thin-Film Filters, Diffraction Gratings. **Optical amplifiers:** Basic application and Types, Semiconductor optical amplifiers, Erbium Doped Fiber Amplifiers, Raman Amplifiers, Wideband Optical Amplifiers. **RBT Levels: L1, L2**	08 Hours (Text1)

Module-5	
Optical Networks: Optical network evolution and concepts: Optical network in terminology, Optical network node and switching elements, Wavelength division multiplexed networks, Public telecommunication network overview. Optical network transmission modes, layers and protocols: Synchronous networks, Asynchronous transfer mode, OSI reference model, Optical transport network, Internet protocol, Wavelength routing networks: Routing and wavelength assignment, Optical switching networks: Optical circuit switched networks, packet switched networks, Multi-protocol Label Switching, Optical burst switching networks. **RBT Levels: L1, L2**	08 Hours (Text2)
Course outcomes: After studying this course, students will be able to: CO1-Realize basic elements in optical fibers, different modes and configurations. CO2-Analyze the transmission characteristics associated with dispersion and polarization techniques. CO3-Design optical sources and detectors with their use in optical communication system. CO4-Apply and analyze various optical amplifiers. CO5-Design optical communication systems and its networks.	
Text Books: 1. GerdKeiser, Optical Fiber Communication, 5thEdition, McGraw Hill Education (India) Private Limited, 2015. ISBN:1-25-900687-5. 2. John M Senior, Optical Fiber Communications, Principles and Practice, 3Edition, Pearson Education, 2010, ISBN:978-81-317-3266-3	
Reference Books: 1. Joseph C Palais, Fiber Optic Communication, Pearson Education, 2005, ISBN:0130085103.	

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

SMART AGRICULTURE

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC733	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to

- Focus on sustainable soil and land management for climate-smart agriculture.
- It provides technical knowledge and examines how wide-scale implementation of climate-smart soil and land management practices can enhance mitigation of climate change and adaptation to its impacts.
- Understanding concept of various sensors used for agriculture
- Understanding communication standards used to collect the data from sensor
- Learn how to Monitor the plant health

Modules	Teaching Hours
Module -1	
Soil Science: Nature and origin of soil; soil minerals, classification and composition, soil reaction, soil properties including structure, PH, surface tension and soil nutrient. **RBT Levels: L1, L2**	08 Hours
Module -2	
Sensors: Classification and characteristics, Smart sensors, Colorimetry based detection, MEMS Electrochemical Sensors, Dielectric Soil Moisture Sensors, ISFET, Weather sensors, Proximity Sensors, Signal conditioning and converters. **RBT Levels: L1, L2**	08 Hours
Module -3	
Actuators for tool automation: A.C.-D.C. Motors, Stepper motor, Solenoid actuators, Piezoelectric motors, Electric drives, Hydraulic and Pneumatic actuator **RBT Levels: L1, L2**	08 Hours
Module -4	
Telemetry: Wireless communication modules and topology, Zig-bee, Bluetooth, LORA, Zero power devices, Energy Harvesting technology **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
Plant health monitoring: Measurement of leaf health, chlorophyll detection, ripeness level, crop mapping, fertilizing, Drone technology for soil field analysis and assistive operations. **Technologies for farming:** Water quality monitoring, micro-irrigation system, solar pump and lighting system, Fencing, Android based automation, Agricultural Robots, Standards for Agriculture **RBT Levels: L1, L2 and L3**	08 Hours

Course outcomes: After studying this course, students will be able to:

CO1-Describe the Soil science , Plant anatomy and health monitoring

CO2-Apply Sensors and actuators for farming tools , sensor data acquisition and telemetry

CO3-Apply Advanced technologies for smart farming.

CO4-Developing prototypes for measuring soil quality

CO5-Developing prototype for weather monitoring system

Text Books:

1. The nature and properties of Soils: Eurasia Publishing House Pvt Ltd, New Delhi Brady, Nyle C. (1988).
2. Measurement Systems; Application and Design: Doeblin, D.O. McGraw Hill, 1984.

Reference Books:

1. Smart Agriculture: An Approach towards Better Agriculture Management : Editor: Prof. Dr. Aqeel-ur-Rehman, OMICS Group,
2. Practical MEMS: Design of microsystems, accelerometers, gyroscopes, RF MEMS,
3. optical MEMS, and microfluidic systems: Ville Kaajakari, Small Gear Publishing Principles of Industrial Instrumentation: Patranabis. D, Tata McGraw Hill, 1995 .
4. Mechatronics: Bolton, W. 2004.Pearson Education Asia
5. Photo-voltaic energy systems: Design and Installation: Buresch, Mathew. 1983McGraw-Hill Book Company, New York.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

CRYPTOGRAPHY AND NETWORK SECURITY

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC734	IA Marks	50
Number of Lecture Hours/Week	03	Exam Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS–03

Course objectives: Course Objectives: This course will enable students to:

- Know about security concerns in Email and Internet Protocol.
- Understand cyber security concepts.
- List the problems that can arise in cyber security.
- Discuss the various cyber security frame work.

Modules	Teaching Hours
Module-1	
Services, mechanisms and attacks, The OSI security architecture, A model for network security Symmetric Cipher Model. **RBT Levels: L1, L2**	08 Hours
Module-2	
Substitution Techniques, Transposition Techniques, Simplified DES, Data encryption standard (DES), The strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of Operation, Evaluation Criteria for Advanced Encryption Standard, The AES Cipher. **RBT Levels: L1, L2**	08 Hours
Module-3	
Principles of Public-Key Cryptasystems, The RSA algorithm, Key Management, Diffie - Hellman Key Exchange, Elliptic Curve Arithmetic, Authentication functions, Hash Functions. **RBT Levels: L1, L2 and L3**	08 Hours
Module-4	
Web Security Consideration, Security socket layer(SSL) and Transport layer security, Secure Electronic Transaction. **RBT Levels: L1, L2**	08 Hours
Module-5	
Viruses and Related Threats,Virus Countermeasures. Firewalls Design Principles, Trusted Systems. **RBT Levels: L1, L2**	08 Hours

Course outcomes: At the end of the course the students will be able to

CO1-Identify the security issues in the network and resolve it.

CO2-Analyse the vulnerabilities in any computing system and hence be able to design a security solution.

CO3-Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.

CO4-Demonstrate various network security applications, IPSec, Firewall, IDS, Web Security, Email Security and Malicious software etc., Internet and Web Programming After Successful completion of

CO5-Apply concept of cyber security framework in computer system administration

Text Book:

1. William Stallings, "Cryptography and Network Security Principles andPractice", Pearson Education Inc., 2nd and 6th Edition, 2014, ISBN: 978-93-325-1877-3.

Reference Books:

1. Cryptography and Network Security, Behrouz A. Forouzan, TMH, 2007.
2. Cryptography and Network Security, AtulKahate, TMH, 2003.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

ROBOTICS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18EC741	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Demonstrate an ability to apply spatial transformation to obtain forward kinematics equation of robot manipulators.
- Demonstrate an ability to perform kinematics and inverse kinematics analysis of robot systems.
- Demonstrate knowledge of robot controllers.
- To develop the student's knowledge in various robot structures and their workspace.

Modules	Teaching Hours
Module -1	
INTRODUCTION ROBOTICS: Robotics – Basic components – Classification – Performance characteristics – Actuators- Electric actuator- DC motor horse power calculation, magneto-astrictive hydraulic and pneumatic actuators. Sensors and vision systems: Different types of robot transducers and sensors – Tactile sensors – Proximity and range sensors - ultrasonic sensor-touch sensors-slip sensors-sensor calibration- vision systems – Image processing and analysis – image data reduction – segmentation feature extraction – Object recognition. **RBT Levels: L1, L2**	08 Hours
Module -2	
ROBOT CONTROL : Control of robot manipulators- state equations-constant solutions-linear feedback systems-single axis PID control- PD gravity control- computed torque control-variable structure control- Impedance control. **RBT Levels: L1, L2**	08 Hours
Module -3	
END EFFECTORS: End effectors and tools- types – Mechanical grippers – Vacuum cups – Magnetic grippers – Robot end effectors interface, work space analysis work envelope-workspace fixtures-pick and place operation- continuous path motion-interpolated motion-straight line motion. **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
ROBOT MOTION ANALYSIS : Robot motion analysis and control: Manipulator kinematics -forward and inverse kinematics **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
ROBOT APPLICATIONS : Industrial and non industrial robots, Robots for welding, painting and assembly – Remote Controlled robots – Robots for nuclear plants. **RBT Levels: L1, L2 and L3**	08 Hours

Course Outcomes: On completion of this course, the students will be able to

CO1-Understand and apply the significance, social impact and future prospect so frobotics and

automation in various engineering applications.
CO2-Identifyanddescribetheanatomyofroboticsystem and analyze robotic motions.
CO3-Summarize drives, end-effectors and identify DOF for different robot applications
CO4- Classify about sensors and various path planning techniques and design different robotic motions
CO5-Applyroboticsconcept to automate the monotonous and hazardous tasks and categorize various types of robots based on the design and application sinreal world scenarios.

Text Books:

1. Mikell P Grover et. al. "Industrial Robots: Technology, Programming and Applications", 2nd Edition, Tata McGraw Hill, 1980, ISBN 9781259006210.
2. Robert J. Schilling, "Fundamentals of Robotics-Analysis and Control", PHI Learning, 2009, ISBN 9788120310476

Reference Books:

1. K.S. Fu, Ralph Gonzalez, C.S.G. Lee, "Robotics: control, sensing, vision and Intelligence", 1st Edition, Tata Mcgraw-Hill, 2008, ISBN 9780070265103

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO2	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO3	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**
CO5	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

EMBEDDED SYSTEMS

[As per NEP, Outcome Based Education (OBE) and Choice Based Credit System (CBCS Scheme]

SEMESTER-VII

Course Code	18EC742	CIE Marks	50
Number of Lecture Hours/Week	3L	SEE Marks	50
Total Number of Lecture Hours	50	Exam Hours	03hrs

CREDITS– 03

Course Learning Objectives: This course will enable students to**:**

- Understand the basic hardware components and their selection method based of the characteristics and attributes of an embedded system.
- Understand typical Embedded system with its components.
- Develop the hardware software co-design and firmware design approaches.
- Explain the need of real time operating system for embedded system applications
- Understand the integration, testing of Embedded hardware and firmware and Embedded development Life cycle.

Module 1	**Teaching Hours**
Introduction To Embedded Systems: History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded system, characteristics of embedded systems and quality attributes of an embedded system, Embedded system-Application specific and Domain specific. **(Text 1:Chapter-1,chapter-3 and chapter-4)** **RBT Levels: L1, L2 and L3**	10Hrs
Module 2	
Typical Embedded System: Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, Onboard communication interfaces, External communication interfaces, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer. **(Text 1:Chapter-2)** **RBT Levels: L1, L2 and L3**	10 Hrs
Module 3	
Hardware Software Co-Design and Program Modeling: Fundamental issues in hardware software co-design and Computational models in Embedded design. **Embedded Firmware Design And Development:** Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development. **(Text1:Chapter 7.1,7.2, Chapter 9.1 and 9.2)** **RBT Levels: L1, L2 and L3**	10 Hrs
Module 4	
RTOS Based Embedded System Design: Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication-shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/	10 Hrs

Synchronization Issues, Task Synchronization Techniques and How to choose an RTOS.(**Text1:Chapter 10)** **RBT Levels: L1, L2 and L3**	
Module 5	
Integration and testing of Embedded hardware and firmware. **Embedded system Development Environment** – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques. **The Embedded product development life cycle (EDLC):** What is EDLC?,Why EDLC?, objectives of EDLC, Different phases of EDLC,EDLC approaches(Modeling the EDLC) **(Chapter 12,13,15)** **RBT Levels: L1, L2 and L3**	10 Hrs

Course outcomes: After studying this course, students will be able to:

CO-1- Compare between the general computing system and the embedded system, also identify the classification of embedded systems and its applications

CO-2-Apply the knowledge of Microcontrollers to understand the basics of typical embedded system and its design components.

CO-3-Analyze the typical embedded system components.

CO-4-Understand and analyze the Development of hardware /software co-design and firmware design approaches.

CO-5-Investigate the process of embedded product development life cycle.

Text Book:

1. Shibu K V, ―Introduction to Embedded Systems‖, Tata McGraw Hill Education Private Limited, 2nd Edition.

Reference Books:

1. James K. Peckol, "Embedded systems- A contemporary design tool", John Wiley, 2008, ISBN: 978-0- 471-72180-2.
2. Yifeng Zhu, “Embedded Systems with Arm Cortex-M Microcontrollers in Assembly Language and C”, 2nd E -Man Press LLC ©2015 ISBN:0982692633 9780982692639.
3. Embedded real time systems by K.V. K. K Prasad, Dreamtech publications, 2003.
4. Embedded Systems by Rajkamal, 2nd Edition, McGraw hill Publications, 2010

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2
CO1	3	2				-	-	-	-	-			3	
CO2	3	-					-	-	-	-			3	
CO3	3	3				-	-	-	-	-			3	
CO4	3	2		-		-	-	-	-	-			3	
CO5	3	2	2										3	

IOT & ITS APPLICATIONS

[As per, Out Come based Education (OBE),and Choice Based Credit System (CBCS) scheme]
SEMESTER-VII

Subject Code	18EC743	CIE Marks	50
Number Lecture Hour/Week	03	SEE Marks	50
Number of Lecture Hours	40	Exam Hours	03

CREDITS-03

Course Objectives: This course will enable students to:

- Introduce concept of IOT and its applications in today's scenario.
- Understand IOT content generation and transport through networks
- Understand the devices employed for IOT data acquisition and communication access technologies
- Introduce some use cases of IOT

MODULES	Teaching Hours
Module -1	
What is IOT: Genesis, Digitization, Impact, Connected Roadways, Buildings, Challenges **IOT Network Architecture and Design:** Drivers behind new network Architectures, Comparing IOT Architectures, M2M architecture, IOT world forum standard, IOT Reference Model, Simplified IOT Architecture. **RBT Levels: L1, L2 and L3**	08 Hours
Module -2	
IOT Network Architecture and Design: Core IOT Functional Stack, Layer1(Sensors and Actuators), Layer 2(Communications Sublayer), Access network sublayer, Gateways and backhaul sublayer, Network transport sublayer, IOT Network management. Layer 3(Applications and Analytics) – Analytics vs Control, Data vs Network Analytics IOT Data Management and Compute Stack **RBT Levels: L1, L2 and L3**	08 Hours
Module -3	
Engineering IOT Networks Things in IOT – Sensors, Actuators, MEMS and smart objects.Sensor networks, WSN, Communication protocols for WSN Communications Criteria, Range Frequency bands, power consumption, Topology, Constrained Devices, Constrained Node Networks, IOT Access Technologies, IEEE 802.15.4 Competitive Technologies–Overview only of IEEE 802.15.4g, 4e, IEEE 1901.2a Standard Alliances – LTE Cat0, Cat-M, NB-IOT **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
Engineering IOT Networks: IP as IOT network layer, Key Advantages, Adoption, Optimization, Constrained Nodes, Constrained Networks, IP versions, Optimizing IP for IOT. Application Protocols for IOT – Transport Layer, Application Transport layer, Background only of SCADA, Generic web based protocols, IOT Application Layer Data and Analytics for IOT – Introduction, Structured and Unstructured data, IOT Data Analytics overview and Challenges. **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
IOT in Industry (Three Use cases) IOT Strategy for Connected manufacturing, Architecture for Connected Factory	08 Hours

Utilities – Power utility, IT/OT divide, Grid blocks reference model, Reference Architecture, Primary substation grid block and automation. Smart and Connected cities –Strategy, Smart city network Architecture, Street layer, city layer, Data center layer, services layer, Smart city security architecture, Smart street lighting. **RBT Levels: L1, L2 and L3**	

Course outcomes: After studying this course, students will be able to:

CO1-Understand the basic concepts IOT Architecture and devices employed.

CO2-Analyze the sensor data generated and map it to IOT protocol stack for transport.

CO3-Analyze various access technologies.

CO4-Apply communications knowledge to facilitate transport of IOT data over various available communications media.

CO-5-Design a use case for a typical application in real life ranging from sensing devices to analyzing the data available on a server to perform tasks on the device.

Text Books:

1. CISCO, IOT Fundamentals – Networking Technologies, Protocols, Use Cases for IOT, Pearson Education; First edition (16 August 2017). ISBN-10: 9386873745, ISBN-13: 978-9386873743

Reference Books:

1. ArshdeepBahga and Vijay Madisetti, 'Internet of Things – A Hands onApproach', Orient Blackswan Private Limited - New Delhi; First edition (2015), ISBN-10: 8173719543, ISBN-13: 978-8173719547

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-

SIGNAL PROCESSING [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-VII			
Subject Code	18EC744	CIE Marks	50
Number of Lecture Hour/Week	03	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS-03			

Course Objectives: This course will enable students to:

- Understand, represent and classify continuous time and discrete time signal and systems, together with the representation of LTI systems.
- Ability to represent continuous time signals (both periodic and non periodic) in the time domain, s-domain and frequency domain.
- Understand the properties of analog filters, and have the ability to design Butterworth filters.
- Understand and apply sampling theorem and convert a signal from continuous time to discrete time or from discrete time to continuous time (without loss of information)
- Able to represent the discrete time signal in the frequency domain.

Modules	**Teaching Hours**
Module -1	
Signal definition, signal classification, system definition, system classification, for both continuous time and discrete time. Definition of LTI systems. **RBT Levels: L1, L2**	08 Hours
Module -2	
Introduction to Fourier transform, Fourier series, relating the Laplace transform to Fourier transform, frequency response of continuous time systems. **RBT Levels: L1, L2**	08 Hours
Module -3	
Frequency response of ideal analog filters, silent features of Butterworth filter design and implementation of analog Butterworth filters to meet given specifications. **RBT Levels: L1, L2 and L3**	08 Hours
Module -4	
Sampling theorem- statement and proof, converting the analog signal to a digital signal. Practical sampling. The discrete Fourier transform, Properties of DFT, comparing the frequency response of analog and digital systems.(FFT not included) **RBT Levels: L1, L2 and L3**	08 Hours
Module-5	
Definition of FIR and IIR filters. Frequency response of ideal digital filters transforming the analog Butterworth filter to the digital IIR filter using suitable mapping techniques, to meet given specifications. Design of FIR filters using the window techniques and frequency mapping technique to meet given specifications comparing the designed filter with the desired filter frequency response. **RBT Levels: L1, L2 and L3**	08 Hours

Course outcomes: After studying this course, students will be able to:

CO1-Understand and explain continuous time and discrete time signals and systems, in time and frequency domain.

CO2-Apply the concept of signals and systems to obtain the desired parameter/representation.

CO3-Analyze the given system and classify the systems /arrive at a suitable conclusion.

CO4-Design analog/digital filters to meet given specifications.

CO5-Design and implement the analog filter using components/suitable simulation tools, digital filters (FIR/IIR) using suitable simulation tools and record the input and output of the filter for the given audio signal.

Text Books:

1. 'Signal and Systems', by Simon Haykin and BarryVanVeen, Wiley.

Reference Books:

1.' Theory and Application of Digital Signal Processing', Rabiner and Gold

2. 'Signal and Systems', Schaum's outline series.

3. 'Digital Signal Processing', Schaum's outline series.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

COMPUTER NETWORKS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL75	CIE Marks	50
Number Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Choose suitable tools to model a network and understand the protocols at various OSI reference levels.
- Design a suitable network and simulate using a Network simulator tool.
- Simulate the networking concepts and protocols using C/C++ programming.
- Model the networks for different configurations and analyze the results.

Laboratory Experiments

PART-A:

Implement the following in C/C++

1. Write a program for a HLDC frame to perform the Bit stuffing.
2. Write a program for a HLDC frame to perform the Character stuffing.
3. Write a program for Distance vector algorithm to find suitable path for transmission.
4. Implement Dijkstra's algorithm to compute the shortest routing path.
5. For the given data, use CRC-CCITT polynomial to obtain CRC code. Verify the program for the cases
   a. Without error
   b. With error
6. Implementation of Stop and Wait Protocol.
7. Implementation of Sliding Window Protocol.
8. Write a program for congestion control using leaky bucket algorithm.

PART-B:

Simulation experiments using NS2/ NS3/ OPNET/ NCTUNS/ NetSim/QualNet or any other equivalent tool

1. Implement a point to point network with four nodes and duplex links between them. Analyze the network performance by setting the queue size and varying the bandwidth.
2. Implement a four node point to point network with links n0-n2, n1-n2 and n2-n3.
Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP/UDP.
3. Implement Ethernet LAN using n (6-10) nodes. Compare the throughput by changing the error rate and data rate.
4. Implement Ethernet LAN using n nodes and assign multiple traffic to the nodes and obtain congestion window for different sources/ destinations.
5. Implementation of Link state routing algorithm.

Course outcomes: On the completion of this laboratory course, the students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Book

1. Data Communications and Networking , Forouzan, 5th Edition, McGraw Hill, 2016 ISBN: 1-25-906475-3.
2. Computer Networks, James J Kurose, Keith W Ross, Pearson Education, 2013, ISBN: 0-273-76896

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

POWER ELECTRONICS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL761	CIE Marks	50
Number Lecture Hour/Week	02	SEE Marks	50
Number of Practical Hours	24	Exam Hours	03

CREDITS-01

Any five experiments from the below list **must be** simulated using the **spice-simulator**.

Course objectives: This laboratory course enables students to get practical experience in design, assembly, testing and evaluation of:

- SCR, DIAC Static characteristics
- Static characteristics of MOSFET and IGBT
- Controlled Rectifiers
- SCR Turn off &UJT firing circuit circuits.
- Voltage (Impulse) commutated choppers.
- AC voltage controllers & controlled rectifiers.
- Speed control of universal & stepper motor.

Experiments

1. Static characteristics of SCR and DIAC.
2. Static characteristics of MOSFET and IGBT
3. Controlled HWR and FWR using RC triggering circuit
4. SCR turn off using
    a. LC circuit
    b. ii) Auxiliary Commutation
5. UJT firing circuit for HWR and FWR circuits.
6. Generation of firing signals for thyristors/ trials using digital circuits/ microprocessor.
7. AC voltage controller using triac – diac combination.
8. Single phase Fully Controlled Bridge Converter with R and R-L loads.
9. Voltage (Impulse) commutated chopper both constant frequency and variable frequency operations.
10. Speed control of universal motor.
11. Speed control of stepper motor.

Course Outcomes: At the end of the course the student will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5: Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Text Books :

1. Mohammad H Rashid, Power Electronics, Circuits, Devices and Applications, 3rd/4th Edition, Pearson Education Inc, 2014, ISBN: 978-93-325-1844-5.

2. M.D Singh and K B Khanchandani, Power Electronics, 2nd Edition, Tata Mc- Graw Hill, 2009, ISBN: 0070583897.

Reference Books :

1. L. Umanand, Power Electronics, Essentials and Applications, John Wiley India Pvt. Ltd, 2009.

2. Dr. P. S. Bimbhra, “Power Electronics”, Khanna Publishers, Delhi, 2012.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

IMAGE AND VIDEO PROCESSING LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL762	CIE Marks	50
Number of Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- To introduce the concepts of image processing and basic analytical methods to be used in image processing.
- To familiarize students with image enhancement and restoration techniques.
- To familiarize students with image compression techniques.
- To introduce segmentation and morphological processing techniques.
- To familiarize students with edge detection.

Laboratory Experiments

Following Experiments to be done using MATLAB / SCILAB or equivalent:

1. Simulation and Display of an Image, Negative of an Image(Binary & Gray Scale) 2. Implementation of Relationships between Pixels.
3. Implementation of Transformations of an Image.
4.Contrast stretching of a low contrast image, Histogram, and Histogram Equalization
5. Display of bit planes of an Image.
6. Display of FFT(1-D & 2-D) of an image.
7. Computation of Mean, Standard Deviation, Correlation coefficient of the given Image.
8. Implementation of Image Smoothening Filters(Mean and Median filtering of an Image).
9. Implementation of image sharpening filters and Edge Detection using Gradient Filters.
10. Image Compression by DCT,DPCM, HUFFMAN coding.
11. Implementation of image restoring techniques.
12. Implementation of Image Intensity slicing technique for image enhancement.
13. Canny edge detection Algorithm.

Course outcomes: After studying this course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratoryinstruments/simulation tools toBuild, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Book :

1. Digital Image Processing – Gonzaleze and Woods, 3rdEd., Pearson.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	2	2	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	2	2	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	2	2	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	2	2	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	2	2	3	-

LOW POWER VLSI DESIGNLAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL763	CIE Marks	50
Number Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Understand the different parameters which are going to effect on power.
- Understand the different types of power dissipations.
- Learn different types of low power VLSI designs techniques.
- Learn the use of different EDA tools.
- Understand the design and realization of CMOS Digital circuits.

Laboratory Experiments

Following Experiments to be done using Mentor Graphics/Cadence Tool/ Spice Tool

Design, simulate and estimate the power dissipation for following circuits using

a) Conventional CMOS techniques.

1. Inverter
2. NAND and NOR
3. XOR/ XNOR

b) MTCMOS techniques.

4. D-Latch
5. NAND and NOR
6. XOR/ XNOR

c) DTCMOS techniques.

7. Inverter

d) compare static NOR and dynamic NOR

e) Glitch free AND circuit.

f) D-latch using clock gating.

Course outcomes: After studying this course, students will be able to:

CO-1Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Book

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", Kluwer Academic, 1998.
2. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000
3. A.P.Chandrasekaran and R.W.Broadersen, "Low power digital CMOS design", Kluwer Academic,1995. 3. A Bellamour and M I Elmasri, " Low power VLSI CMOS circuit design", Kluwer Academic,1995.
4. Jan M.Rabaey, MassoudPedram, "Low Power Design Methodologies" Kluwer Academic, 2010.
5. Sung-Mo Kang and Yusuf Leblebici "CMOS Digital Integrated Circuits"

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

PYTHON LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL764	CIE Marks	50
Number Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Write, test and debug simple python programs.
- Represent compound data using Python lists, tuples, and dictionaries.
- Read and write data from/to files in Python.
- Program using different libraries available.

Laboratory Experiments

Following experiments are to be done using Python

1. Write a program to demonstrate basic data type in python.
2. Write a program to demonstrate list and tuple in python.
3. Write a program to print date, time for today and now in python.
4. Write a program to display welcome to SHARNBASVA UNIVERSITY by using classes and objects.
5. Write a program to count frequency of characters in a given file.
6. Write a program to compute GCD and LCM of two numbers.
7. Write a program for checking the given number is even or odd.
8. Write a program to print the factorial of number.
9. Write a program to check whether a given number is palindrome or not.
10. Using a numpy module create an array and check the following:
    a. Type of array b. Axes of array c. Shape of array

d. Type of elements in array.

Course outcomes: After studying this course, students will be able to:

CO1 Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4-Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5-Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Books:

1. Mark Lutz, "Programming Python", O`Reilly, 4th Edition,2010
2. AlSweigart,"Automate the Boring Stuff with Python practical programming for total beginners",1stEdition, No Starch Press, 2015.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

DSP ALGORITHM AND ARCHITECTURE LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL771	CIE Marks	50
Number Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Use of instruction set of TMS320C54xx DSP processor to develop ALP for DSP algorithms.
- Learn ALP programming for TMS320C54xx
- Learn the use of Code Composer Studio (CCS) IDE software.
- Understand the design and realization of Digital FIR and IIR filter
- Understand the design and realization of Decimation and Interpolation filters

Laboratory Experiments

Following Experiments to be done using Code Composer Studio (CCS) IDE and DSP Processor

1. Write a TMS320C54XX assembly language program to add set of 5 numbers stored in an array labeled 'num'
2. Write a TMS320C54XX assembly language program to compute the dot product of two vectors x1 and x2 and store the product in the location y.
3. Write a TMS320C54XX assembly language program to compute the output y=mx1+C. consider that x1 and C are stored in data memory and m in the program memory. The result y should be stored in data memory. Assume suitable values of m, x1 and C.
4. Write a TMS320C54xx assembly language program to read 100 words from input port address INPORT and store them in the data memory at address 'Buffer'.
5. Write a TMS320C54xx assembly language program to implement y(n)=h0 X x(n)+h1 X x (n-1)+h2 X x(n-2).
6. Write the assembly language program to multiply two Q15 numbers Num1 and Num2 and obtain the result N3.
7. Write an assembly language program to implement IIR filter
8. Write an assembly language program to implement FIR filter
9. Write an assembly language program to implement Decimation filter
10. Write an assembly language program to implement interpolation filter

Course outcomes: After studying this course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4-Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Book

1. AndhePallavi, K.UmaRao, Digital Signal Processor Architecture, Programming and Applications, Pearson Education ISBN-978-81-317-6666-8.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

OPTICAL COMMUNICATION AND NETWORKING LAB

[As per Choice Based Credit System (CBCS) Scheme]
SEMESTER-VII

Subject Code	18ECL772	CIE Marks	50
Number of Lecture Hour/Week	02	SEE Marks	50
Total Number of Lecture Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Performance comparison of optical link using LED and LASER for specific distance.
- Performance Evaluation of Point to point optical link at different distances and for different transmitter powers.
- Performance comparison of optical link receivers and for different fibers.
- Impact of optical amplifiers on link performance.

Experiments

1. To study the VI & PI characteristics of the FO-LED.
2. To study the VI &PI characteristics of the Laser Diode.
3. Real time Temperature sensor data transfer using fiber optic
4. To study the transfer Characteristics between the DETECTOR and SOURCE with simplex cable.
5. To study the VOICE communication over the fiber optic cable.
6. To study Voice communication using CODEC.
7. To study PWM signal communication using fiber optic.
8. To study digital data transmission with LED and switch.
9. To study the RS232 interface for PC communication.
10. Measurement of Bit Error Rate
11. Study of free space communication system
12. Pulse Broadening in Fibre Optic Communication

Course outcomes: After studying this course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Books:

1. Gerd Keiser, “Optical Fiber Communication” McGraw – Hill International, 4th Edition 2010.
2. John M Senior, “Optical Fiber Communication” 2nd Edition, Pearson Education, 2007.
3. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 3rd Edition, 2008.
4. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

SMART AGRICULTURE LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL773	CIE Marks	50
Number Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Know the applications of various sensors used in agriculture
- Learn the various crops cultivated in the local area and crop diseases
- Implement the prototype for soil nutrients detection system
- Implement the prototype for measurement of soil PH value.
- Implement a prototype for IoT based weather reporting system

Laboratory Experiments

1. Study of various sensors used in the modern agriculture: Temperature and humidity sensor, Soil moisture sensor, NPK sensor, RFID, PIR sensor, LDR etc.
2. Study of major field crops cultivated in the Kalaburagi district and crop diseases.
3. Measure Soil Nutrient using Arduino & Soil NPK Sensor.
4. Monitoring the soil moisture using the Arduino microcontroller
5. Determination of PH value of a soil using Arduino microcontroller
6. IoT based Temperature and humidity measurement system for green houses
7. Monitoring of light intensity in green house using Arduino microcontroller
8. REID sensing technology based smart agriculture system

Course outcomes: After studying this course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

References

1. R.Sindhuja and B.Krithiga, Soil Nutrient Identification Using Arduino, Asian Journal of Applied Science and Technology (AJAST) Volume 1, Issue 4, Pages 40-42, May 2017.
2. https://how2electronics.com/measure-soil-nutrient-using-arduino-soil-npk-sensor/
3. Beza Negash Getu; Hussain A. Attia, Automatic control of agricultural pumps based on soil moisture sensing, AFRICON 2015, DOI: 10.1109/AFRCON.2015.7332052
4. BharatiMasram, Harsh Mehta, HarshalBokade, Hritik Jain, Shrawani Wankhede, Soil Determination using PH – Nutrient Relatively, International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-9 Issue-4, April 2020.
5. https://www.engineersgarage.com/green-house-monitoring-using-arduino/
6. Devanath S, Hemanth Kumar A.R, RachitaShettar, Design and Implementation of IOT Based Greenhouse Environment Monitoring and Controlling System Using Arduino Platform, International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 09, Sep 2019.
7. RakibaRayhana, Gaozhi Xiao, and Zheng Liu, RFID Sensing Technologies for Smart Agriculture, Article in IEEE Instrumentation and Measurement Magazine · May 2021 DOI:

10.1109/MIM.2021.9436094.
8. "(PDF) Smart Plant Monitoring System." [Online]. Available: https://www.researchgate.net/publication/283123947_Smart_Plant_Monitoring_System. [Accessed: 04-Apr-2019.
9. S. A. H. Z. Abidin and S. Noorjannah Ibrahim, "Web-based monitoring of an automated fertigation system: An IoT application," 2015 IEEE 12th Malaysia Int. Conf. Commun. MICC 2015, no. Micc, pp. 1–5, 2016.
10. O. M. E. Ahmed, A. A. Osman, and S. D. Awadalkarim, "A Design of an Automated Fertigation System Using IoT," 2018 Int. Conf. Comput. Control. Electr. Electron. Eng. ICCCEEE 2018, pp. 1–5, 2018.
11. S. Aparajitha, R. Swathija, K. Haritha, and S. R. S. S, "Smart Irrigation System Using Bluetooth Module and arduino," no. 2, pp. 544–549, 2018.
12. R. Dagar, S. Som, and S. K. Khatri, "Smart Farming - IoT in Agriculture," 2018 Int. Conf. Inven. Res. Comput. Appl., no. Icirca, pp. 1052–1056, 2018.
13. C. J. T. Dinio et al., "Automated Water Source Scheduling System with Flow Control System," 2018 IEEE 10th International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM), Baguio City, Philippines, 2018, pp. 1-5,2018. doi: https://doi.org/10.1109/HNICEM.2018.8666253,
14. D. Dumic, "Automatic Plant Watering System via Soil Moisture Sensing by means of Suitable Electronics and its Applications for Anthropological and Medical Purposes NerminDuzic and DaliborDumic Abstract Conclusion and Future," vol.v41, July 2018, pp.1–4, 2017.
15. C. Joseph, I. Thirunavuakkarasu, A. Bhaskar, and A. Penujuru, "Automated fertigation system for efficient utilization of fertilizer and water," 2017 9th Int. Conf. Inf. Technol. Electr. Eng. ICITEE 2017, Vol. 2018- Janua, pp.1–6, 2018.
16. N. Kaewmard and S. Saiyod, "Sensor data collection and irrigation control on vegetable crop using smart phone and wireless sensor networks for smart farm," ICWiSe 2014 - 2014 IEEE Conf. Wirel. Sensors, pp. 106–112, 2014.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

CRYPTOGRAPHY & NETWORK SECURITYLAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18ECL774	CIE Marks	50
Number of Lab practice Hour/Week	02	SEE Marks	50
Total Number of Hours	24	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Learn to implement Substitution & Transposition Techniques.
- Learn to implement the algorithms DES,RSA,MD5,SHA-1
- Learn to use network security tools like Gnu PG, KF sensor, Net Strumbler.

Laboratory Experiments

1. Implement the following substitution & transposition techniques concepts:
   a) Caesarcipher
   b) Playfaircipher
   c) Hillcipher
   d) Vigenerecipher
   e) Railfence–row & column transformation.
2. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1

3. Implement the Signature Scheme-Digital Signature Standard 4. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
5. Setup a honey pot and monitor the honey poton network (KF Sensor)
6. Installation of root kits and study about the variety of options.
7. Perform wireless audit on an access point or a router and decrypt WEP and WPA. (NetStumbler).
8. Demonstrate intrusion detection system (ids)using any tool (snort or any other s/w)

Course outcomes: After studying this course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.
CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.
CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.
CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.
CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

Reference Books:

1. Cryptography and Network Security, Behrouz A. Forouzan, TMH, 2007.
2. Cryptography and Network Security, AtulKahate, TMH, 2003.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

PROJECT-VII [As per, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme] SEMESTER-VII			
Subject Code	18PRJ78	CIE Marks	50
Number Lecture Hour/Week	2P	SEE Marks	50
Total Number of Hours	20	Exam Hours	03
CREDITS-01			

Course Objectives: Students will be taught to:

- Get exposure about the electronics hardware and various software tools.
- Design the working model of the open ended problem.
- Understand concepts of Packaging.
- Understand the latest technology trends in the PCB design.
- Prepare technical documentation of the project.

Students Will Be Given An Open Ended Problem Of The Society And Asked To Solve By Designing And Implementing The System In Team.

Course outcomes: After studying this course, students will be able to:

CO1- Apply the knowledge of electronics hardware and software components to solve the real time problems of the society.

CO2- Analyze the various existing solutions available to solve the real time problem and propose the best solution.

CO3- Design and implement the system to solve the real time problem of the society.

CO4-Conduct investigations on the output and prepare the technical documentation of the designed system in a team.

CO5.- Use the modern tool available like advanced hardware and software tools.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	**3**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**3**	3	**-**	**3**	**-**	**3**	**-**
CO2	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	-	**-**	**3**	**-**	**3**	**-**
CO3	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**-**	**3**	**3**	**2**	**3**	**-**	**3**	**-**
CO4	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**

INDUSTRIAL PSYCHOLOGY AND ORGANISATIONAL BEHAVIOUR

[As per, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme]

SEMESTER-VII

Subject Code	18HSM79	CIE Marks	50
Number of Lecture Hour/Week	01	SEE Marks	50
Total Number of Lecture Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Relating human psychology to science
- Understand the human psychology
- Understand the nature of organization and organization models
- Understand the human social communication
- Understand the leadership qualities

Modules	Teaching Hours
Module -1	
Introduction to I/O psychology: Major fields of I/O psychology, brief history of I/O psychology, employment of I/O psychology, ethics in I/O psychology. (Chapter-1) **RBT Levels: L1, L2**	03 Hours
Module -2	
Organisational communication: Types of organizational communication, interpersonal communication, improving employee communication skills. (Chapter-11) **RBT Levels: L1, L2**	03 Hours
Module -3	
Leadership: Introduction, personal characteristics associated with leadership, interaction between the leadership and the situation specific leader skills, leadership where we are today. (Chapter-12) **RBT Levels: L1, L2**	05 Hours
Module -4	
Group behaviour- teams and conflicts, Group dynamics, factors affecting group performance, individual versus group performance, group conflicts. (Chapter-13) **RBT Levels: L1, L2**	05 Hours
Module-5	
Stress management: Dealing with the demands of life and work, stress defined, predisposition to stress, sources of stress, consequences of stress, stress reduction intervention related to life /work issues. (Chapter-15) **RBT Levels: L1, L2**	04 Hours

Course Outcomes: At the end of this course, students would be able to

CO1-Comprehend the knowledge and concepts of human psychology
CO2-know the importance of psychology
CO3-have insight into individual and group behavior
CO3-deal with people in better way
CO-4-motivate groups and build groups

Text Book: MichaelG.Aamodt, Industrial/Organizational Psychology: An Applied Approach, 6th Edition, Wadsworth Cengage Learning, ISBN: 978-0-495-60106-7.

Reference Books:

1. Blum M.L. Naylor J.C., Horper& Row, Industrial Psychology, CBS Publisher, 1968
2. Luthans, Organizational Behaviour, McGraw Hill, International, 1997
3. Morgan C.t.,KingR.A.,JohnRweisz&John Schoples, Introduction to Psychology, McHraw Hill, 1966
4. SchermerhornJ.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	3	2	2	2	3	2	3	-	-	3
CO2	-	-	-	-	-	3	2	3	3	3	2	3	-	-	3
CO3	-	-	-	-	-	2	2	3	3	3	3	3	-	-	3
CO4	-	-	-	-	-	3	2	3	3	3	3	3	-	-	3
CO5	-	-	-	-	-	3	3	3	3	3	3	3	-	-	3

RESEARCH PROJECT/FIELD PROJECT-VIII [As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme] SEMESTER-VIII			
Subject Code	18PRJ81	CIE Marks	50
Total No. of implementation weeks	4	SEE Marks	50
		Exam Hours	03
CREDITS-08			

Course Objectives: Students will be Guided to:

- Understanding about the Project and its components.
- Introduction of the project selected.
- Detailed literature survey of the project and understand concepts of problem identification.
- Design and development of Proposed Methodology.
- Implementation of the proposed methodology and thesis document preparation.

Students Will Be Given An Open Ended Problem Of The Society And Asked To Solve By Designing And Implementing The System Individually

Course outcomes: After studying this course, students will be able to:

CO1- Identify and define an electronics-related problem by studying existing systems and setting clear objectives for the project.

CO2- Design and develop a methodology using appropriate circuit design tools, simulations, and techniques to address the identified problem.

CO3 Design and develop a methodology using appropriate circuit design tools, simulations, and techniques to address the identified problem.

CO4- Document the project work through detailed technical reports, including circuit diagrams, methodologies, results, and analysis.

CO5-Present the project findings effectively to an audience using clear explanations, visuals, and demonstrations of circuits or prototypes.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**3**	3	**-**	**3**	**-**	**3**	**-**
CO2	**3**	**3**	**3**	**3**	**3**	**1**	**2**	**3**	**3**	**3**	**2**	**3**	**-**	**3**	**-**
CO3	**3**	**3**	**3**	**-**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**
CO4	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**
CO5	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**

INTERNSHIP [As per Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme] SEMESTER-VIII			
Subject Code	18ECI82	CIE Marks	50
Total No. of implementation/training weeks	12	SEE Marks	50
		Exam Hours	03

CREDITS-13

Course Objectives: Students will be taught to:

- Learn to appreciate work and its function in the economy.
- Develop work habits and attitudes necessary for job success.
- Develop communication, interpersonal and other critical skills in the job interview process.
- Build a record of work experience.
- Acquire employment contacts leading directly to a full-time job following graduation from college.

Students has to carry out the internship of 12 weeks in the industry.

Course outcomes: After studying this course, students will be able to:

CO1- Apply the knowledge of electronics hardware and software components to solve the real time problems of the society.

CO2- Analyze the various existing solutions available to solve the real time problem and propose the best solution.

CO3- Design and implement the system to solve the real time problem of the society.

CO4- Conduct investigations on the output and prepare the technical documentation of the designed system in a team.

CO5- Use the modern tool available like advanced hardware and software tools.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	-	-	-	3	3	2	-	-	-	-	3	-	3	-
CO2	2	3	2	2	-	2	2	-	-	-	-	3	-	3	-
CO3	2	2	3	2	-	2	2	-	-	-	-	3	-	3	-
CO4	-	-	-	-	-	-	-	2	3	3	2	3	-	3	-
CO5	-	-	-	-	3	-	-	2	-	-	-	3	-	3	-