SCHEME & SYLLABUS OF UNDERGRADUATE DEGREE COURSE

Electronics & Communication Engineering

VII & VIII Semester

Effective for the students admitted in year 2021-22 and onwards.

B. Tech. Electronics & Communication Engineering
4th Year – VII Semester

THEORY											
S.No.	Category	Course		Contact hrs/ week			Marks				Cr
		Code	Title	L	T	P	Exam Hrs.	IA	ETE	Total	
1	DC	7EC4-01	VLSI technology	3	0	0	3	30	70	100	3
2	DE	Department elective: any one		2	0	0	2	30	70	100	2
		7EC5-11	Semiconductor microwave devices and applications								
		7EC5-12	Embedded networking								
		7EC5-13	DSP architectures for VLSI applications								
3	UE	University Elective		3	0	0	3	30	70	100	3
		Sub-Total		8	0	0	-	90	210	300	8
PRACTICAL & SESSIONAL											
4	DC	7EC4-20	Automation and Simulation lab	0	0	2	2	60	40	100	1
5	UI	7EC7-30	Industrial Training (45 Days)	0	0	6	-	60	40	100	3
6		7EC7-50	Minor Project	0	0	4	3	60	40	100	2
7	CCA	7EC8-00	Co-Curricular Activities	0	0	2	-	60	40	100	1
		Sub- Total		0	0	14	-	240	160	400	7
		TOTAL OF VII SEMESTER		08	0	14	-	330	370	700	15

L: Lecture, **T**: Tutorial, **P**: Practical, **C**r: Credits
ETE: End Term Exam, **IA**: Internal Assessment

B. Tech. Electronics & Communication Engineering
4th Year – VIII Semester

THEORY												
S.No.	Category	Course		Contact hrs/ week			Marks				Cr
		Code	Title	L	T	P	Exam Hrs.	IA	ETE	Total	
1	UE	University Elective: Any One		3	0	0	3	30	70	100	3
		Sub-Total		3	0	0		30	70	100	3
PRACTICAL & SESSIONAL											
2	UI	8EC7-40	Seminar	0	0	4		60	40	100	2
3		8EC7-50	Major Project	0	0	8		60	40	100	4
4	CCA	8EC8-00	Co-Curricular Activities	0	0	4	-	60	40	100	2
		Sub- Total		0	0	16		180	120	300	8
		TOTAL OF VIII SEMESTER		03	0	16		210	190	400	11

L: Lecture, **T**: Tutorial, **P**: Practical, **C**r: Credits
ETE: End Term Exam, **IA**: Internal Assessment

SYLLABUS
4th Year- VII Semester: B.Tech. (Electronics & Communication Engineering**)**

7EC4-01: VLSI technology

Credits: 03 **Max. Marks: 100 (IA:30, ETE:70)**
3L:0T:0P **End Term Exam: 3 Hours**

Course Objectives To enable the students to understand the various VLSI fabrication techniques
Course Outcomes: Upon successful completion of the course, students will be able to
CO-1: Understand the fundamentals of VLSI Technology.
CO-2.Understand about the trends in semiconductor technology, and how it impacts scaling and its effect on device density, speed and power consumption.
CO-3: Able to learn Layout, Stick diagrams, Fabrication steps.
CO-4: To impart knowledge about the miniaturization of Electronic Systems..

Se. No.	Contents	Hours
1.	**INTRODUCTION:** Objective, Scope and Outcome of the course	1
2.	**Introduction to VLSI Technology:** Device scaling and Moore's law, basic device fabrication methods, alloy junction and planar process, Czochralski and Bridgman techniques, Characterization methods and wafer specifications, defects in Si and GaAs.	8
3.	**Oxidation:** Surface passivation using oxidation. Deal-Grove model, oxide characterization, types of oxidation and their kinematics, thin oxide growth models, stacking faults, oxidation systems.	9
4.	**Diffusion and Ion-Implantation:** Solutions of diffusion equation, diffusion systems, ion implantation technology, ion implant distributions, implantation damage and annealing, transient enhanced diffusion and rapid thermal processing	8
5.	**Epitaxy and Thin Film Deposition:** Thermodynamics of vapor phase growth, MOCVD, MBE, CVD, reaction rate and mass transport limited depositions, APCVD/LPVD, equipments and applications of CVD, PECVD, and PVD.	8
6.	**Etching and Lithography:** Wet etching, selectivity, isotropy and etch bias, common wet etchants, orientation dependent etching effects; Introduction to plasma technology. Optical lithography contact/proximity and projection printing, resolution and depth of focus, resist processing methods and resolution enhancement, X-ray lithography.Materlization and Interconnect .	6
	Total	40

Suggested Books:

1. Plummer, J.D., Deal, M.D. and Griffin, P.B., "Silicon VLSI Technology: Fundamentals, Practice and Modeling", 3rd Ed., Prentice-Hall., 2000.
2. Sze, S.M., "VLSI Technology", 4th Ed., Tata McGraw Hill., 1999.
3. Chang, C.Y. and Sze, S.M., "VLSI Technology", McGraw-Hill., 1996
4. Gandhi, S. K., "VLSI Fabrication Principles: Silicon and Gallium Arsenide", John Wiley and Sons, 2003.
5. Campbell, S.A., "The Science and Engineering of Microelectronic Fabrication", 4th Ed., Oxford University Press., 1996

SYLLABUS
4th Year- VII Semester: B.Tech. (Electronics & Communication Engineering**)**
7EC5-11: Semiconductor microwave devices and applications
(Department Elective)

Credits: 02 **Max. Marks: 100 (IA:30, ETE:70)**
2L:0T:0P **End Term Exam: 3 Hours**

Course Objectives: To study fabrication process **and associated** mathematical models of semiconductor junctions for circuits and systems

Course Outcomes: Upon successful completion of the course, students will be able to
CO-1: Understand the principles and characteristics of different types of semiconductor devices
CO-2: Understand the fabrication process of semiconductor devices
CO-3: Utilize the mathematical models of semiconductor junctions for circuits and systems and identify the mathematical models of MOS transistors for circuits and systems.
CO-4: Identify microwave devices for several applications.

Se. No.	Contents	Hours
1.	**INTRODUCTION:** Objective, Scope and Outcome of the course	1
2.	Transient and ac behaviour of p-n junctions, effect of doping profile on the capacitance of p-n junctions, noise in p-n junctions, high-frequency equivalent circuit, varactor diode and its applications; Schottky effect, Schottky barrier diode and its applications; Heterojunctions	6
3.	Tunneling process in p-n junction and MIS tunnel diodes, V-I characteristics and device performance, backward diode. Impact ionization, IMPATT and other related diodes, small signal analysis of IMPATT diodes	6
4.	Two-valley model of compound semiconductors, Vd-E characteristics, Gunn effect, modes of operation, small-signal analysis of Gunn diode, power frequency limit, Construction and operation of microwave PIN diodes, equivalent circuit, PIN diode switches, limiters and modulators.	6
5.	High frequency limitations of BJT, microwave bipolar transistors, heterojunction bipolar transistors; Operating characteristics of MISFETs and MESFETs, short-channel effects, high electron mobility transistor.	6
6.	Characteristics and design of microstrips, slotlines and coplanar Waveguides, Design considerations for microwave and millimeter wave amplifiers and oscillators, circuit realization, noise performance	5
	Total	**30**

Suggested Books:

1. Sarrafzadeh, M. and Wong, C.K., "An Introduction to VLSI Physical Design", 4th Ed., McGraw-Hill., 1996
2. Wolf, W., "Modern VLSI Design System on Silicon", 2nd Ed., Pearson Education., 2000
3. Sait, S.M. and Youssef, H "VLSI Physical Design Automation: Theory and practice", World scientific., 1999
4. Dreschler, R., "Evolutionary Algorithm for VLSI CAD", 3rd Ed., Springer, 2002
5. Sherwani, N.A., "Algorithm for VLSI Physical Design Automation", 2nd ED., Kluwer., 1999
6. Lim, S.K., "Practical problems in VLSI physical Design Automation", Springer., 2008

SYLLABUS

4th Year- VII Semester: B.Tech. (Electronics & Communication Engineering**)**

7EC5-12: Embedded networking

(Department Elective)

Credits: 02 **Max. Marks: 100 (IA:30, ETE:70)**

2L:0T:0P **End Term Exam: 3 Hours**

Course Objectives: This course is intended for designers who want to use Ethernet, Can Protocols USB and other networking concepts..

Course Outcomes: Upon successful completion of the course, students will be able to

CO1: Ability to work with CAN bus

CO2: Ability to understand and implement Firewalls and Protocols

CO3: Identify network types and topologies.

CO4: Explain Real Time Operating System (RTOS).

CO5: Explain Advanced Wireless Networks

Se. No.	Contents	Hours
1.	**INTRODUCTION:** Objective, Scope and Outcome of the course	1
2.	**Embedded Communication Protocols:** Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols - RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Fire wire	7
3.	**USB and CAN Bus:** USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs –CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN	7
4.	**Ethernet Basics:** Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components – Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol	7
5.	**Embedded Ethernet:** Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure. UNIT –V Wireless Embedded Networking: Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization - Energy efficient MAC protocols –SMAC – Energy efficient and robust routing – Data Centric routing	8
	Total	30

Suggested Readings:

1. Embedded Systems Design: A Unified Hardware/Software Introduction - Frank Vahid, Tony Givargis, John & Wiley Publications, 2002 2.
2. Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port - Jan Axelson, Penram Publications, 1996.
3. Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series - Dogan Ibrahim, Elsevier 2008.
4. Embedded Ethernet and Internet Complete - Jan Axelson, Penram publications, 2003. 3. Networking Wireless Sensors –Bhaskar Krishnamachari, Cambridge press 2005.

SYLLABUS
4th Year- VII Semester: B.Tech. (Electronics & Communication Engineering**)**
7EC5-13: DSP architectures for VLSI applications
(Department Elective)

Credits: 02 **Max. Marks: 100 (IA:30, ETE:70)**
2L:0T:0P **End Term Exam: 3 Hours**

Course Objectives: To impart knowledge of theory and applications of power electronics systems
Course Outcomes: Upon successful completion of the course, students will be able to
CO-1: To introduce architectural features of programmable DSP Processors wth Examples of TMS320C67XX Processor for better understanding
CO-2: To understand implementation of basic dsp algorithms & interfacing techniques to memory and I/O devices
CO-3: To develop the programming knowledge using Instruction set of DSP Processors.
CO-4: To understand DSP development Tools

Sr. No.	Contents	Hours
1.	**INTRODUCTION:** Objective, Scope and Outcome of the course	
2.	**Architectures for programmable digital signal processors** : Introduction, Basic Architectural Features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Features for External Interfacing. Commercial digital Signal processing Devices, TMS320C67XX Processor, Data Addressing Modes - Memory Space - Program Control - Detail Study of Instructions and Programming - On-Chip peripherals - Interrupts - Pipeline Operation	7
3.	**IMPLEMENTATION OF BASIC DSP ALGORITHMS** : Introduction, The Q - notation, FIR Filters, IIR Filters, Interpolation and Decimation Filters (one example in each case) -Implementation Of FFT Algorithms: Introduction, An FFT Algorithm for DFT Computation, Overflow and Scaling, Bit-Reversed Index Generation & Implementation on the TMS32OC67XX. Memory Space Organization, External Bus Interfacing Signals, Memory Interface, Parallel I/O Interface, Programmed I/O, Interrupts and I / O Direct Memory Access (DMA), Synchronous Serial Interface.	8
4.	**General Design Issues**, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.	5
5.	**DSP Development Tools**, The DSP System Design Kit (DSK), The Assembler and the Assembly Source File, The Linker and Memory Allocation, The Code Composer Studio, Building blocks involved in a DSP Based Bio-telemetry Receiver and Image Processing System.	5
	Total	**30**

Suggested Readings:

1. B. Venkataramani and M. Bhaskar, “Digital Signal Processors, Architecture, Programming and Applications”, 2nd Edition, TMH, 2004.
2. Ifeachor& Jervis, “Digital Signal Processing- A practical approach”, 4th edition, Pearson Education, 2004.
3. J.G.Proakis, “Algorithms for Statistical Signal Processing”, 4th edition, Pearson, 2002.

4. Peter Pirsch, "Architectures for Digital Signal Processing", 2nd edition, John Weily, 2007
5. Avtar Singh and S. Srinivasan, "Digital Signal Processing", 4 th edition, Thomson Publications, 2004

SYLLABUS
4th Year- VII Semester: B.Tech. (Electronics & Communication Engineering**)**

7EI4-20: Automation and Simulation Lab
(Department Elective)

Credits: 01 **Max. Marks: 100 (IA:60, ETE:40)**
0L:0T:2P **End Term Exam: 3 Hours**

Course Objectives: To impart knowledge of instruments used for industrial automation

Course Outcomes: Upon successful completion of the course, students will be able to
CO-1: Understand programming of Programmable Logic Controllers
CO-2: Design of control systems using DCS.
CO-3: Design of control system using SCADA
CO-4: Understand the concept of PID tuning

Se. No.	**Name of Experiments** 6 experiments out of first ten and 4 experiments based on 11th
1.	Study of hardware and software used in Programmable Logic Controllers (PLC).
2.	Ladder diagram implementation using combinations of different timers. (Any application)
3.	Ladder diagram implementation using combinations of different timers and counters. (Any application)
4.	Developing and implementing any PID control loop in PLC system.
5.	Developing and implementing any closed control loop using SCADA system.
6.	Developing and implementing any closed control loop using DCS system
7.	Study hardware and software platforms for DCS
8.	Logic implementation for traffic Control Application
9.	Logic implementation for Bottle Filling Application
10.	PID Controller Tuning: Tune PID controller for heat exchanger using DCS
11	Custom design and simulation of different higher level analog and digital circuits using advance EDA tools like Tanner Spice S-edit and L- edit.