# Autonomous Programme Structure of Final Year B. Tech. (Electronics & Telecommunication) Academic Year: 2019-2020 Onwards

## Final Year B. Tech. Electronics and Telecommunication Engineering Semester - 1

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<td>Hours/Week</td>
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<td>In Semester</td>
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<td>VLSI Design</td>
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<td>VLSI Design Lab</td>
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**OE 4101: Open Elective I**

1. Television and Audio Engineering
2. Electronic Product Design
3. Digital Video Processing

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**DEAN ACADEMICS**  
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EC 4101 VLSI DESIGN

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. To design combinational, sequential circuits using Verilog HDL
2. To describe behavioral and RTL modeling of digital circuits
3. To explain and compare Programmable Logic Devices
4. To introduce the concepts and techniques of digital CMOS design

Course Outcomes:
After completion of the course, students will be able to
1. Explain the fundamentals of Verilog HDL
2. Design digital systems using Verilog
3. Analyze the architecture of PLD's according to technology and application change
4. Analyze the impact of non ideal effects on MOSFETs
5. Design digital circuits using CMOS transistors

Unit I: Introduction to Verilog HDL (08)

Unit II: Verilog Constructs and Modeling Styles (08)
Continuous Assignments, Procedural Assignments, Operators in Verilog, Conditional Statements, Loop Statements, Task and Functions, Gate-Level Modeling, Gate Type, Gate Delay, Dataflow Modeling, Delays, Expressions, Operators, and Operands, Operator Types, Behavioral Modeling, Structured Procedures, Timing Controls, Sequential and Parallel Blocks, Generate Blocks.

Unit III: Modeling of Combinational and Sequential Logic (12)
Adder, ALU, Multiplexer, De-multiplexer, Decoders, Comparator, Parity Generator and Checker, Flip-flops, Counters, Shift registers, Memory, modeling of FSM.

Unit IV: Programmable Logic Devices (06)
CPLD Architecture, features, specifications and applications. FPGA Architecture, features, specifications and applications.

Unit V: Digital CMOS Circuits (08)
CMOS, MOSFET parasitics, Technology scaling, Channel length modulation, Body Effect, Latch Up effect, Hot electron effect, Velocity saturation, Power dissipations, CMOS Inverter, CMOS combinational logic design, Transmission gates, Layout Design Rules.
Text Books:

Reference Books:

Online Recourses:
1. https://onlinecourses.nptel.ac.in/noc18_cs48/
EC 4102 COMPUTER NETWORKS AND SECURITY

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. Introduce network models and functions of each layer
2. Describe basic concepts of the threats for data and network
3. Introduce the fundamentals of cryptography and network security

Course Outcomes:
After completion of the course, students will be able to
1. Describe and analyze the functions of layers of OSI model and compare with the TCP/IP model
2. Explain and evaluate networking protocols, inter-networking devices and their functions
3. Explain the Quality of Service parameters for Internet applications
4. Describe the threats to the data and network and the techniques to resolve them

Unit I: Physical layer and Data Link layer
Networks models: OSI model, Layers in OSI model, TCP/IP protocol suite, Addressing, Data Transfer: DSL, Cable TV Networks, Data link control: Framing, Flow Control (Stop and Wait and Sliding Window Protocols), error control (CRC), HDLC and PPP, Multiple access: Random access (Aloha, CSMA, CSMA/CD) protocols.

Unit II: Wired and Wireless LANS
Wired LANS: Ethernet (IEEE 802.3), Ethernet standards (Ethernet, Fast Ethernet and Gigabit Ethernet) Wireless LANS: IEEE 802.11, Bluetooth IEEE 802.15, Connecting LANS, Connecting devices, Network emulation demonstration with NIC card and MAC address on Ubuntu platform.

Unit III: Network Layer
Network layer functions, Logical addressing: IPv4, IPv6 addresses, IPv4 to IPv6 conversion unicast routing algorithms with the protocols (RIP, OSPF and BGP), Network layer Protocols: ARP, RARP, ICMP and IGMP, demonstration of Ipconfig/all, ping, tracert commands and analysis of IPv4, IPv6, ARP and ICMP protocols using wireshark.

Unit IV: Transport layer and Application Layer
Process to Process Communication, addressing, Transport layer protocols: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Stream Control Transport Protocol (SCTP), Quality of services (QoS): data flow characteristics, traffic shaping, Internet Applications and protocols, Domain Name System (DNS), E-mail, FTP, HTTP, demonstration of TCP, UDP, HTTP and DNS using wireshark.

Unit V: Data Security
Unit VI: Network Security


Text Books:

Reference Books:

Online Recourses:
1. https://nptel.ac.in/courses/106105081/
2. https://nptel.ac.in/courses/106105031/
3. https://trai.gov.in/
4. https://www.itu.int/online/mm/scripts/gensefl9?_ctryid=1000100560
HS 4101 MANAGEMENT FOR ENGINEERS

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. To develop understanding about the basics of management functions
2. To explain the concept of total quality management
3. To analyze cost and financial aspect of the business
4. To develop the strategic thinking and decision making abilities in the rapidly changing global business environment

Course Outcomes:
After completion of the course, students will be able to
1. Explain the principles and functions of management
2. Identify social responsibility and ethical issues involved in the Organization
3. Apply tools of quality management
4. Analyze the cost, financial aspects of business and the need of globalization

Unit I: Basics of Management (08)
Introduction, Definition of management, characteristics of management, functions of management: Planning, Organizing, Staffing, Directing, Co-ordination, Controlling, Motivating, Communication, Decision making.

Unit II: Organizational Environments and Cultures (06)
External environments, Internal environments, Ethics and social responsibility.

Unit III: Quality Management (10)

Unit IV: Cost and Financial Accounting (10)
Basic concepts of cost accounting, Classification and analysis of costs, Marginal costing, Break-even point, Cost Volume Profit analysis, key financial statements, financial analysis.

Unit V: Globalization (06)
Global trends and commerce, new opportunities offered by globalization, preparation for globalization, globalization drivers, implementation issues related to globalization, quality of global leadership.
Text Books:

Reference Books:
OE 4101 TELEVISION AND AUDIO ENGINEERING

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. To introduce the basic concepts and design of colour TV and Digital TV
2. To explain advanced TV technologies like HDTV, CATV, CCTV, DTH, CAS and case study for live telecast
3. To introduce multimedia compression standards
4. To familiarize the students with digital recording, playback systems, acoustic design, microphones and loudspeakers

Course Outcomes:
After completion of the course, students will be able to
1. Explain the concepts of colour TV design and Digital TV
2. Discuss and compare technologies like CATV, CCTV, DTH, colour TV systems, Wi-fi TV, 3D TV and different display technologies
3. Describe and analyze multimedia standards for text, audio, video and animation Techniques
4. Explain and compare optical recording, microphones, speakers and PA system
5. Design acoustics for classrooms, auditoriums and drama theatres

Unit I: Colour and Digital Television
Resolution, interlaced scanning, BW, CVS, Color TV systems, frequency interleaving, colour difference signals, colour TV receiver, NTSC, PAL, SECAM encoders and decoders. Introduction to Digital TV, Digital TV signals and parameters, Digital TV Transmitters and receivers.

Unit II: Advanced TV systems
HDTV standards and systems, HDTV transmitter and receiver, CCTV, CATV, direct to home TV, set top box, Conditional Access System (CAS), 3D TV systems, case study (Cricket match, Marathon, Football match), Wi-Fi TV, Video door phone systems, Display devices: LED, LCD and Plasma.

Unit III: Multimedia Compression

Unit IV: Acoustics and Digital Audio/Video
Optical recording, noise, CD, DVD, dual layer DVD, rewritable DVD, Blue Ray DVD, Studio acoustics and reverberation, acoustic chambers, PA system for auditorium, public meeting, debating hall, football stadium, college hall, advanced PA systems, different types of speakers and microphones.
Text Books:

Reference Books:

Online Recourses:
1. https://nptel.ac.in/courses/106105082/38
OE 4101 ELECTRONIC PRODUCT DESIGN

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. To explain the hardware and software stages of product design and development
2. To introduce different consideration of analog, digital and mixed circuit design
3. To explore methods and different tools used for PCB design
4. To describe the importance of testing in product design cycle
5. To explain the process and importance of documentation.

Course Outcomes:
After completion of the course, students will be able to
1. Interpret and relate various stages of Hardware, Software and PCB design
2. Apply special design consideration’s for product development
3. Identify the test specification and test the product
4. Analyze and troubleshoot problem’s in the product
5. Justify the importance of documentation in product development

Unit I: Introduction to product development

Unit II: Hardware Design and Testing Methods
Design Process, Identify the requirements, formulating specifications, Specification vs Requirements, System Partitioning, Functional design, Architectural design, Prototyping, Performance and efficiency measures, Egoless design, Black box test, white box test and Grey box test.

Unit III: Software Design and Testing Methods

Unit IV: PCB Design
Fundamental definitions and Standards, Routing topology configurations, Layer stack up assignment, Grounding Methodologies, Aspect Ratio, Image Plane, Critical frequencies, Bypass and decoupling.

Unit V: Product Debugging and Testing
Steps for debugging, Techniques for troubleshooting, Characterization of Electromechanical, active, passive components and devices. Inspection and test of components. Simulation, Prototyping and testing, Integration, Validation and verification, EMI and EMC issues.
Unit VI: Documentation
Definition need and types of documentation, Record, Accountability and liability
Preparation, presentation and preservation of documents. Methods of documentation,
Visual techniques, Layout of documentation, Bill of material.

Text Books:
2. Robert J. Herrick, “Printed Circuit board design Techniques for EMC Compliance”,

Reference Books:

Online Recourses:
1. http://nptel.ac.in
2. www.ti.com
OE 4101 DIGITAL VIDEO PROCESSING

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives:
1. To provide basic knowledge of Digital Video Processing concepts and its standards
2. To extend numerous concepts from still 2-D images to dynamic imagery 3-D images
3. To introduce new concepts unique to spatio-temporal data such as timeline, motion, tracking etc.

Course Outcomes:
After completion of the course, students will be able to
1. Analyze the importance of digital video standards over analog video standards
2. Explain the modeling of video image formation using projection theory
3. Compare the Block matching and Optical flow estimation algorithms
4. Compare different background subtraction techniques and tracking algorithms
5. Apply digital video processing concepts for development of the specific application

Unit I: Basics of Video
Analog video signal and standards, Digital video signal and standards and need of digital video, sampling of video signals

Unit II: Time-Varying Image Formation Models
Three dimensional motion models ,Rigid motion in the Cartesian Coordinates, Rigid motion in the Homogeneous Coordinates, Deformable motion, Geometric Image Formation, Perspective projection, Orthographic projection, Photometric Image Formation, Lambertian Reflectance model ,Photometric effects of 3-D motion

Unit III: 2D Motion Estimation Techniques

Unit IV: Background Subtraction techniques for moving object detection
Frame differencing, Mean and Median filtering, Gaussian Mixture Model (GMM), Kernel density estimation.

Unit V: Motion Tracking
Basic Principles, Motion Tracking using Optical flow, blob tracking, colour feature based mean shift, Kalman tracking.

Unit VI: Applications of Video Processing
Video Surveillance, Object tracking, Video Watermarking etc.
Text Books:

Reference Books:

Online Resources:
EC 4103 VLSI DESIGN LAB

Teaching Scheme
Practical: 2 Hours / Week

Examination Scheme
Oral : 50 Marks
Credits: 1

Course Objectives:
1. To draw the layout of digital CMOS circuits using Microwind
2. To simulate, synthesize and implement combinational and sequential circuits using Verilog HDL on PLD

Course Outcomes:
After completion of the course, students will be able to
1. Draw and analyze the digital CMOS circuits layout
2. Design CMOS layout for any Boolean expression
3. Simulate digital circuits using Verilog and analyze its synthesis report
4. Implement digital circuits on PLD

List of Experiments:
A. To prepare CMOS layout in selected technology for:
   1. Inverter, NAND, NOR gates.
   2. Half Adder.
   3. 2:1 Multiplexer using transmission gates.
   4. Four variable Boolean expression.
B. To write, simulate, synthesize and implement Verilog code for:
   5. Mux and DeMux.
   6. Four bit ALU.
   7. 4 bit Up-Down Counter.
   Traffic light controller using FSM.

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EC4104 PROJECT PHASE I

Teaching Scheme
Tutorial: 02 Hours / Week
Practical: 14 Hours / Week

Examination Scheme
In Semester: 100 Marks
Oral: 50 Marks
Credits: 9

Course Outcomes:
After completion of the course, students will be able to
1. Identify a problem in a real-life application
2. Select an appropriate methodology to solve identified problem
3. Plan the stages for executing the project
4. Discuss and present methodology
5. Develop and test the modules

Guidelines:
A. Approval of the Project Concept: - The project should be done in a group. The Synopsis of Project’s concept should be drafted and submitted for approval to the departmental committee, at the beginning of the academic year. Only after obtaining the approval, the students should start working on the Project.
B. Guidance: - One Guide will be assigned to each Project Group. In case of Industry-Sponsored Projects, one Guide is required to be assigned by the concerned Industry, in addition to the College Guide.
C. Documentation of the Project-related work: - A Log-book is required to be maintained by the students for the relevant technical documentation and logging of the tasks / activities.
D. Reporting: - The students should report to their Guide regularly and the Logbook should be checked and authenticated by the Guide.
E. Expected Deliverables:- System Design and its Simulations.
F. Evaluation: - A Report consisting of Literature Survey, Design Methodology etc., is required to be submitted prior to the evaluation process. The said report needs to be certified by the Guide and the department authority. The evaluation should be based on the presentation of Project’s Concept and 50 percent completion of work. The said evaluation should be done by TWO EXAMINERS (Internal and External).
G. Evaluation Criteria : - Innovation, Depth of Understanding, Individual member’s contribution, Presentation skills, Internal Guide’s assessment for the work done during the semester and Report of the Project work as mentioned above.