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

Final Year B. Tech. Electronics and Telecommunication Engineering Semester – I										
Course Code	Course Title	Teaching Scheme			Examination Scheme				Marks	Credits
		Hours /Week								
		Lecture	Tutorial	Practical	In Semester	End Semester	Oral	Practical		
EC 4101	VLSI Design	3	0	0	50	50	0	0	100	3
EC 4102	Computer Networks and Security	3	0	0	50	50	0	0	100	3
HS 4101	Management for Engineers	3	0	0	50	50	0	0	100	3
OE 4101	Open Elective-I	3	0	0	50	50	0	0	100	3
EC 4103	VLSI Design Lab	0	0	2	0	0	50	0	50	1
EC 4104	Project Phase-I	0	2	14	100	0	50	0	150	9
	Total	**12**	**2**	**16**	**300**	**200**	**100**	**0**	**600**	**22**
	Grand Total	**30**			**600**				**600**	**22**

OE 4101: Open Elective I

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

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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)**

Trends in HDL, Design Flow, Hierarchical Modeling Concepts, Modules and Ports, Instances, Lexical Conventions, Data Types, System Tasks and Compiler Directives.

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:

1. S. Palnitkar, **"Verilog HDL – A Guide to Digital Design and Synthesis"**, *Pearson,* (3rd Edition), (2010).
2. Neil H. E. Weste, David Money Harris, **"CMOS VLSI Design: A Circuit & System Perspective"**, *Pearson Publication* (4th Edition), (2010).

Reference Books:

1. J Bhaskar, **"A Verilog HDL Primer (3/e)"**, *Kluwer*, (3rd Edition), (2005).
2. Wyane Wolf, **"Modern VLSI Design (System on Chip)"**, *PHI Publication,* (3rd Edition), (2002).

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 **(07)**

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 **(07)**

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 **(08)**

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 **(06)**

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 **(06)**

Security goals, Attacks and Defense strategies, Cryptography: Substitution cipher, DES, AES and RSA algorithms, Digital signatures, Authentication protocols: One-Way Authentication, Mutual Authentication, Dictionary Attacks, Centralized Authentication, Needham-Schroeder Protocol, Kerberos.

Unit VI: Network Security **(08)**

Network, transport and application layer security, Attacks: DoS and DDoS, Session High jacking and Spoofing, ARP Spoofing and Attacks on DNS, Viruses, Worms and Malware, Virus and Worm Features.

Text Books:

1. Behrouz A. Foruzan, **"Data communication and Networking"**, *Tata McGraw-Hill*, (5th Edition), (2013).
2. Andrew S. Tannenbaum, **"Computer Networks"**, *Pearson Education*, (4th Edition), (2003).
3. William Stallings **"Cryptography and Network Security Principles and Practice'"**, *Pearson Education* (7th Edition), (2017).
4. Leon-Garcia, Widjaja, **"Communication Networks"**, *Tata McGraw Hill,* (2nd Edition), (2004).

Reference Books:

1. Wayne Tomasi, **"Introduction to Data Communication and Networking"**, *Pearson Education*, (1st Edition), (2007).
2. James. F. Kurouse and W. Rouse, **"Computer Networking: A Top down Approach Featuring"**, *Pearson Education*, (3rd Edition), (2007).
3. William Stallings, **"Data and Computer Communication"**, *Pearson Education*, (8th Edition), (2000).
4. Greg Tomsho, Ed Tittel, David Johnson, **"Guide to Networking Essentials"**, Thomson *India Learning*, (5th Edition), (2007).

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/gensel9?_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)**

Definition of quality, continuous improvement definition of quality, types of quality, quality of design, conformance and performance, phases of quality management, Quality Management Assistance Tools: Ishikawa diagram, Pareto Analysis, Pokka Yoke (Mi stake Proofing), Quality circles, TQM, Kaizen, Five S (5S), Six sigma Quality Management, The ISO 9001:2015, Quality Management System Standard, Software quality management with respect to CMM level and ISO standard.

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.

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Text Books:

1. Stephen P. Robbins, Mary Coulter, **"Management",** *Prentice Hall of India,* (8th Edition), (2014).
2. Charles W.L Hill, Steven L McShane, **"Principles of Management",** *McGraw Hill Education, Special Indian Edition*, (2007).
3. M.Y Khan, P. K Jain, **"Financial Management"**, *McGraw Hill Education,* (8th Edition), (2018).

Reference Books:

1. Gail Freeman-Bell, James Balkwill, **"Management in Engineering",** *Prentice Hall of India*, (2nd Edition), (2005).
2. T. R. Banga, S.C. Sharma, **"Industrial organization and Engineering Economic",** *PHI Publication,* (25rd Edition), (2002).
3. M.C. Shukla, **"Business Organization and Management",** *PHI Publication,* (2rd Edition), (2002).
4. C. M. Chang, **"Engineering Management: meeting the Global Challenges",** Publisher: *CRC Press*, (2016).

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 **(12)**

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 **(10)**

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 **(10)**

Introduction to Multimedia techniques, Multimedia Applications, Hardware Software requirements, Multimedia building block, Steps of creating Multimedia, Text: Types, Compression, Hypertext, Image: JPEG, Multimedia, Audio: MIDI, MP3, Video: MPEG, Animation: Introduction, Background, uses, types, 3D animation, virtual reality.

Unit IV: Acoustics and Digital Audio/Video **(10)**

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:

1. R. R. Gulati, **"Modern Television Practice"**, *New Age International*, (5th Edition), (2015).
2. Ralf Steinmetz, Klara Nahrstedt, **"Multimedia: Computing, Communication and Applications"**, *Pearson Publication*,(8th Edition), (2011).
3. R.G. Gupta, **"Audio and Video Systems"**, *TMH Publication*, (2nd Edition), (2010).
4. Robert D. Finch, **"Introduction To Acoustics"**, *PHI*, (2nd Edition), (2007).

Reference Books:

1. A. M. Dhake, **"Television and Video Engineering"**, *McGraw-Hill*, (2nd Edition), (2003).
2. Ranjan Parekh, **"Principles of Multimedia"**, *Tata Mcgraw Hills,* (2nd Edition), (2013).
3. Alec Nisbett, **"The Sound Studio"**, (5th Edition), (1993).

Online Recourses:

1. https://nptel.ac.in/courses/106105082/38
2. https://en.wikipedia.org/wiki/Sound_reinforcement_system

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 **(06)**

Stages in Product Design, Five element of successful design, Reliability, Packaging and factors, Assembly and Disassembly, Wiring, Temperature, Vibration and Shock, Safety, Noise, Energy coupling, Grounding, Shielding.

Unit II: Hardware Design and Testing Methods **(08)**

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 **(08)**

Types of software, Waterfall model of software development. Model, metrics and software limitations. Risk abatement and failure prevention, Software bugs and testing. Good programming practice, user Interface.

Unit IV: PCB Design **(08)**

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 **(06)**

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.

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Unit VI: Documentation **(06)**

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:

1. Kim Fowler, **"Electronic Instrument Design"**, *Oxford University Press,* (2015).
2. Robert J. Herrick, **"Printed Circuit board design Techniques for EMC Compliance"**, *IEEE Press*, (2nd Edition).

Reference Books:

1. James K. Peckol, **"Embedded Systems – A Contemporary Design Tool"**, *Wiley publication,* (1st Edition), (2008).
2. J C Whitakar, "**The Electronics Handbook"**, *CRC press.*

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 **(06)**

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 **(08)**

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 **(12)**

2 D motion Correspondence and Optical Flow, 2-D Motion Estimation-The Occlusion Problem, Aperture Problem, 2-D Motion Field models methods using the Optical Flow Equation-The Optical Flow Equation, Second-Order differential methods, Block motion model, Horn and Schunck method, Estimation of the Gradients, Adaptive Methods. Generalized Block motion, Block matching Method, Motion estimation.

Unit IV: Background Subtraction techniques for moving object detection **(06)**

Frame differencing, Mean and Median filtering, Gaussian Mixture Model (GMM), Kernel density estimation.

Unit V: Motion Tracking **(04)**

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

Unit VI: Applications of Video Processing **(06)**

Video Surveillance, Object tracking, Video Watermarking etc.

Text Books:

1. A. Murat Tekalp, **"Digital Video Processing"**, *Prentice Hall*, (2nd Edition), (2015).

Reference Books:

1. Yao Wang, Jorn Ostermann, Ya-Qin Zhang, **"Video Processing and Communications"**, *Prentice Hall*, (2nd Edition), 2002
2. Alan C. Bovik, **"The Essential Guide to Video Processing"**, *Elsevier Science*, (2nd Edition), (2009).

Online Recourses:

1. Fundamentals of Digital Image and Video Processing - coursera

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.
   8. 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.