

E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002



B.E ELECTRONICS AND COMMUNICATION ENGINEERING

Third Year – Sixth Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1701MGX01	Professional Ethics	3	0	0	3	40	60	100
1702EC601	VLSI Design	3	0	0	3	40	60	100
1702EC602	Digital Communication	3	0	0	3	40	60	100
1702EC603	Wireless Networks and Standards	3	0	0	3	40	60	100
1703EC014	Internet of Things- Elective - III	3	0	0	3	40	60	100
	Professional (Open) Elective – IV	3	0	0	3	40	60	100
Laboratory Course								
1702EC651	VLSI Design Laboratory	0	0	2	1	50	50	100
1702EC652	Communication and Networks Laboratory	0	0	2	1	50	50	100
1704EC653	Industrial Visit & Presentation	0	0	0	1	100	-	100
1704GE651	Life Skills: Aptitude - II	0	0	2	1	100	-	100
Total		18	0	6	22	540	460	1000

L – Lecture | T – Tutorial | P – Practical | CA – Continuous Assessment | ES – End Semester

1701MGX01

PROFESSIONAL ETHICS

L	T	P	C
3	0	0	3

PREREQUISITE:

1. Basic understanding of business management
2. Basic understanding of human values

COURSE OBJECTIVES:

1. To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
2. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
3. To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights
4. To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.
5. To use the engineering principles to update and maintain the technical skills.

UNIT I ENGINEERING ETHICS

9 Hours

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION

9 Hours

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY

9 Hours

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Case Studies on Chernobyl, Bhopal MIC and Sterlite copper.

UNIT IV RESPONSIBILITIES AND RIGHTS

9 Hours

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES

9 Hours

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Case study on Hiroshima and Nagasaki

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi 2004
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)
6. Nptel link: <https://nptel.ac.in/courses/109/106/109106117/>

1702EC601

VLSI DESIGN

L	T	P	C
3	0	0	3

PREREQUISITE:

1. 1702EC303- Digital Circuits and Systems
2. 1702EC351- Digital Electronics Laboratory

COURSE OBJECTIVES:

1. To understand the CMOS Fabrication Process and CMOS Circuits
2. To study CMOS Circuits using various Logic Styles
3. To provide basic knowledge about Clocking, Memory and VLSI Subsystem Design

UNIT I FABRICATION OF CMOS IC AND PHYSICAL DESIGN 9 Hours

An overview of Silicon Semiconductor technology- NMOS fabrication - CMOS fabrication: n-well, P-well- Twin Tub and SOI Process- Layout design rules- Lambda Design Rules Stick Diagrams-VLSI Layout Design - Layout of Basic Structures - CMOS Logic Gates- Implementation of given logic function using CMOS logic

UNIT II MOS CIRCUIT DESIGN PROCESS 9 Hours

Pass Transistor and Transmission Gate Static CMOS design, Pseudo NMOS –dynamic CMOS logic Clocked CMOS logic, Precharged domino logic- Keeper Circuits - Dual Rail- Cascode Voltage Switch Logic-Circuit Pit Falls

UNIT III CMOS MEMORIES AND CLOCKING 9 Hours

Sequencing Static Circuits Conventional CMOS Latches and Flip-Flops, Klass Semidynamic Flip-Flop (SDFF) –TSPC Latches and FF – Memory architecture- Flash Memory ,CMOS Static RAM- Dynamic RAM and CAM -,CMOS Clocking Styles

UNIT IV VLSI SUBSYSTEM DESIGN 9 Hours

CMOS Mux - Equality Detector - Shift and Rotation Operation – Priority encoder- Ripple Carry Adder-Carry Look Ahead Adder -Carry Skip Adder - Carry select and Carry save-Adder - Braun/ Baugh Wooley -Modified Booth Encoded Multiplier.

UNIT V IMPLEMENTATION STRATEGIES 9 Hours

Full custom and Semi custom design, Standard cell design and cell libraries, FPGA building block architectures, FPGA interconnect routing procedures.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR:

1. Comparison of Logic Styles - Differential and Sense Amplifier Circuits Prescaler - Bit Slice .
2. ALU CMOS Clock Generation and Distributions - BICMOS- FINFET Technology.

REFERENCES:

1. John P.Uyemura, "Introduction to VLSI circuits and systems", John Wiley & Sons, 2015
2. Neil.H.EWeste David Harris CMOS VLSI Design: A Circuits and Systems Perspective, 4th edition, Pearson Addison Wesley, 2015.
3. Kamran Eshraghian, Douglas A. Pucknell, Essentials of VLSI Circuits and Systems Prentice Hall of India, 2015.
4. E. Fabricious, Introduction to VLSI Design, 1st edition, McGraw Hill, 2014
5. Keng,Lablebick,"CMOS Digital Integrated Circuits", Tata McGraw Hill, 2014
- 6.Nptel link : <https://nptel.ac.in/courses/117/101/117101058/>

1702EC602	DIGITAL COMMUNICATION	L	T	P	C
		3	0	0	3

PREREQUISITE:

1. Analog communication
2. Probability and random process

COURSE OBJECTIVES:

1. To know the principles of quantization and waveform coding
2. To apply the concepts of Error control coding.
3. To understand the various Band pass signaling schemes.
4. To understand the principles of spread spectrum.

UNIT I QUANTIZATION AND CODING 9 Hours

Review of Sampling and Reconstruction, Quantization and Encoding, Waveform coding – PCM, DPCM, DM, ADM, Linear Predictive Coding.

UNIT II ERROR CONTROL CODING TECHNIQUES 9 Hours

Linear block codes – Hamming codes – Syndrome decoding –Cyclic codes – Standard types of cyclic codes– Convolutional codes – Viterbi decoding.

UNIT III INTRODUCTION TO INFORMATION THEORY 9 Hours

Measure of information – Entropy – Source coding theorem –Channel coding theorem – Discrete memory less channels–lossless, deterministic, noiseless, BEC, BSC – Mutual information – Channel capacity – Shannon Hartley law- Transform coding – LPC – Shannon-Fano coding, Huffman Coding, Run length coding, LZW algorithm.

UNIT IV DIGITAL TRANSMISSION TECHNIQUES 9 Hours

Matched filter detection-Intersymbol Interference, Eye pattern - Generation and detection of BPSK, BFSK, QPSK, DPSK, MSK, GMSK, QAM - BER and Power spectral Density Comparison.

UNIT V SYNCHRONISATION AND SPREAD SPECTRUM TECHNIQUES 9 Hours

Importance of Synchronisation – Carrier, frame and symbol/Chip synchronization techniques, Spread Spectrum - PN Sequences, Direct Sequence and Frequency Hopping Spread Spectrum Systems, BER Analysis, Processing gain and Jamming Margin.

TOTAL: 45+15 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Frequency of Spread Spectrum.
2. TDMA – FDMA – CDMA – OFDMA.

REFERENCES:

1. Simon Haykin, “Digital Communications”, John Wiley, 2015.
2. J.G Proakis, —Digital CommunicationI, 5/e, Tata Mc Graw Hill Company, 2008.
3. Bernard Sklar, “Digital Communication”, 2nd Edition, Pearson Education, 2006.
4. Herbert Taub & Donald L Schilling, “Principles of Communication Systems”, 3rd Edition, Tata McGraw Hill, 2008.
5. H P Hsu, Schaum Outline Series- Analog and Digital CommunicationsI, TMH 2006 .
6. Nptel link Nptel link : https://onlinecourses.nptel.ac.in/noc20_ee17/course

1703EC603	WIRELESS NETWORKS AND STANDARDS (Common to B.E / B.Tech – CSE, IT & ECE)	L 3	T 0	P 0	C 3
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PREREQUISITE:

- 1.Computer networks
- 2.Basics of Communication

COURSE OBJECTIVES:

1. To study about Wireless networks, protocol stack and standards.
2. To study about fundamentals of 3G Services, its protocols and applications.
3. To study about evolution of 4G Networks, its architecture and applications.

UNIT I WIRELESS NETWORK ARCHITECTURE 9 Hours

Introduction-Wireless network logical architecture – Network physical architecture- Wireless LAN standards: System architecture, protocol architecture, physical layer, MAC layer, 802.11 Enhancements – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth- VoWLAN and VoIP security – WPA- IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II MOBILE NETWORKS LAYER 9 Hours

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing- Characteristics of MANETs, Table-driven and Source-Initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

UNIT III PROTOCOLS AND TCP/IP SUITE 9 Hours

The Need for a Protocol Architecture - The TCP/IP Protocol Architecture - The OSI Model - Internetworking TCP enhancements for wireless protocols - Traditional TCP: Windows based Congestion control, fast retransmit/fast recovery, Influences of mobility on TCP mechanism - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks

UNIT IV DESIGN OF WIRELESS WIDE AREA NETWORK 9 Hours

Basics of indoor RF planning- Three phases of wireless network design- Overview of UTMS Terrestrial Radio access network-UMTS Core network Architecture: link budgets for GSM, CDMA, 3G-MSC, 3G- SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)systems - LTE network architecture and protocol.

UNIT V CURRENT AND FUTURE OF WIRELESS NETWORKING TECHNOLOGY 9 Hours

Introduction – 4G vision – 4G features and challenges - Applications of 4G – Leading edge WNT: Wireless mesh network routing- Network independent roaming- Gigabit wireless LANs- OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Signal Encoding Techniques, Cordless Systems and Wireless Local Loop
2. Equalization, Coding, and Diversity, Heterogeneous Wireless Networks

REFERENCES:

1. Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
2. Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
3. Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013
4. Nptel link:<https://nptel.ac.in/courses/106/105/106105183/>

1703EC014

INTERNET OF THINGS

L	T	P	C
3	0	0	3

PREREQUISITE:

Computer Networks

COURSE OBJECTIVES:

1. To understand the concepts of Internet of Things
2. To introduce network and communication protocols of IoT
3. To build IoT applications.

Unit I Introduction to IoT

9 Hours

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, Difference between IoT and M2M, Software defined Network(SDN)

Unit II Network and Communication Aspects

9 Hours

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

Unit III Challenges of IoT

9 Hours

Design challenges, Development challenges, Security challenges, Other challenges

Unit IV Applications of IoT

9 Hours

Home automation, Industry applications, Surveillance applications, Other IoT applications

Unit V Developing IoTs

9 Hours

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Cloud Computing
2. Dockers and Containers

REFERENCES:

1. Vijay Madiseti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach"
2. Waltenequs Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice"
3. Nptel link: https://onlinecourses.nptel.ac.in/noc20_cs22/course.

1702EC651

VLSI DESIGN LABORATORY

L	T	P	C
0	0	4	2

PREREQUISITE :

Digital Electronics Laboratory

COURSE OBJECTIVES:

1. To gain expertise in design, development and simulation of digital circuits with Verilog HDL.
2. To apply concepts and methods of digital system design techniques through hands-on experiments.
3. To develop skills, techniques and learn state-of-the-art engineering tools (such as HDL, Xilinx tools)

LIST OF EXPERIMENTS:

I. Design and simulation of Combinational Logic Circuit using Verilog HDL

1. Adder – Carry Select & Carry Save, Multiplexer and Demultiplexer, Encoder and Decoder
2. Multiplier

II. Design and simulation of Sequential Logic Circuit using Verilog HDL

3. Flip-flops, Counters, Shift Registers
4. Frequency Dividers

III. CMOS Circuit design using SPICE (DC and Transient Analysis)

5. CMOS Inverter
6. CMOS NAND and NOR Gates
7. CMOS Latch

IV. FPGA Implementation

8. 4 bit Adder
9. 4x4 Multiplier
10. ALU Design

TOTAL:45 HOURS

REQUIREMENTS:

1. Xilinx or Altera FPGA -10 Nos
2. Xilinx software – 10 User
3. Personal Computers – 10 Nos.

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1. Synchronous Sequential Logic circuits.
2. Asynchronous Sequential Logic circuits.

REFERENCES:

1. John P.Uyemura, "Introduction to VLSI circuits and systems", John Wiley & Sons, 2015
2. Neil.H.EWeste David Harris CMOS VLSI Design: A Circuits and Systems Perspective, 4th edition, Pearson Addison Wesley, 2015.
3. Kamran Eshraghian, Douglas A. Pucknell, Essentials of VLSI Circuits and Systems Prentice Hall of India, 2015.
4. E. Fabricious, Introduction to VLSI Design, 1st edition, McGraw Hill, 2014

1702EC652	COMMUNICATION AND NETWORKS LAB	L	T	P	C
	(Common to B.E / B.Tech – CSE, IT & ECE)	0	0	4	2

PREREQUISITE :

1. Adequate knowledge of computer networks
2. Adequate knowledge of network and routing protocols
3. Basic knowledge of network security

COURSE OBJECTIVES:

1. To make students aware about various types of cables used in guided media like coaxial cable, optical fiber cable, twisted pair cables and its categories
2. To understand the working difference between straight cable and cross over cable.
3. To use the packet tracer to simulate various networks.

LIST OF EXPERIMENTS:

1. Study of Network Topologies
2. Implementation And Study of Stop & Wait Protocol
3. Implementation And Study of Go Back N Protocol
4. Implementation And Study of Selective Repeat Protocol
5. Configure a Network Using Distance Vector Routing Protocol
6. Configure a Network Using Link State Vector Routing Protocol
7. Implementation And Study of CSMA/CA Protocol
8. Implementation of Data Encryption And Decryption
9. Configure a Network Topology Using Packet Tracer Software
10. To Create Scenario And Study The Performance of Network With CSMA/CD Protocols through Simulation

TOTAL:45 HOURS

REQUIREMENTS:

1. LTS LAN Trainer Kit – 6 Nos
2. L – Sim simulator – 6 Users
3. N – Sim simulator – 35 Users
4. Cisco Packet tracer

ADDITIONAL EXPERIMENTS/ INNOVATIVE EXPERIMENTS:

1. To Create Scenario And Study The Performance of Token Bus And Token Ring Protocols Through Simulation
2. Study of Socket Processing

REFERENCES:

1. Computer Networks: A Systems Approach, 4th Ed. (2007), by Larry Peterson and Bruce Davie. Covers background networking material with which students should have familiarity.
2. Computer Networking: A Top-Down Approach Featuring the Internet, 5th Ed. (2010), by James F. Kurose and Keith W. Ross. Covers similar material to Peterson and Davie.

1704EC653

INDUSTRIAL VISIT PRESENTATION

L	T	P	C
0	0	2	1

In order to provide the experiential learning to the students, shall take efforts to arrange at least two industrial visit / field visits in a year. A presentation based on Industrial visits shall be made in this semester and suitable credit may be awarded.

ASSESSMENT PATTERN :

Continuous Assessment (100 Marks)

Distribution of marks for Continuous Assessment	Marks
Test	40
Presentation / Quiz / Group Discussion	40
Report	20
Total	100

Grades (Excellent / Good / Satisfactory / Not Satisfactory)

1704GE651

LIFE SKILLS: APTITUDE – II

L	T	P	C
0	0	2	1

PREREQUISITE :

Technical English – I and II

COURSE OBJECTIVES:

1. To brush up problem solving skill and to improve intellectual skill of the students
2. To be able to critically evaluate various real life situations by resorting to Analysis Of key issues and factors
3. To be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
4. To enhance analytical ability of students
5. To augment logical and critical thinking of Student

UNIT I PARTNERSHIP, MIXTURES AND ALLEGATIONS, PROBLEM ON AGES, SIMPLE INTEREST, COMPOUND INTEREST 6 Hours

Introduction Partnership - Relation between capitals, Period of investments and Shares- Problems on mixtures - Allegation rule - Problems on Allegation – Problems on ages - Definitions Simple Interest - Problems on interest and amount - Problems when rate of interest and time period are numerically equal - Definition and formula for amount in compound interest - Difference between simple interest and compound interest for 2 years on the same principle and time period.

UNIT II BLOOD RELATIONS, CLOCKS, CALENDARS 6 Hours

Defining the various relations among the members of a family - Solving Blood Relation puzzles - Solving the problems on Blood Relations using symbols and notations - Finding the angle when the time is given - Finding the time when the angle is known - Relation between Angle, Minutes and Hours - Exceptional cases in clocks - Definition of a Leap Year - Finding the number of Odd days - Framing the year code for centuries - Finding the day of any random calendar date.

UNIT III TIME AND DISTANCE, TIME AND WORK 6 Hours

Relation between speed, distance and time - Converting kmph into m/s and vice versa - Problems on average speed - Problems on relative speed - Problems on trains - Problems on boats and streams - Problems on circular tracks - Problems on races - Problems on Unitary method - Relation between Men, Days, Hours and Work - Problems on Man-Day-Hours method - Problems on alternate days - Problems on Pipes and Cisterns.

UNIT IV DATA INTERPRETATION AND DATA SUFFICIENCY 6 Hours

Problems on tabular form - Problems on Line Graphs - Problems on Bar Graphs - Problems on Pie Charts - Different models in Data Sufficiency - Problems on data redundancy

UNIT V ANALYTICAL AND CRITICAL REASONING 6 Hours

Problems on Linear arrangement - Problems on Circular arrangement - Problems on Double line-up - Problems on Selections - Problems on Comparisons - Finding the Implications for compound statements - Finding the Negations for compound statements- Problems on assumption - Problems on conclusions - Problems on inferences - Problems on strengthening and weakening of arguments.

Total: 30 Hours

REFERENCES:

1. Arun Sharma, 'How to Prepare for Quantitative Aptitude for the CAT', 7th edition, McGraw Hills publication, 2016.
2. Arun Sharma, 'How to Prepare for Logical Reasoning for CAT', 4th edition, McGraw Hills publication, 2017.
3. R S Agarwal, 'A modern approach to Logical reasoning', revised edition, S.Chand publication, 2017.
4. R S Agarwal, 'Quantitative Aptitude for Competitive Examinations' revised edition, S.Chand publication, 2017.
5. Rajesh Verma, "Fast Track Objective Arithmetic", 3rd edition, Arihant publication, 2018.
6. B.S. Sijwalii and InduSijwali, "A New Approach to REASONING Verbal & Non-Verbal", 2nd edition, Arihant publication, 2014.