Minutes of the 3rd meeting of BOS in Dept., of Electronics& Communication Engineering (Held on 10.06.2020)

The ECE Department 3rdmeeting of Board of Studies (BOS) was conducted through online mode on 10.6.2020 at 11.00 A.M using ZOOM Application with following given link address.

https://zoom.us/j/92863815387?pwd=MnBpRFVjMXpGVVFXTURabEdmeSt2Zz09 . Following external members have attended the meeting along with internal faculty members. The ECE HOD, Dr E. KusumaKumari, BOS Chairman headed the meeting.

Details of members attended:

S.No	Name of the BOS Member	Nominee	Address
1.	Dr.E.KusumaKumari	Chair person	Professor & Head, ECE, SVEC
2.	Prof.I.SanthiPrabha	University Nominee	Prof.in ECE Dept., University College of Engg., JNTUK, Kakinada
3.	Prof. NVSN. Sarma	Subject Expert	Director, IIIT Trichy Tiruchirapalli, Tamilnadu.
4.	Prof. M. VenugopalaRao	Subject Expert	Prof., ECE Dept., K.L.University, Vijayawada.
5.	Sri.Sunkavalli Siva Kumar	Alumni Nominee	Sr.Engineer,Qualcomm, Bangalore.
6.	All Faculty Members in Dept.	Members	ECE Dept., SVEC

The following are the key points discussed in the meeting.

- **Item No.1 : Chairperson, BOS has welcomed all the members and given the Opening Remarks.**

- **Item No.2: Review & approval of the V& VI Sem of B. Tech ECE of V18 Reg.**

- The Chairman and the members reviewed the course structure of B. Tech ECE and suggested modifications in the structure.
- Members suggested to includetopics, Multipath Propagation, Fading, Types of fading concepts in Antenna & Wave Propagation course in V semester.
- Members suggested to include the concept of Cavity Resonator, Impedance , and Dielectric Constant Measurement in Microwave Engineering Course in VI Semester.
- Members suggested to include Mini-project as Lab associated Component in each Lab Course.
- Members suggested to includetopics, Introduction of DTFT in the Course of Digital Signal Processing in VI semester.
- Members suggestedto include separate column in the course structure to indicate the course category.
- The approved course structure & Syllabus for the V & VI semesters of B. Tech ECE in Academic Year 2020-21 were given in**Annexure-01& Annexure-02**

- **Item No.3: Review & Approval the List of Open Elective Courses offered by ECE Dept., in VI Semester B. Tech ECE of V18 Reg.**

  BOS Members suggested to include the Course titled as "Principles of Communication Systems" as an Open elective course instead of Bio- Medical Engineering Course in VI semester. The approved Syllabus was given in **Annexure -03**

- **Item No. 04:Approval for offering Honors degree in DATA SCIENCE offered by Department of Computer Science and Engineering for B. Tech Electronics and Communication Engineering students under V18 Regulation**

  BOS Members approved our students to opt for the Honors degree offered by the Department of Computer Science and Engineering with the rules and regulations which will be approved by Academic Council.

- **Item No. 5: Approval of List of Courses offered to EEE Department in the VI Semester.**

  BOS Members Approved the List of Courses offered to EEE Department in the VI Semester and details of syllabus is given in **Annexure -04**

S.No	Programme	Semester	Course Code	Course Name
1	EEE	VI	V18ECT23	Fundamentals of Microprocessor & Microcontrollers
2	EEE	VI	V18ECL10	Microprocessors & Microcontrollers Lab

- **Item No. 6: Review and approval of Proposed course structure & Syllabi for III & IV semesters of B. Tech ECT under V18 Regulations.**

  BOS Members Approved Course structure &Syllabi for III & IV semesters of B. Tech ECT under V18 Regulations. Details were given in **Annexure -05**

- **Item No. 7: Approval of List of Courses offered to CST Department in the IIISemester.**

  BOS Members Approved the List of Courses offered to CST Department in the IIISemester and details of syllabus is given in **Annexure -06**

S.No	Programme	Semester	Course Code	Course Name
1	CST	III	V18ECT06	Digital Electronics
2	CST	III	V18ECL04	Digital Electronics Lab

Finally, the chairperson thanked all the BOS members and faculty. The meeting was ended at 12.30 P.M

Dr. E. Kusuma Kumari,
Chairperson, BOS

Annexure- 01

Approved Course structure in 3rd Meeting of BOS

V- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V18CST81	Data structures & Algorithms	3	-	-	Professional Core	3
2	V18ECT11	VLSI design	3	-	-	Professional Core	3
3	V18ECT12	Microprocessors & Microcontrollers	3	-	-	Professional Core	3
4	V18EET15	Control Systems	3	-	-	Professional Core	3
5	V18ECT13 V18ECT14	**Professional Elective-I** Antenna &Wave Propagation Telecommunication Switching Systems & Networks	3	1	-	Professional Elective	4
6	V18ECT15	Engineer & Society	2	-	-	Mandatory & Non Credit	-
7	V18CSL34	Data Structures& Algorithms lab (BOS of CSE)	-	-	2	Professional Core	1
8	V18ECL07	Microprocessor &Microprocontrollers Lab	-	-	2	Professional Core	1
9	V18ECL08	VLSI Design Lab	-	-	2	Professional Core	1
10	V18ECMOOCs	MOOCs Course (Any Course in Engg. with Min 8 weeks)				Mandatory Course	2
11	V18ENT05	Professional Comm. skills(Eng+ aptitude) –III (BOS of English)	4	-	-	Mandatory & Non Credit	MC
		TOTAL	**21**	**01**	**06**		**21**

VI- Semester

S. No	Course Code	Course Name	L	T	P	Course-Category	Credits
1	V18CST11	Computer Networks	3	-	-	Professional Core	3
2	V18ECT16	Digital Signal Processing	3	-	-	Professional Core	3
3	V18ECT17	Microwave Engineering	3	-	-	Professional Core	3
4	V18ECT18 V18ECT19	**Professional Elective-II** Embedded Systems-1 CMOS Digital IC Design	3	-	-	Professional Elective	3
5	V18MBET52	Management Science	3	-	-	Humanities course	3
6		**Open Elective-I**	3			Open Elective	3
7	V18ECL09	Digital Signal Processing Lab	-	-	2	Professional Core	1
8	V18CSL35	Computer Networks Lab	-	-	2	Professional Core	1
9	V18ENT06	Professional Comm. Skills (Eng+ aptitude) (MNC)- IV	4	-	-	Mandatory & Non Credit	--
		TOTAL	**22**	**-**	**04**		**20**

List of Open Elective Courses

S.No	Course Code	Name of the Course	Department Offered
1	V18ECTOE1	Internet of Things	Electronics & Communication Engineering
2	V18ECTOE2	Introduction to Communication Systems	
3	V18ECTOE3	Introduction to VLSI Design	
4	V18CSTOE01	Data Base Management Systems	Computer Science Engineering.
5	V18CSTOE02	Software Engineering	
6	V18CSTOE03	Python Programming	
7	V18EEOE1	Energy Audit & Conservation	Electrical & Electronics Engineering
8	V18EEOE2	Electrical Measuring Instruments	
9	V18EEOE3	Industrial safety	
10	V18MEOE1	Basic Mechanical Engineering	Mechanical Engineering
11	V18MEOE2	Green Engineering	
12	V18MEOE3	Introduction to Robotics	

Approved Syllabus for V & VI Semesters

V-Semester Syllabus

V Sem.	Data Structures and Algorithms	Course Code: V18CST81	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Explain Sorting and searching techniques. **(K2)**

CO2: Demonstrate algorithm notations. **(K2)**

CO3: Develop Singly Linked Lists, Double Linked List. **(K3)**

CO4: Interpret the Basic Concepts in Data Structures, Stacks and Queues **(K3)**

CO5: Develop Binary trees and BST **(K3)**

CO6: Develop various graph algorithms. **(K3**)

Unit I: Sorting: bubble sort, insertion sort, selection sort, quick sort, merge sort, heap sort, radix sort.
Searching: linear search, binary search. Introduction to hashing, hash functions.

Unit II: Introduction to data structures – Basic terminology, classification of data structures, operation on data structures, ADT, time and space complexity, Big O, Omega and Theta notation.
Arrays: Representation of arrays - polynomial representation, addition of two polynomials, sparse representation, transpose of sparse matrix. (**Refer Reference Text book 1**)

Unit III: Linked list: Introduction, **single linked list** Representation of node, operations on single linked list, reverses the linked list. **Double linked list**: operations (insert delete and display). **Circular linked List** and its operations (create and display single circular linked list).

Unit IV: Stacks introduction, array representation, operations, linked list representation, operation on linked stacks, infix to postfix conversion, evolution of arithmetic expression. **Queues** Introduction, Array representation, operations linked list representation, linked queue operations, circular queues.

Unit V: Trees: Introduction, Terminology, Representation of Trees, types of trees, **Binary Trees:** Properties of Binary Tress, creating a binary tree from general tree, Tree Traversals. **Binary Search Tree:** introduction, creation, insertion, delete, display and search operations.

Unit – VI: Graphs: introduction, Terminology, directed graphs, Graph Representation, **Graph Traversal techniques**: Depth First Search, Breadth First Search. **Spanning Trees**: Krushkal's Algorithm, Prim's algorithm. Single source shortest Paths and all pair shortest path algorithm

TEXT BOOKS:

1. Data Structures using C by ReemaThareja, Second Edition, oxford publications.
2. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.

REFERENCE BOOKS:

1. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, Distributed by Wiley publications, new Delhi.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.
3. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
4. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
5. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	VLSI Design	Course Code: V18ECT11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand different IC technologies and basic electrical properties of MOS,CMOSand Bi-CMOS Circuits. **(K2)**

CO-2: Develop layouts for MOS & Bi-CMOS circuits using design rules. **(K3)**

CO-3:Calculate the parameters of MOS circuits and assess the effects of scaling **(K3)**

CO-4: Analyze the concept of Combinational and arithmetic circuits. **(K4)**

CO-5: Describe the fundamentals of low power VLSI design. **(K2)**

UNIT-I

Review of Microelectronics and An Introduction to MOS technology: IntroductiontoICtechnology,BasicMOStransistors,EnhancementmodeMOS transistor Action, Depletion mode MOS transistor Action, NMOS, PMOS fabrication, CMOS fabrication and Bi-CMOStechnology, Comparison between CMOS and Bi-CMOS technology.

UNIT-II

Basic Electrical Properties of MOS and BICMOS Circuits: I_{ds} versus V_{ds} relationships, Aspects of MOS transistor threshold voltage V_t, Trans conductance g_m, Output conductance g_{ds} and Figure of merit, NMOS inverter, Pull-up to pull-down ratio for NMOS inverter driven by another NMOS inverter and through one or more pass transistors, Alternative forms of pull-up,CMOS inverter, BICMOS inverters, Latch-up inCMOScircuits.

UNIT-III:

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/Bi-CMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams- Translation to Mask Form.

UNIT-IV:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter

Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

Scaling of MOS Circuits: Scalingmodels and scaling factors, Scaling factors for device parameters, Limitations of scaling.

UNIT-V:

Subsystem design and layout: Architectural issues, Switch logic, Gate Logic

Examples of Structured Design (Combinational Logic): A Parity Generator, BusArbitration Logic for n-line-Bus

An Illustration of Design Process:Multiplier, Design ofanALUSubsystem, Ripple Carry Adder, and Carry look ahead adder.

UNIT-VI:

Introduction to Low Power VLSI Design: Need for Low Power VLSI chips,Sources of Power dissipation, Short circuit power dissipation Switching power dissipation and Short channel Effects.Low Power design through Voltage Scaling: VTCMOS, MTCMOS.

Text Books:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A. Pucknell and SholehEshraghian, Prentice-Hall of India Private Limited, 2005Edition
.
2. CMOS Digital Integrated Circuits Analysis and Design bySung-Mo Kang, Yusuf Leblebici, Tata McGraw- Hill Education,2003.

Reference Books:

1. “Practical Low Power Digital VLSI Design” by Gary K. Yeap, , KAP, 2002
2. “Low Power CMOS VLSI Circuit Design” by Kaushik Roy, Sharat Prasad, Willey, 2000

V Sem.	Microprocessor &Microcontrollers	Course Code: V18ECT12	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the basic architecture and Modes of 8086 microprocessor **(K2).**

CO-2: Construct assembly language programs for arithmetic and Logical Operations - **(K3).**

CO-3: Describe the Hardware and software requirements in interfacing **(K2)**

CO-4 Describe Architecture and features ofIntel 8051 microcontroller**(K2)**

CO-5.Construct assembly language programs for 8051 microcontroller**(K3)**

CO-6.Identify latest technology in microcontroller environment**. (K2)**

UNIT-1: **Introduction to Microprocessors**: EvolutionofMicroprocessors, features, Intel Microprocessor families, Architecture of 8086 microprocessor, pin/signal description,Physical address formation, I/O Addressing capability. Minimum Mode Maximum mode of 8086, General bus operation, Description of Minimum mode pins, Timing diagrams.
Interrupts, Available interrupts, Interrupt Cycle, ISR (Interrupt service Routine), and subroutines, Interrupt programming.

UNIT-II:**Programming with 8086 Microprocessor**: Various addressing modes of 8086, Instruction set and Classification, Assembler Directives of 8086.Program development steps, assembly language program development tools, Machine level programming, and writing programs with an assembler, writing Assembly language program using procedures and assembler macros.Sample Programs using various types of instructions.

UNIT – III:**Interfacing with Basic Peripherals**: Semiconductor memories interfacing (RAM, ROM), Interfacing Microprocessor to keyboards, interfacing to ADC/DAC , Interfacing 8255(PPI-Parallel I/O port), 8254(programmable Interval Timer/counter), 8259(Programmable interrupt controller), 8251(serial communication UART), DMA - 8237 data transfer,Stepper motor interfacing and programming.

UNIT – IV:**8051 Microcontroller**: Intel 8051 Microcontroller, Microprocessor vs. Microcontroller, 8051 Microcontroller Architecture, Microcontroller 8051 pin diagram, Internal and External Memory, Counters and Timers, Serial Communication in 8051, interrupts in 8051.
Addressing Modes, Data Transfer Instructions, Data and Bit-Manipulation Instructions, Arithmetic Instructions, simple programs using microcontroller 8051.

UNIT – V: PIC Microcontroller: Introduction, characteristics of PIC microcontroller, PIC microcontroller families, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

UNIT – VI: **Atmega328 Microcontroller**: Architecture and PIN Description of Atmega328 Arduino microcontroller. Arduino Language reference program structure, data types, variables & constants, operators, control statements and loops.

TEXT BOOKS:

1. Advanced microprocessor and Peripherals byA.K.Ray and K.M.Bhurchandi, TMH, 2000.
2. Microprocessors and Interfacing by Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGrawHill Education Private Limited, 3rd Edition.

Reference Books:

1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey,Pearson, Eighth Edition-2012.
2. Beginning Arduino Programming by Brian Evans

Sem.	Antenna & Wave Propagation Professional Elective-1	Course Code: V18ECT13	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Understand the radiation mechanism and fundamental parameters of antenna **(K2)**

CO-2: Solve the field components of dipole, quarter monopole antenna and their characteristics. **(K3)**

CO-3: Solve array factor for N element linear array and directivity**(K3)**

CO-4: Design basic microstrip antennas such as rectangular and circular and explain the concepts of modern antennas **(K3)**

CO-5: Design Microwave antennas and explain the procedure for antenna gain and Radiation pattern measurement **(K3)**

CO-6: Explain concept of propagation methods and fading in wave propagation.**(K2)**

UNIT I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, twowires, Current Distribution on a thin wire antenna. Antenna Parameters –Near and far field regions, Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidth, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, Reciprocity Theorem applicable to antenna Simple Problems.

UNIT II

WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Electric and magnetic Field Components, Radiation Resistance, Beamwidth, Directivity Loop Antennas: Small Loops - Concept of short magnetic dipole -Field Components, Comparison of far fields of small loop and short dipole, Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofiler helical antennas in Axial Mode and Normal Modes

UNIT III

ANTENNA ARRAYS : Two element arrays – N element Uniform Linear Arrays – Broadside, End-fire Arrays, Array factor, EFA with Increased Directivity, Derivation of their characteristics and comparison, Principle of Pattern Multiplication, Non – Uniform arrays- Binomial arrays , Phased Arrays concept- Beam scanning-Applications – Antenna synthesis-Binomial method.

UNIT IV

MICROWAVE ANTENNAS AND ANTENNA MEASUREMENTS

Parabolic Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds. Horn Antennas – Types-Design Characteristics of Pyramidal Horns.

Antenna Measurements – Block diagram of radiation pattern measurement setup and measurement procedure, Distance Criterion, Indoor and outdoor measurement-Far field measurement – Anechoic chamber-Advantages-Block diagram of Gain Measurements and measurement procedure (Comparison, Absolute and 3-Antenna Methods).

UNIT V

MODERN ANTENNAS: Microstrip Antennas-Geometry, Features, Advantages and Limitations, Rectangular and Circular Patch Antennas –Radiation mechanism-Design –Simple design problems of MSA- Smart antennas- Block diagram- concept- switched beam and adaptive array concept –MIMO antenna-Wearable antenna.

- **UNIT VI**

WAVE PROPAGATION AND TRENDS IN WIRELESS COMMUNICATION: Concepts of Propagation – frequency ranges and types of propagations. Concept of Ground Wave Propagation - Sky Wave Propagation –Mechanism of Reflection and Refraction – Concept of Tropospheric propagation . Fading, Types of fading, Multipath propagation.

TEXT BOOKS

1. Antennas for All Applications by John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems by E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Broadband Microstrip Antenna byGirish Kumar, Artech house Publishers

REFERENCES

1. Antenna Theory by C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation by K.D. Prasad, SatyaPrakashan, Tech India Publications, New Delhi, 2001.
3. Antennas and Wave Propagation bySisirK.Das and Annapurna Das – TataMcGraw Hill
4. Electronic and Radio Engineering by F.E. Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

V-Sem.	Electronic Switching Systems Professional Elective-1	Course Code: V18ECT14	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Explain functioning of Manual and cross bar automatic switching systems **(K2)**

CO-2: Explain the stored program control concept involved in electronic switching systems. **(K2)**

CO-3: Describe the inherent facilities with time division switching, Combinational switching.**(K2)**

CO-4: Analyze the various CCITT signaling models, Various Plans. **(K4)**

CO-5: Investigate the methods of collecting& measuring traffic data. **(K3)**

CO-6: Explain the architecture and services of ISDN. **(K2)**

UNIT -I:

Introduction: Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System,Manual Switching System, Major Telecommunication Networks.

Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:

Electronic Space Division Switching: Stored Program Control, Centralized SPC: Standby mode, Synchronous duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

UNIT -III

Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching,Generalized time division Space switch, Basic Time division time switching: modes of operation, simple problems, Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching

UNIT IV

Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, CCITT Signaling System no.6.**Packet Switching: C**oncepts of Packet switching, Local- Area and Wide- Area Networks, Large-scale Networks.

UNIT -V:

Switching Networks: Single- Stage Networks, Grading, Link Systems, and Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, and Call Packing.

Telecommunications Traffic: The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems.

UNIT -VI:

Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, and Voice Data Integration.

Text Books:

1. Telecommunication Switching Systems and Networks byThiagarajanViswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks by J. E. Flood, 2006, Pearson Education.

References:

1. Digital Telephony by J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks by Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Systems by H. Taub& D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking by B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering by Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

V-Sem.	Engineer and Society	Course Code: V18ECT15	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Comprehend different moral perspectives and one's own Ethical standards. **(K2)**

CO-2: Understand the concept of safety and risk. **(K2)**

CO-3: Explain different initiatives to protect nature. **(K2)**

CO-4: Identify the role of Information Technology. **(K2)**

CO-5: Understand different types of infringement of Intellectual Property Rights. **(K2)**

CO-6: Understand the importance of Entrepreneurship. **(K2)**

UNIT–I: Human Values

What is engineering – who is an engineer - Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy–Self-confidence –Character.

UNIT–II: Engineer's Responsibilities and Rights

Safety and risk –Types of risks – Voluntary vs. Involuntary risk –Short Term vs. Long Term Consequences–Expected Probability–Reversible Effects–Threshold Levels for Risk – Delayed vs. Immediate Risk – Collegiality – Techniques for achieving Collegiality - Twosenses of Loyalty–Rights–Professional Responsibilities – Confidential and Proprietary information.

UNIT–III: Global climatic issues and mitigation strategies

Greenhouse effect –global warming – acid rain – ozone layer depletion – International efforts-key initiatives of Montreal protocol, Rio declaration, Kyoto protocol, Johannesburg summit.

UNIT–IV: Future challenges to society

Sustainable development – Measures for sustainable development – Water conservation practices–Rainwater harvesting methods-Watershed management Resettlements and Rehabilitation of people-waste and reclamation–Role of information technology-Role of an engineer in mitigating societal problems.

UNIT –V: Patent law, Trade Marks and Copyrights

Introduction, Types of IPR – Patent requirements - Application process – Ownership–Transfer–Infringement–Litigation.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement.

UNIT–VI: Entrepreneurship

Meaning, definition& concept of Entrepreneurship, characteristics &skills of entrepreneur, Role of an entrepreneur in economic development.

Text Books

1. Professional ethics and human values by DdharanikotaSuyodana, Marutipublications(unit1,2).
2. Environmental studies" by Deeksha Dave, P. UdayaBhaskar,Cengage Learning.(unit3,4).

Reference Books

1. Professional Ethics and Human Values, by A. Alavudeen, R. KalilRahman andM.Jayakumaran-UniversitySciencePress.
2. EnvironmentalStudiesbyR.Rajagopalan2nd Edition2011,OxfordUniversity Press.
3. Intellectual Property Rights byR.Radha Krishnan, S.Balasubramanian Excel Books, NewDelhi.
4. Intellectual Property Rights byPrabhuddhaGanguli. Tata McGrawHill, New Delhi.
5. FundamentalsofEntrepreneurshipbyPH.Nandan,PHILearning,NewDelhi.

V Sem.	Data Structures and Algorithms Lab	Course Code:V18CSL34	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: ConstructSorting and searching methods. **(K3)**
CO2: Construct hash table **(K3)**
CO3: Implement programs using Singly Linked Lists, Double Linked List.**(K3)**
CO3: Construct Basic Data Structures, Stacks, Queues and Applications. **(K3)**
CO4: construct Binary search tree **(K3)**
CO5: Implement various graph operations and shortest path algorithm. **(K3)**

List of Experiments

1. Programs to implement the following sorting techniques Selection sort, Quick sort, Merge sort
2. Programs to implement the following searching methods
   (a)Linear search (b) Binary search.
3. A Program to Implement hash table and its operations.(Note: Use at least one collision resolution technique)
4. A Program to implement addition of two polynomials. (Using arrays).
5. A Program to implement single linked list and its operations. (create, insert, delete, display, reverse list)
6. A Program to implement double linked list and its operations.
7. A Program to implement stack operations using arrays.
8. A Program to implement queue operations using arrays.
9. A Program to convert infix expression to postfix expression.
10. A Program to implement Binary search Tree and its operations.
11. A Program to implement graph traversal algorithms (BFS & DFS).
12. A Program to implement minimum spanning tree algorithms (Prims &Krushkal)
13. A Program to implement single source shortest path algorithm.

TEXT BOOKS:

1. Data Structures, algorithms and applications in C++, SartajSahni, Universities press, Second Edition.
2. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh Mehta, 2nd Edition, Universities Press (India) Pvt. Ltd.

REFERENCE BOOKS:

1. An Introduction to Data Structures with Application, Jean-Paul Tremblay , Paul Sorenson, Second Edition.
2. Fundamentals of Data Structures and algorithms by C V Sastry, RakeshNayak, Ch. Raja Ramesh, IK Publications, new Delhi.
3. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
4. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

V Sem.	Microprocessor &Microcontrollers Lab	Course Code:V18ECL07	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**

CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. . **(K3)**

CO-3: Develop ALP to perform arithmetic and logical operations using various instructions.**(K3)**

CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)**

CO-5: Develop Assembly language programs for 8051 Micro controller . **(K3)**

CO-6: Perform some applications using ARDUINO BOARD **(K3)**

LIST OF EXPERIMENTS

PART- A:

8086 Assembly Language Programming using Assembler Directives

Introduction to MASM/TASM

1. Basic Arithmetical operations –Unsigned Addition, Subtraction, Multiplication and Division.

(Machine programming and Assembler programs)

2. Multibyte addition/subtraction
3. Sorting of given array of elements (Ascending order /descending order)
4. Sum of squares/cubes of a given n-numbers
5. Shift and rotate operations for given number.

PART- B: 8051 Assembly Language Programming

6. Write an Assembly Language program to find average of n numbers by 8051 microcontroller.
7. Write an Assembly Language program to find the no of 1's and 0's in a given number by 8051

Microcontroller.

8. Write an Assembly Language program to interface stepper motor to 8051 microcontroller(Both directions)

PART C: ARDUINO programming:

9. Blinking a LED using ARDUINO board and provide some delay.
10. Interfacing different sensors to ARDUINO board and observe their operation.
11. 2 to 3 week Mini Project

Requirements:

PC installed with TASM/MASM, Keil Micro vision
Regulated power supplies (12v)
Interfacing modules (Study Cards),
FRC, USB (RS232) Cables.
ARDUINO Boards.

V Sem.	VLSI Design lab	Course Code:V18ECL08	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Explain the VLSI Design Methodologies using Mentor Graphics Tools **(K2)**
CO-2: Demonstrate significance of various CMOS Analog and Digital circuits in Full-customIC Design flow **(K2)**

CO-3: Explain the Physical Verification in Layout Design **(K2)**

CO-4: Design and analyze of Analog and mixed signal simulation **(K2**)
CO-5: Analyze the Significance of Pre-Layout Simulation and Post-Layout Simulation. **(K2)**

PART-A

List of Experiments:

Design the following experiments using 130nm CMOS technology and extract parasitics.

1. CMOS Inverter
2. Universal Logic gates
3. Full Adder
4. RS-Latch & D- latch
5. JK-Flip Flop
6. Ripple Carry Adder
7. Asynchronous Counter
8. Ring Oscillator
9. R-2R Ladder Type DAC
10. Differential Amplifier
11. 2-3 week Mini Project.

Lab Requirements:

Software:

Mentor Graphics – Pyxis Schematic, IC Station, Calibre, ELDO Simulator

VI- Semester Syllabus

VI Sem.	Computer Networks	Course Code: V18CST11	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Discuss fundamentals of network concepts and Reference Models. **(K2)**

CO2: Discuss Communication media and switching techniques. **(K2)**

CO3: Demonstrate Error control and protocols. **(K3)**

CO4: Apply Routing algorithms and congestion control algorithms. **(K3)**

CO5: Discuss Transport layer services and protocols. **(K2)**

CO6: Describe Application layer protocols. **(K2)**

UNIT-I: Introduction: Reference models: The OSI Reference Model- the TCP/IP Reference Model, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT– II: Physical Layer: Transmission Media, Multiplexing: FDM, WDM and TDM- LAN Technologies, introduction to switching: Circuit Switched Networks, Datagram Networks, and Virtual Circuit Networks.

UNIT–III: Data link layer: Design issues, Framing, Flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, MAC: ALOHA, CSMA. Elementary Data Link Layer protocols: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel. Sliding window protocol: One bit, go back N, Selective repeat-Stop and wait protocol, HDLC, point to point protocol (PPP).Piggybacking.

UNIT-IV : Network Layer : Network layer design issues- Algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast Routing algorithms-Congestion control and algorithms, Internet Protocol (IP) Addresses, Subnet masking

UNIT–V :Transport Layer: Services, Primitives and sockets, Elements of transport protocols, Internet Transport protocols(TCP,UDP,RPC,RTTP/RTP,RTCP) Segment headers, Primitives, Control, Congestion control, Quality of Service, QoS improving techniques: Leaky Bucket and Token Bucket algorithm.

UNIT–VI: Application Layer: DNS, SMTP, POP,And FTP HTTP Presentation formatting. Network security: Introduction to Cryptography, Authentication, Basics of Public key and private key cryptography, digital signatures and certificates firewalls and wireless security.

TEXT BOOKS:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks byBehrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding Communications and Networks, 3rd Edition by W.A. Shay, Thomson

VI Sem.	Digital Signal Processing	Course Code: V18ECT16	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Classify Discrete Time Signals, systems, estimate the response of various Systems **(K2)**

CO-2: Compute DFT for discrete time signals using FFT Algorithm **(K3)**

CO-3: Describe the various implementations of digital filter structures **(K2)**

CO-4: Analyze and design a Digital filter (FIR&IIR) from the given specifications **(K4)**

CO-5: Use the Multi-rate Processing concepts in various applications.**(K2)**

CO-6: Describe the concepts of DSP Processor. **(K3)**

UNIT I INTRODUCTION: Review of Signals and systems, Digital Signal Processing: Discrete time signals &sequences,Classification of Discrete time Systems, stability of LTI systems.Response of LTI systems toarbitrary inputs.Solution of Linear constant coefficient difference equations.Frequency domain representation ofdiscrete time signals and systems.

UNIT II DISCRETE FOURIER TRANSFORMS: Introduction to DTFT**,** Discrete Fourier transforms, Properties of DFT, Introduction to Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFTAlgorithms, Inverse FFT.

UNIT III REALIZATION OF DIGITAL FILTER: Review of Z-transform, digital filters, Block diagram representation of linear constant coefficient difference equations,Basic structures of IIR systems, Transposed forms.Basic structures of FIR systems.

UNIT IV DESIGN OF IIR and FIR DIGITAL FILTERS: Analog filter approximations – Butterworth and Chebyshev, Design of IIR Digital filters from Analog filters, Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniquesand Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Decimation, InterpolationSampling rate conversion, Implementation of sampling rate converters**,** Applications – Sub-band Coding of SpeechSignals.

UNIT VI INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs, Multiplier andMultiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs,Multiple Access Memory,Multiported memory, VLIW

architecture, Pipelining, Special addressing modes, On-Chip Peripherals.Introduction to Software Defined Radio.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications by John G. Proakis, DimitrisG.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing byA.V.Oppenheim and R.W. Schaffer, PHI

Reference Books:

1. Digital Signal Processing by Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing by MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. Digital Signal Processing byAlan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
4. Digital Signal Processing byRamesh babu, Sci Tech publications
5.Digital Signal Processing byA.NagoorKani, RBA Publications.

VI Sem.	Embedded Systems-1	Course Code: V18ECT17	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the Basic Concepts of embedded systems-**(K2).**

CO-2: Describe the characteristics of Application & Domain-Specific Embedded Systems -**(K2)**.

CO-3: Discuss various hardware, software design approaches in embedded environment- **(K2)**

CO-4: Develop programming and interfacing of 8051 using development tools –**(K3)**

CO-5: Explain the fundamental concepts of ARM Architecture. **(K2)**

CO-6: Develop ALP programs using ARM/Thumb instruction set. **(K3)**

UNIT I - INTRODUCTION TO EMBEDDED SYSTEMS

Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas, purpose of embedded systems, typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, embedded firmware.

UNIT II: APPLICATION AND DOMAIN-SPECIFIC EMBEDDED SYSTEMS

Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

UNIT-III: EMBEDDED HARDWARE / FIRMWARE DESIGN:

Analog and digital electronic components, I/O types and examples, Serial communication devices, Wireless devices**,** Embedded Firmware design approaches, Embedded Firmware development languages, DMA, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT IV- PROGRAMMING AND INTERFACING OF 8051

Interfacing: LEDs & switches interfacing, keypad is interfacing, Seven Segment Display interfacing, 16X2 LCD interfacing, stepper motor interfacing,serial port interfacing using Embedded C.

UNIT – V: ARM ARCHITECTURE

ARM Design Philosophy,ARM Core Data Flow Model,Registers, PSR, Pipeline, Interrupts and Vector Table, Architecture Revision, ARM Processor Families.

UNIT – VI: ARM PROGRAMMING MODEL

Instruction Set: Data Processing Instructions, Branch, Load, Store Instructions, PSR Instructions, Conditional Instructions.

Thumb Instruction Set: Register Usage, Other Branch Instructions, Data Processing Instructions, Single-Register and Multi Register Load-Store Instructions, Stack, Software Interrupt Instructions

Text Books:

1. "Embedded systems" by Shibu K.V Tata McGraw Hill Education Pvt. Ltd.2013

2. "Microcontrollers: Theory and Applications" by AJAY V DeshmukhTATA McGraw Hill publications2012

3. "ARM System Developer's Guide – Designing and Optimizing System Software" by Andrew Sloss, Dominic Symes, Chris Wright, , ELSEVIER

References:

1. "The8051Microcontroller:Architecture,Programming,andApplications" by Kenneth J.Ayala, WestPublishing

2. "8051Microcontrollers&EmbeddedSystems" by MuhammadAliMazdi PearsonEducation

3. "ARM System on chip Architecture" by Steve Furber2nd Edition | Pearson

VI Sem.	Microwave Engineering Professional Elective- II	Course Code: V18ECT18	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO 1 : Derive TE/TM modes in Rectangular waveguide and characteristics.**(K4)**
CO 2 : Illustrate the construction, operation and, Derive Power output and efficiency of Two cavity Klystron and Reflex klystron**(K4)**
CO 3: Illustrate the construction and operation of Travelling wave tube, cylindrical cavity magnetron and derive Hull cut off condition **(K4)**
CO 4: Explain operation of various passive waveguide components and calculate Scattering matrix for them **(K3)**
CO 5; Explain the operation of Microwave Solid State Devices and Understand basics of Microwave Integrated circuits and Materials for MIC**(K2)**
CO 6: Explain the procedure for measuring various microwave parameters using a Microwave test bench **(K2)**

UNIT I
MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides(RWG) – Solution of TE and TM wave equation in RWG- Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relation& Characteristics- Cavity resonators – Rectangular cavity resonator – Dominant mode – Resonant frequency – related problems.

UNIT II
MICROWAVE TUBES (O type) : Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working,
Bunching Process, Power Output, Efficiency, Applications, Related Problems.

UNIT III
HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants(Qualitative treatment).**M-type Tubes** Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron –Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT IV MICROWAVE PASSIVE COMPONENTS : Waveguide Attenuators- Waveguide phase shifters - Scattering Matrix-Significance, Formulation and Properties-Directional coupler –Magic Tee- operation and Scattering Matrix Calculation of E plane Tee, H plane Tee and Magic Tee and Directional coupler - Ferrite Components- Faraday rotation - Gyrator -Isolator and Circulator

UNIT V

MICROWAVE SOLID STATE DEVICES: TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes - Avalanche Transit Time Devices – IMPATT Diodes – Principle of Operation and characteristics, Detector Diode, PIN Diode applications,Introduction to MMIC-Monolithic Microwave Integrated circuits – Materials - Related Problems.

UNIT VI

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Impedance, Measurement of Dielectric constant

TEXT BOOKS:

1. Microwave Devices and Circuits by Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Foundations for Microwave Engineering by R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
3. "Microwave Engineering" by David M.Pozar , Fourth Edition, Wiley, India 2012.

REFERENCES:

1. Microwave Principles by Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
2. Microwave Engineering by Annapurna Das and SisirK.Das, McGraw Hill Education, 3rd Edition.
3. Microwave and Radar Engineering by M.Kulkarni, Umesh Publications, 3rd Edition.
4. Microwave Engineering by G S N Raju , I K International
5. Microwave and Radar Engineering by G SasibhushanaRao Pearson

	Professional Elective- II					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO- 1: Understand the concepts of NMOS and Pseudo NMOS designs. **(K2)**

CO- 2: Describe the combinational MOS Logic Circuits, **(K2)**

CO- 3: Explain the Principle and Performance of dynamic CMOS Circuits **(K2)**

CO-4: Apply the concepts of Combinational MOS Logic Circuits in Designing the Transmission Gates **(K2)**

CO- 5: Demonstrate the behavior of Bi-stable Elements and Flip flops**(K2)**

CO- 6: Calculate Leakage Currents in various semiconductor memories. **(K2)**

UNIT-I: MOS Design

NMOS & Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low Voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time; CMOS logic - Inverter, logic gates.

UNIT-II: Combinational MOS Logic Circuits:-**I**

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates,

UNIT-III: Combinational MOS Logic Circuits-II:

AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-IV: Sequential MOS Logic Circuits

Behavior of bitable elements, Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-V: Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits – Domino logic, NORA logic.

UNIT-VI: Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

TEXT BOOKS:

1. Digital Integrated Circuit Design by Ken Martin, Oxford University Press, 2011.

2. CMOS Digital Integrated Circuits Analysis and Design by Sung-Mo Kang, Yusuf Leblebici,TMH, 3rd Ed., 2011.

REFERENCE BOOKS:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective by Ming-BO Lin,CRC Press, 2011

2. Digital Integrated Circuits – A Design Perspective, by Jan M. Rabaey, AnanthaChandrakasan, BorivojeNikolic, 2nd Ed., PHI.

VI Sem.	Digital signal Processing Lab	Course Code: V18ECL09	L	T	P	C
			0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Design and simulate Digital IIR and FIR filter **(K3)**

CO-2: Develop and simulate Interpolator and Decimator **(K3)**

CO-3: Apply DSP algorithms for audio applications **(K3)**

CO-4: Apply DSP algorithms on a DSP processor for real time applications**(K3)**

List of Experiments:

PART - A

1. Convolution

(a)To perform linear convolution of two signals

(b)To perform circular convolution of two signals

2.Discrete Fourier Transform and Fast Fourier Transform

(a)To obtain a N-point DFT of a signal using recursive algorithm.

(b)To determine the FFT of a 1-D signal.

3. Digital IIR Filter Design

To design and simulate Infinite Impulse Response (IIR) filters and analyze their Responses

4. Digital FIR Filter Design

To design and simulate Finite Impulse Response (FIR) filters and analyze their Responses

5. Interpolator and Decimator Design

To design and simulate an Interpolator and Decimator.

6. Audio application

(a)Read a .wav file and plot time domain waveform of a speech signal

(b)Read a .wav file and Plot spectrograms with different window sizes and shapes

List of Experiments using CC Studio:

PART – B

TMS320C6713 Architecture

To study the architecture of TMS320C6713 DSP processor.

9. **Fast Fourier Transform**

To determine the FFT of a 1-D signal

10. **Digital IIR Filter Design**

To design Infinite Impulse Response (IIR) filters and analyze their responses in real time.

11. **Digital FIR Filter Design**

To design Finite Impulse Response (FIR) filters and analyze their responses in real time.

10.Power Spectral Density

To obtain the Power Spectral Density of a periodic signal in real time.

11 2 to3 week Mini Project.

VI Sem.	Computer Networks Lab	Course Code:	L	T	P	C
			0	0	3	1.5

		V18CSL35				

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Implement Error detection techniques **[K3]**

CO2: Implement Routing Algorithms **[K3]**

CO3: Implement Congestion Algorithms **[K3]**

CO4:Implement Sliding Window Algorithms. **[K3]**

CO5: Implement socket programming **[K3]**

List of Experiments:

From 1-4 simulation and 5-11 implement using C/C++/Java/Python

1. Study of basic network commands and Network configuration commands.
2. Implementation of Bit Stuffing
3. Implementation of Character Stuffing
4. Implementation of Dijkstra's algorithm
5. Implementation Distance vector algorithm
6. Construct Detecting error using CRC-CCITT
7. Implementation of stop and wait protocol
8. Implementation of Congestion control using leaky bucket algorithms
9. Implementation using Socket TCP both client and server programs.
10. Implementation using Socket UDP both client and server programs

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TEXT BOOKS:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH

REFERENCES:

1. An Engineering Approach to Computer Networks by S.Keshav, 2nd Edition, Pearson Education
2. Understanding communications and Networks by 3rd Edition, W.A. Shay, Thomson

VI Sem.	Internet of Things Open Elective- I	Course Code: V18ECTOE1	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO- 1: Describe M2M and IOT Technologies.**(K2)**

CO- 2: Identify the layers and protocols in IOT. **(K2)**

CO- 3: Describe various communication technologies used in IOT**. (K2)**

CO- 4: Demonstrate various hardware components required for IOT applications. **(K2)**

CO- 5: Identify the cloud technologies**. (K2**)

CO- 6: Explain the applications of IoT. **(K2)**

UNIT I – INTRODUCTION

Introduction from M2M to IoT - An Architectural Overview, building architecture, Main design principles and needed capabilities, An IoT architecture outline, M2M and IoTTechnologyFundamentals - Devices and gateways

UNIT II – IOT PROTOCOLS

Functionality of Layers in IoT –Study of protocols - Wireless HART, Z-Wave, 6LoWPAN, RPL,CoAP, MQTT.

UNIT III - COMMUNICATION TECHNOLOGIES IN IOT

IoT Connectivity – IEEE 802.15.4, Wi-Fi, Bluetooth, Zigbee, LPWAN, 5G Era.

UNIT IV - SYSTEM HARDWARE

Sensors, Actuators, Radio Frequency Identification, Introduction to Embedded Devices for IoT - RASPBERRY PI.

UNIT V – Cloud Computing

Data Collection, Storage and Computing Using a Cloud Platform for IoT Applications/Services.

UNIT VI - IOT APPLICATIONS

Real time applications of IoT - Smart and Connected Cities,Public Safety, Irrigation.

TEXTBOOKS:

1. “From Machine-to-Machine to the Internet of Things: Introduction to a New Age ofIntelligence”, 1st Edition, by Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, DavidBoyle, Academic Press, 2014.

2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet ofThings by David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,Cisco Press 800 East 96th Street Indianapolis, Indiana 46240 USA.

REFERENCE BOOKS:

1.From Internet of Things to Smart Cities: Enabling Technologies - edited by HongjianSun,Chao Wang, Bashar I. Ahmad, CRC Press -2018.

2.“Architecting the Internet of Things” by Bernd Scholz-Reiter, Florian Michahelles, , ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.

3.IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT byDavidEtter.

4.“Internet of Things (A Hands-on- Approach)” by Vijay Madisetti and ArshdeepBahga, 1 stEdition, VPT, 2014.

5.Internet of Things by Raj Kamal, McGraw-Hill Education. Copyright.

VI Sem.	Principles of Communication Systems (Open Elective- I)	Course Code: V18ECTOE2	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Demonstrate the fundamentals of communication systems **(K2)**

CO-2: Compare the various analog modulation and demodulation schemes**(K2)**

CO-3: Compare the various digital modulation and demodulation schemes **(K2)**

CO4: Explain the wireless communication system concepts**(K2)**

CO-5:outline the satellite communication system principles **(K2)**

CO-6:outline the Optical communication system principles **(K2)**

Unit-I

Fundamentals of Communication systems: Block diagram of communication system; types of communications-analog and digital; Noise–types of noise, sources of noise, and calculation of noise in linear systems, and noise figure.

Unit-II

Fundamentals of Analog Communication: Need for modulation; Types of modulation, generation and detection of AM, Angle modulation: frequency & phase modulations, comparison of AM, FM & PM. Sampling theorem, NY Quist criteria, introduction to PAM, PWM and PPM.

Unit-III

Fundamentals of Digital Communication: Advantages; Working principle of PCM; comparison of PCM, DM; introduction to digital modulation techniques-ASK, FSK, PSK.

UNIT-IV:

Fundamentals of Wireless Communication : Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Concepts of 2G, 3G, 4G. Wireless Local Loop(WLL),Wireless Local Area network(WLAN), Bluetooth and Personal Area Networks. Introduction to 5G.

Unit-V

Fundamentals of Satellite communication: Brief history of Satellite systems; Principles, architecture, advantages, disadvantages, applications and frequency bands used for satellite communication.

UNIT VI:

Fundamentals of Optical Communication: Evolution of fiber optic system- Element of an Optical Fiber Transmission link and Reception link- Total internal reflection- Acceptance angle –Numerical aperture Optical Fiber Modes and Configurations - Linearly Polarized Modes -Single Mode Fibers-Graded Index fiber structure.

Textbooks:

1. Principles of Communications by H. Taub and D. Schilling, TMH, 2003.
2. Wireless Networks: Applications and Protocols by T. S. Rappaport, Pearson Education
3. Satellite Communications by Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
4. Optical Fiber Communication by John M. Senior (Pearson)

References:

1. Electronic Communication Systems by Kennedy and Davis, TMH, 4th edition, 2004.
2. Wireless Communication and Networks: 3G and Beyond by I. SahaMisra, TMH Education.
3. Satellite Communications: Design Principles by M. Richharia, B S publications, 2nd Edition, 2003.
4. Optical Fibre Communication byGerd Kaiser (TMH)

VI Sem.	Introduction to VLSI Design (Open Elective- I)	Course Code: V18ECTOE3	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Demonstrate the fundamentals of IC technology such as various MOS fabrication technologies**.** **(K2)**

CO2: Computeelectrical properties of MOS circuits such as Ids – Vds relationship, And MOS circuit parameters **(K3)**

CO3: Develop stick diagrams, layouts using design rules of various MOS Technologies**.(K3)**

CO4: Compute the sheet resistance, area capacitance of various MOS layers And inverter delays. **(K3)**

CO5: Explain the various MOS circuit parameters scaling and assess the Effects of scaling. **(K2)**

CO6: Demonstrate VHDL synthesis, simulation, design capture tools design Verification tools. **(K2)**

UNIT –I Introduction

Introductionto IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison between CMOS and bipolar technologies.

UNIT – II

Basic electrical properties of MOS and BiCMOS circuitsI_{ds}–V_{ds}relationships – Aspects of MOS transistor threshold voltage – MOS Trans–conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull– up to pull–down ratio for nMOS inverter driven by another nMOS inverter for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

UNIT – III

MOS and BiCMOS circuit design process

MOS layers – Stick diagrams – Design rules and layout – General observation on the design rules, 2□m double metal, double poly – CMOS/BiCMOS rules, 1.2□m Double metal, Double poly CMOS rules – Layout diagrams of NAND and NOR gates and CMOS inverter – Symbolic Diagrams – Translation to MaskForm.

UNIT – IV

Basic circuit concepts

Sheet resistance – Sheet resistance concept applied to MOS transistor and inverters – Area capacitance of layers – Standard unit of capacitance – Some area capacitance calculations – The delay unit – Inverter delays – Driving large capacitive loads – Propagations Delays – Wiring Capacitance – Fan–in and Fan–out characteristics – Choice of layers – Transistor switches – Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT – V

Scaling of MOS circuit

Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density.

UNIT – VI :VHDL MODELLING:

Simulation – Logic Synthesis – Inside a logic synthesizer – Constraints – Technology libraries – VHDL and logic synthesis – Functional gate – Level verification – Place and route – Post layout timing simulation – Static timing

– Major net list formats for design representation – VHDL synthesis – Programmingapproach.

Text Books:

1. Essentials of VLSI Circuits and Systems by Kamran Eshraghian, Douglas and A.Pucknell and SholehEshraghian, Prentice–Hall of India Private Limited, 2005Edition.
2. VLSI Design by K. LalKishor and V.S.V.Prabhakar, I.K. International Publishing House Private Limited, 2009 First Edition.
3. VLSI Design by A.Shanthi and A.Kavitha, New Age International Private Limited, 2006 FirstEdition.

References Books:

1. VLSI Design ByDebaprasad Das, Oxford UniversityPress,2010.
2. VLSI Design ByA.Albert Raj & T. Latha, PHI Learning Private Limited, 2010.

VI Sem.	Fundamentals of Microprocessors & Microcontrollers (Offered by ECE to EEE)	Course Code: V18ECT 23	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Describe the basic architecture of 8086 microprocessor along with signal Descriptions, modes of operation ,stack structure and interrupt responses**(K2).**
CO-2: Construct assembly language programs using the concepts of addressing Modes and instructions with a programming tool- **(K3).**
CO-3: Demonstrate interfacing of 8086 with memory and programmable peripheral Devices-**(K3).**
CO-4: Examine the Architecture and operation of 8051 Microcontrollers, timers and ports **(K2)**
CO-5: Explain about PIC Microcontrollers with their architecture - **(K2).**
CO-6: Describe the Data types, I/O programming, logical operations, data conversion **(K2)**

UNIT–I:Introduction to Microprocessor Architecture
Introduction and evolution of Microprocessors– Architecture of 8086–Register Organization
of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to
80286–80386 and 80486 and Pentium.

UNIT–II:Minimum and Maximum Mode Operations
Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086
Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:I/O Interface
8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using
8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor Interfacing– Static memory interfacing with 8086–DMA controller (8257)– Architecture–
Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)– Command
Words and operating modes of 8259.

UNIT–IV:Introduction to 8051 Micro Controller

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– V:PIC Architecture

Block diagram of basic PIC 18 micro controller, registers I/O ports.

UNIT– VI:Programming in C for PIC

Data types, I/O programming, logical operations, data conversion

Text Books:

1."The 8051 Micro Controller Architecture, Programming andApplications", by Kenneth J Ayala, Thomson Publishers, 2nd Edition.
2. PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18 by Muhammad Ali Mazidi, RolindD.Mckinay , Danny causey -Pearson Publisher 21st Impression.

Reference Books:

1. "A Text book of Microprocessors and Micro Controllers" by R.S. Kaler, I.K. International Publishing House Pvt. Ltd.
2. "Microcontrollers – Theory and Applications" by Ajay V. Deshmukh, Tata McGraw–Hill Companies –2005.
3. "Microcontrollers – Principles and Applications" by Ajit Pal, PHI Learning Pvt Ltd, 2011.
4. Microprocessors and Interfacing by Douglas V Hall, Mc–Graw Hill, 2nd Edition.
5. "Advanced Micro Processors and Interfacing" by Ray and Burchandi, , Tata McGraw–Hill.

Sem.	Lab (Offered by ECETo EEE)	Code: V18ECL 10	0	0	2	1

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO-1: Develop algorithm and logic for different operations using 8086 Instructions. **(K3)**
CO-2: Construct simple programs for 8086 using Assembler directives (MASM)/Machine control Instructions. . **(K3)**
CO-3: Develop ALP to perform arithmetic and logical operations using various instructions.. **(K3)**
CO-4: Develop ALP to perform conversions, finding squares of a numbers by using Loop, Jump instructions. . **(K3)**
CO-5: Develop the ALP to Interface the various peripherals to 8086 microprocessors. . **(K3)**
CO-6: Develop ALP to perform arithmetic and logical operations using 8051 Microcontroller Instruction set .**(K3)**

Any 10 of the following experiments are to be conducted:

I. Microprocessor 8086&Microcontroller 8051
Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and Division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move block, Reverse string sorting,
Inserting, Deleting, Length of the string, String comparison.
4. Interfacing 8255–PPI
5. Interfacing 8259 – Interrupt Controller.
6. Interfacing 8279 – Keyboard Display.
7. Stepper motor control using 8253/8255.
8. Reading and Writing on a parallel port using 8051
9. Timer in different modes using 8051
10. Serial communication implementation using 8051
11. Understanding three memory areas of 00 – FF Using 8051 external interrupts.
12. Interface PIC 18 with an opt isolator
13. Interface PIC 18 with a DC motor

COURSE STRUCTURE for B.TECH (ECT)

III Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT01	Electronic Devices & Circuits	3	1	-	4
2	V18ECT02	Digital System Design	3	-	-	3
3	V18ECT03	Signals & Systems	3	1	-	4
4	V18ECT 04	Network Theory	3	-	-	3
5	V18MBT51	Managerial Economics & Financial Analysis	3	-	-	3
6	V18ECL01	Electronic Devices & Circuits LAB	-	-	2	1
7	V18ECL02	Digital System Design LAB	-	-	2	1
8	V18ENT03	Professional Comm. Skills- I	3	-	-	MNC
9	V18ENT11	Constitution of India	2	-	-	MNC
		TOTAL	**20**	**2**	**4**	**19**

Total Contact Hours: 26 **Total Credits : 19**

IV Semester

S. No	Course Code	Course Name	L	T	P	Credits
1	V18ECT07	Analog & Digital Communications	3	1	-	4
2	V18ECT08	Analog Circuits	3	1	-	4
3	V18ECT09	Probability Theory & Stochastic Process	3	1	-	4
4	V18ECT10	Electromagnetic Waves & Transmission Lines	3	1	-	4
5	V18MAT03	Mathematics-III	3	-	-	3
6	V18ECL 05	Communications Lab	-	-	2	1
7	V18CSL32	Object Oriented Programming Through Java Lab	-	-	2	1
8	V18ECL06	Analog Circuits Lab	-	-	2	1
9	V18ENT04	Professional Comm. Skills- II	3	-	-	MNC
		TOTAL	**18**	**4**	**6**	**22**

Total Contact Hours: 28 **Total Credits: 22**

Course : Electronic Devices And Circuits
Code : V18ECT01

L	T	P	C
3	1	-	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the basic concepts of semiconductor physics and explain the formation of p-n Junction. **[K2]**
2. Discuss special semiconductor diodes. **[K2]**
3. Construct and working principle of rectifiers with and without filters with relevant expressions and necessary comparisons **[K3]**
4. Describe the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations. **[K2]**
5. Explain the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions. **[K2]**
6. Analyze small signal low frequency transistor amplifier circuits using BJT and FET in different configurations. **[K4]**

Syllabus:

UNIT-I: Semi-Conductor Physics & Junction diode characteristics: Review of semiconductor physics, continuity equation, law of junction, p-n junction diode, current components in PN junction Diode, derivation of diode equation, V-I Characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

UNIT- II: Special Semiconductor Diodes: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, LDR, Photo diode, Photo transistor, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT, Construction, operation and characteristics of all the diodes are required to be considered.

UNIT- III: Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, L-section filter, π-section filter multiple L section and π-section filter, derivation for ripple factor in each case.

UNIT- IV: Transistor Characteristics: BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, and characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, punch through/ reach through, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- V: Transistor Biasing and Thermal Stabilization: Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self-bias, Stabilization against variations in VBE, Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability. FET Biasing.

UNIT- VI: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, Generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers. Generalized analysis of FET amplifier small signal model, analysis of CS amplifier.

Text Books:

1. Electronic Devices and Circuits by J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Integrated Electronics by Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.
3. Electronic Devices and Circuits by R.L Boylestad and Louis Nashelsky, Pearson publications

References:

1. Electronic Devices and Circuits by K. Satya Prasad, VGS Book Links.
2. Electronic Devices and Circuits by Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
3. Electronic Devices and Circuits by Bell, Oxford
4. Electronic Devices and Circuits by A.P Godse,U.A.Bakshi , Technical publications

Course: Digital System Design
Code:V18ECT02

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the various types of number systems and their conversions, codes and logic Gates.**(K_2)**
2. Apply the minimization techniques to simplify the hardware requirements of digital circuits. **(K_3)**
3. Develop basic digital circuits with combinational logic using IEEE Standard 1076 Hardware Description Language (VHDL). **(K_3)**
4. Develop basic digital circuits with sequential logic using IEEE Standard 1076 Hardware Description Language (VHDL). **(K_3)**
5. Apply the knowledge of flip flops to construct different finite state machines **(K_3)**
6. Explain the concepts of different programmable logic devices. **(K_2)**

UNIT – I: **NUMBER SYSTEMS & CODES**

i) Representation of numbers of different radix, conversion from one radix to another radix, r-1's and r's complements of signed members, problem solving.
ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 code etc.,
iii) Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS forms, Gray code, error detection and correction codes, NAND-NAND and NOR-NOR realizations.

UNIT – II: MINIMIZATION TECHNIQUES

Boolean theorems, principle of complementation & duality, De-Morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 4 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

COMBINATIONAL LOGIC CIRCUITS DESIGN - I

Design of half adder, full adder, half subtractor, full subtractor, 4-bit adder-subtractor circuit, BCD adder circuit, Look-a-head adder circuit.

UNIT – III: COMBINATIONAL LOGIC CIRCUITS DESIGN -II

Design of decoder, encoder, priority encoder, multiplexer and demultiplexer, 4-bit digital comparator, Higher order multiplexing and demultiplexing, Realization of Boolean functions using decoders and multiplexers, Modeling of combinational logic circuits using VHDL.

UNIT – IV: SEQUENTIAL CIRCUITS-I

Classification of sequential circuits, basic flip-flops, truth tables and excitation tables, Conversion from one flip-flop to another flip-flop.
Design of registers: shift register, bi-directional shift register and universal shift register. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Modeling of sequential circuits using VHDL

UNIT – V: SEQUENTIAL CIRCUITS-II

Finite state machine, Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures.Realization of circuits using various flip-flops.Mealy to Moore conversion and vice-versa.

UNIT-VI: INTRODUCTION TO PLDs

PROM, PAL, PLA-Basics structures, merits & demerits, comparison, realization of Boolean functions and programming tables using PROM, PAL, PLA.

TEXT BOOKS:

1. Switching and finite automata theory by ZviKohavi,TMH, 2nd edition, 2008
2. Switching Theory and Logic Design by A. Anand Kumar, PHI Learning Pvt. Ltd, 3rd edition, 2016.
3. Digital Design Principles & Practices by John F. Wakerly, PHI/ Pearson Education Asia, 3rd edition, 2005.

REFERENCES:

1. Modern Digital Electronics by RP Jain, TMH Education Pvt., Ltd.,, 4th edition, 2010.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
3. Fundamentals of Digital Logic with VHDL Design by Stephen Brown, ZvonkoVranesic, McGraw-Hill, 3rd Edition.

Course :Signals& Systems
Code : V18ECT03

L	T	P	C
3	1	-	4

Prerequisite: Fundamentals of Electrical Circuits, Linear Algebra and Differential Equations, Ordinary Differential Equations.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Apply the knowledge of linear algebra to vector space& analogy, orthogonality and basic signals.**K3**

CO2: Classify systems based on their properties and determine the response of LTI system using convolution **K2**

CO3: Analyze the spectral characteristics of continuous-time signals and systems using Fourier analysis **K4**

CO4: Apply sampling theorem concept to convert continuous time signals to discrete time signal and reconstruct.**K3**

CO5: Apply Laplace transform and inverse Laplace transform to analyze continuous time signals and systems with respect to ROC.**K3**

CO6: Apply Z transform to analyze discrete time signals and systems with respect to ROC.**K3**

UNIT-I

BASIC SIGNALS: Introduction to signal and system, Classification of Signals, Elementary signals, Signal properties and operations, orthogonal signal space, Signal approximation using orthogonal functions.

UNIT-II

LINEAR-TIME INVARIANT SYSTEMS: Properties of Systems, Continuous-Time LTI Systems: The Convolution Integral; Properties of Linear Time-Invariant Systems; Causal LTI Systems Described by Differential and Difference Equations.

UNIT III

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS: Trigonometric and Exponential Fourier series, Fourier series Representation of Continuous-Time Periodic Signals(Sinusoidal, triangular and square); Convergence of the Fourier series.

Fourier Transforms: Representation of Aperiodic Signals; The Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform.

UNIT-IV

Representation of a Continuous-Time Signal by its Samples; The Sampling Theorem; Reconstruction of a Signal From its Samples; The Effect of Under Sampling; Aliasing; Discrete-Time Processing of ContinuousTime Signals; Sampling of Discrete-Time Signals.

UNIT-V

Laplace Transforms: The Laplace transform; The Region of Convergence for Laplace Transforms; The Inverse Laplace Transform; Properties of the Laplace Transform; Laplace Transform Pairs; Analysis and Characterization of LTI Systems Using the Laplace Transform.

UNIT-VI

Z-Transforms: The Region of Convergence for the Z-Transform; Properties of the Z-Transform; Z-Transform Pairs; Analysis and Characterization of LTI Systems using Z-Transforms.

TEXT BOOKS:

1. Signals and Systems by A.V. Oppenheim and A.S. Willsky with S. H. Nawab, Second Edition, PHI Private limited.
2. Signals and Systems, Second Edition by S. Haykin and B. Van Veen, John Wiley & Sons.
3. "Principles of Linear Systems and Signals" by B. P. Lathi, Second Edition, Oxford, 2009.

REFERENCES:

1. "Signals & Systems - Continuous and Discrete" by R.E.Zeimer, W.H.Tranter and R.D.Fannin, Pearson, 2007.
2. "An Introduction to Signals and Systems" by John Alan Stuller, Thomson, 2007. 40
3. "Signals & Systems Analysis using Transform Methods & MATLAB" by M.J.Roberts, Tata McGraw Hill, 2007.
4. ocw.mit.edu › Supplemental Resources › Signals and Systems
5. www.satishkashyap.com/2012/04/iit-video-lectures-on-signals-and.html
6. nptel.ac.in/courses/117104074/1
7. www.cdeep.iitb.ac.in/nptel/.../Signals%20and%20System/TOC-M1.htm
8. freevideolectures.com/Subject/Signals-Systems

Course :Network Theory
Code : V18ECT04

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Solve the electrical network using mesh and nodal analysis **(K3)**
2. Apply network theorems to analyze the Electric circuits.**(K3)**
3. Explain RLC transient circuits and Filters **(K2)**
4. Describe the steady state analysis of RLC circuits**(K2)**
5. Analyze the resonance circuits **(K4**)
6. Solve the two port network parameters **(K3)**

UNIT – I

Introduction to Electrical Circuits : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination, Capacitance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources.

UNIT-II

Network theorems: Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, - problem solving using dependent sources also.

UNIT – III

Transients: Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, problem solving using R-L-C elements with DC excitation. Solutions using Laplace transform method.

UNIT – IV

Steady State Analysis of A.C Circuits: Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, problem solving.

UNIT – V

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, anti resonance at all frequencies.

UNIT – VI

Two-port networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission parameters, h-parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascade connection of two port networks, series connection of two port networks, problem solving.

TEXT BOOKS:

1. Electric Circuit Analysis by Hayt and Kimmarle, TMH EigthEdition ,2012.
2. Network Analysis by Van-Valkenberg.

REFERENCES:

1. Circuit Theory (Analysis and Synthesis) By ABHIJIT Chakrabarti 7th Revised Edition,DhanpatRai&Co.
2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
3. Network Analysis and Filter Design by Chadha, Umesh Publications.
4. Circuits & Network Analysis & Synthesis byA.Sudhakar&Shyam Mohan S.Pillai Tata McGraw Hill, 2nd Edition, 1994.

Course :Managerial Economics and Financial Analysis
Code : V18MBT51

L	T	P	C
3	-	-	3

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Understand the basic concepts of managerial economics, demand, and elasticity of demand and methods of demand forecasting. **[K2]**
CO2: Estimate the production function with one, two and infinite variables. Understand various cost concepts and calculating breakeven point **[K2]**
CO3: Understand and showing a price output determination in different types of market structures and knowing various pricing methods **[K2]**
CO4: Understand various forms of business organizations **[K2]**
CO5: Prepare financial statements and its analysis. **[K3]**
CO6: Appraise the projects by using various capital budgeting methods **[K4]**

UNIT-I Introduction to Managerial Economics and demand Analysis: Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

UNIT – II Production and Cost Analyses: Concept of Production function- Cobb-Douglas Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total cost –Cost–Volume-Profit analysis-Determination of Breakeven point(simple problems)Managerial significance and limitations of Breakeven point.

UNIT – III Introduction to Markets, & Pricing Policies: Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing, Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

UNIT – IV Types of Business Organization and Business Cycles: Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

UNIT – V Introduction to Accounting & Financing Analysis: Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis

UNIT – VI Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods and modern methods (simple problems)

TEXT BOOKS

1. 'Managerial Economics and Financial Analysis' by Dr. N. AppaRao, Dr. P. Vijay Kumar: Cengage Publications, New Delhi – 2011
2. Managerial Economics and Financial Analysis by Dr. A. R. Aryasri –TMH 2011
3. 'Managerial Economics and Financial Analysis' by Prof. J.V.Prabhakararao, Prof. P. Venkatarao. Ravindra Publication.

REFERENCES:

1. Managerial Economics & Financial Analysis by ShailajaGajjala and UshaMunipalle, Univerties press, 201 Dr. B. Kuberudu and Dr. T. V. Ramana: Himalaya Publishing House, 2014.
2. Managerial Economics by V. Maheswari: Sultan Chand.2014
3. Managerial Economics by Suma Damodaran: Oxford 2011.
4. Managerial Economics by VanithaAgarwal: Pearson Publications 2011.
5. Financial Accounting for Managers by Sanjay Dhameja: Pearson
6. Financial Accounting, byMaheswari: Vikas Publications.
7. Managerial Economics and Financial Analysis by S. A. Siddiqui&A. S. Siddiqui: New Age International Publishers, 2012
8. Indian Economy by Ramesh Singh, 7th Edn., TMH2015
9. A Text Book of Microeconomic Theory by PankajTandon Sage Publishers, 2015

Course: Electronic Devices and Circuits Lab
Code : V18ECL01

L	T	P	C
-	-	2	1

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO-1 : Identify, Test and describe the specifications of various components. **[K2]**
CO-2: Find the unknown Frequency using Cathode Ray Oscilloscope. **[K1]**
CO-3: Interpret the Characteristics of various semiconductor devices. **[K2]**
CO-4: Sketch the Regulation Characteristics of Zener Diode. **[K3]**
CO-5: Examine the Performance of Rectifiers with and without Filters.**[K3]**
CO-6 : Sketch the Frequency Response of Amplifiers and Compute Bandwidth. **[K3]**

Electronic Workshop Practice:

1. Identification, Specifications, and Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices like Diodes, BJTs, JFETs, LEDs, UJT.
3. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO..

List of Experiments:

1. P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias only)
   Part B: Silicon Diode (Forward & Reverse bias)
2. Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
3. Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
4. BJT Characteristics (CB Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
5. BJT Characteristics (CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
6. FET Characteristics (CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
7. UJT Characteristics
8. BJT-CE Amplifier
9. Emitter Follower-CC Amplifier
10. FET-CS Amplifier
11. MINI Project

Course :Digital System Design Lab
Code : V18ECL02

L	T	P	C
-	-	2	1

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Examine the logic behavior of various IC gates.**(K_3)**
2. Construct and test combination logic circuits.**(K_3)**
3. Construct and test synchronous Asynchronous sequential circuits. **(K_3)**
4. Develop and Simulate Combinational logic circuit and validate its functionality using VHDL on Xilinx Software Package. **(K_3)**
5. Develop and Simulate Sequential logic circuit and validate its functionality using VHDL on Xilinx Software Package. **(K_3)**

LIST OF EXPERIMENTS

Part A: USING HARDWARE (Minimum of 5 Experiments to be done)

1. Verification of Basic Logic Gates and implementing all individual gates with Universal Gates.
2. Construct Half Adder and Full Adder using Half Adder and verify the truth table.
3. Design a Combinational Logic circuit for 3X8 Decoder and verify the truth table.
4. Design a Combinational Logic circuit for 4x1 MUX, 1X4 De-MUX and verify the truth table.
5. Verification of truth tables of the basic Flip- Flops with Synchronous and Asynchronous modes.
6. Design a Decade Counter and verify the truth table.

Part B: USING XILINX Tool (Minimum of 5 Experiments to be done)

Note: The students are required to design and draw the internal logical structure of the following Digital Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

1. Design of Full Adder using 3 modeling systems.
2. 8to 3 Encoder (with and without parity).
3. 4- Bit comparator-IC 7485.
4. Flip-Flops (D/SR/JK Flip-Flops).
5. 4 bit binary up/down counter-IC74193.
6. Shift registers-IC 7495.
7. MINI Project (Compulsory)

Course :Analog& Digital Communications
Code : V18ECT07

L	T	P	C
3	1	-	4

Pre requisites: Signals and systems, Mathematics.

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain the spectral characteristics, generation and detection techniques of Amplitude modulation techniques **(K2)**
2. Explain the spectral characteristics, generation and detection techniques of angle modulation techniques **(K2)**
3. Illustrate different types of noise and predict its effect on analog communication Systems.**(K3)**
4. Describe the generation and detection methods of various digital modulation schemes.**(K2)**
5. AnalyzeOptimal Reception of Digital Signal and explain various multiple access techniques.**(K4)**
6. Describe the concepts of error control coding **(K2).**

UNITI

Analog Modulation: Need for modulation, Frequency Division Multiplexing, **Linear Modulation Techniques** - AM, DSB-SC, SSB, VSB - Time domain and frequency domain description, single tone modulation, power relations - Generation &Detection.Applications, AMTransmitters, AM Receivers - Super-heterodyne receiver, IF, AGC.

UNIT II

Angle Modulation: Phase and Frequency Modulation, Narrow band and Wide band FM, Carsons rule, Indirect and direct method of FM generation, Detection of FM, Applications, Phase locked loop, Comparison of FM and AM. FMTransmitters, FM Receivers.

UNIT III

Noise in Analog Communication system: Noise in DSB &SSB system, Noise in AM system, Noise in Angle Modulation system,Pre-emphasis and de-emphasis.

Pulse Modulation: Time Division Multiplexing,PAM, PWM, PPM-Generation and Detection.

UNIT IV

Digital Modulation Systems: Pulse Modulation: Baseband signals. Sampling process; Quantization Process; Quantization Noise; Pulse-Code Modulation; Noise Considerations in PCM Systems; Differential Pulse-Code Modulation, Delta modulation, adaptive delta modulation, Amplitude, phase and frequency shift keying schemes (ASK, PSK, FSK), M-array modulation schemes.

UNIT V

Optimal Reception of Digital Signal: Matched filter receivers, optimum receiver - bandwidth consideration and probability of error calculations for these schemes.

Multiple Access Techniques: TDMA, FDMA and CDMA

UNIT VI

Information theory and Error control Coding: Measure of information – Entropy, Information rate– Source coding theorem – Channel capacity – Shannon-Hartley law – Shannon's limit-Error, control Codes – Linear codes, Cyclic codes, Convolution Coding.

TEXT BOOKS:

1. "An Introduction to Analog & Digital Communications" by Simon Haykin and Michael Moher, 2nd Ed., Wiley, (2007).
2. "Principles of Communication Systems" by H Taub& D. Schilling, GautamSahe, TMH, 3rd Edition, (2007).
3. "Electronics Communication Systems- Fundamentals through advanced" by Tomasi, Wayne, 5th Edition, Pearson Education, 2009
4. "Modern Digital &Analog Communications Systems" by Lathi, 2e, Oxford University Press

REFERENCE BOOKS:

1. "Modern Communication Systems: Principles & Applications" by Loen W. Couch, Prentice Hall, (P621.382/84), (1995)
2. "Communication Systems: An Introduction to Signals and Noise in Electrical Communications" by Bruce Carlson, Paul B. Crilly and Janet C. Rutledge, 4th Edition, McGraw-Hill, (2002).
3. "Communication Systems" by Simon Haykin, 4th Edition, John Wiley & Sons, (2001).
4. "Communication Systems: Fundamentals and Design Methods" by NevioBenvenuto, Roberto Corvaja, TomasoErseghe, and Nicola Laurenti, John Wiley & Sons, (2006).
5. "Principles of Digital Communication and Coding" by Andrew J. Viterbi & Jim K. O, McGraw-Hill Book Company.
6. "Digital Communications - Fundamentals and Applications" by Bernard Sklar, 2E, Prentice Hall.
7. "Digital and Analog Communication Systems" by Sam Shanmugam, K, Wiley publisher (2006).

Course: Analog Circuits
Code: V18ECT08

L	T	P	C
3	1	-	4

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Construct wave shaping circuits for various applications**(K3**)
2. Analyze transistor amplifier circuits at low and high frequencies.**(K4)**
3. Explain the operation of Feedback and Power amplifiers **(K2)**
4. Explain the operation of sinusoidal and non-sinusoidal oscillators**(K2)**
5. Construct circuits for different applications using ICs.**(K3)**
6. Explain the operation of Active filters and Data Converters**(K2)**

Unit I

Wave shaping circuits: Response of high pass and low pass RC circuits to step, pulse inputs. High pass RC circuit as differentiator, low pass RC circuit as integrator. Series and shunt clippers, clipping at two independent levels, Positive and Negative Clampers.

Unit II

Transistor at High frequencies: Hybrid π CE transistor model, CE short circuit current gain, Current gain with resistive load, Gain bandwidth product.

Multistage amplifiers: Low frequency analysis of cascade and cascade amplifiers.

Unit III

Feedback and Power amplifiers: Voltage series, current series, voltage shunt, current shunt feedback amplifiers, effect of negative feedback. Various classes of operation (Class A, B, AB, C), power efficiency calculations.

Unit IV

Oscillators: Oscillators: Basic concept, Barkhausen criterion, RC oscillators (phase shift, Wien bridge), LC oscillators (Hartley, Colpitts) Non-sinusoidal oscillators:Bistable, Monostable and AstableMultivibrators.

Unit V

Integrated Circuits and applications: Op-amp Block Diagram, Ideal Op-amp, Equivalent Circuit, Power supplies, Ideal voltage transfer curve, open loop op-amp configurations. Inverting and non-inverting amplifiers, summing, scaling, averaging amplifier, integrator and differentiator, 555 timer functional block diagram, Astable and Monostablemultivibrators.

Unit VI

Active filters and Data Converters: First order Low pass, high pass, band pass and band stop filters, all pass filter design guidelines.Weighted resistor DAC, R-2R ladder DAC. Dual slopes ADC, Successive approximation ADC, flash ADC.

Text Books:

1. Integrated Electronics by J. Millman and C.C. Halkias, TMH
2. Electronic Devices and Circuits bySalivahanan, N.Suresh Kumar, A. Vallavaraj, TMH
3. Pulse, Digital and Switching Waveforms by J. Millman and H. Taub, TMH
4. Pulse and Digital Circuits by A. Anand Kumar, PHI
5. Linear Integrated Circuits by D. Roy Choudhury, 4th edition, New Age International (p) Ltd.
6. Op-Amps & Linear Integrated Circuits byRamakanth A. Gayakwad,3rd edition, PHI.

References :

1. Electronic Devices and Circuits Theory by Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall.
2. Electronic Circuit Analysis byB.V.Rao, K.R.Rajeswari, P.C.R.Pantulu, K.B.R.Murthy, Pearson Publications.
3. Pulse & Digital Circuits by BN Yoga Narasimhan, 2000,SriMaruthi Publishers, Bangalore.
4. Operational Amplifiers & Linear Integrated Circuits by Sanjay Sharma ;SK Kataria&Sons;2nd Edition,2010

Course: Probability Theory & Stochastic Processes

L	T	P	C
3	1	-	4

Code : V18ECT09

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Explain basic concepts of probability theory through Sets and Relative Frequency **[K2]**
2. Explain the concept of a random variable, functions based on random variable like distribution and density functions **[K2]**
3. Compute the expected value, moments on one random variable **[K3]**
4. Illustrate the concepts of joint distribution & density functions on multiple random variables and their transformations with examples **[K3]**
5. Compute the statistical characteristics of stochastic processes like auto correlation & cross correlation functions.**[K3]**
6. Calculate the power density spectrum and cross power- density spectrum of signals **[K3]**

UNIT I: PROBABILITY :Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events

UNIT II: **THE RANDOM VARIABLE**: Definition of a random variable, Discrete, continuous and mixed random Variables. Distribution & density functions and its properties of a random variable.Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh random variables.Conditional distribution and density functions and its properties.

UNIT III: OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, expected value of a random variable, function of a random variable, moments about the origin, central moments, variance, characteristic function, moment generating function, transformations of a random variable: Monotonic transformations for a continuous random variable

UNIT IV: MULTIPLE RANDOM VARIABLES : Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density, statistical independence, sum of two random variables, sum of several random variables, central limit theorem: unequal distribution, equal distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint moments about the origin, joint central moments, joint characteristic functions, jointly Gaussian random variables: two random variables case, N-random variables case

UNIT V: RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of Stationarity and statistical independence. First-order stationary processes, second-order and wide-sense Stationarity, nth-order and strict-sense Stationarity, time averages and Ergodicity, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions

UNIT VI: RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The power density spectrum: properties, relationship between power density spectrum and autocorrelation function, the cross-power density spectrum, properties, relationship between cross-power density spectrum and cross-correlation function.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles by Peyton Z. Peebles, TMH, 4th Edition, 2001.
2. Probability, Random Variables and Stochastic Processes byAthanasios Papoulis and S.UnnikrishnaPillai, PHI, 4th Edition, 2002.
3. Probability Theory and Stochastic Processes by Y. Mallikarjuna Reddy, 4th Edition, Universities Press,

REFERENCE BOOKS:

1. Probability Theory and Stochastic Processes by B. PrabhakaraRao, BS Publications
2. Probability and Random Processes with Applications to Signal Processing by Henry Stark and John W. Woods, Pearson Education, 3rd Edition.
3. Outline of Probability, Random Variables, and Random Processes bySchaum
4. An Introduction to Random Signals and Communication Theory by B.P. Lathi, International Textbook, 1968.
5. Random Process byLudeman , John Wiley
6. Probability Theory and Random Processes by P. Ramesh Babu, McGrawHill, 2015.

L	T	P	C
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Course: Electro Magnetic Waves & Transmission Lines

Code : V18ECT10

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Use Various laws of static electric field to determine E. **(K3**)
2. Use Various laws of magneto static field to determine H and Apply Maxwell's equations to analyze the time varying behavior of EM waves **(K3)**
3. Compute the Propagation Characteristics of the EM Waves in different mediums. **(K3)**
4. Calculate Brewster angle, critical angle and total internal reflection.**(K3)**
5. Compute Primary and Secondary constants for a given transmission line**(K3)**
6. Calculate reflection coefficient, VSWR etc. using smith chart**(K3)**

UNIT I: Review of Co-ordinate Systems, **Electrostatics:** Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Types of Capacitance Illustrative Problems.

UNIT II: Magneto Statics : Biot-Savart Law, Ampere's Circuital Law andApplications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems.

Maxwell's Equations (Time Varying Fields): Faraday's Law andTransformeremf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Introduction to Boundary conditions.Illustrative Problems.

UNIT III: EM Wave Characteristics - I: Wave Equations for Conducting and PerfectDielectric Media, Uniform Plane Waves – Definition, All Relations between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media.Wave Propagation in Good Conductors and Good Dielectrics.Polarization.Illustrative Problems.

UNIT IV: EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Pointing Theorem – Applications, Illustrative Problems.

UNIT V: Transmission Lines - I : Types, Parameters, Transmission Line Equations,Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless line. Condition for DistortionlessLine.Illustrative Problems.

UNIT VI: Transmission Lines – II : Input Impedance Relations, SC and OC Lines,Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single Stub Matching. Illustrative Problems.

TEXT BOOKS:

1. Elements of Electromagnetic by Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems by E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Electromagnetic field theory and Transmission Lines byG.SasibhusanaRao,Wiley India Pvt.L

REFERENCES:

1. Electromagnetic Fields and Wave Theory by GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics by William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
3. Transmission Lines and Networks byUmeshSinha, SatyaPrakashan (Tech. India Publications), New Delhi, 2001.
4. Electromagnetic waves & Radiating Systems, Prentice Hall, India 3.by NarayanaRao, N: Engineering Electromagnetics, 3rd ed., Prentice Hall, 1997.
5. Engineering Electromagnetics by William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006

Course: Analog Circuits Lab
Code: V18ECL06

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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO 1- Construct circuit for linear wave shaping circuits. **[K3]**

CO 2- Construct feedback amplifiers and obtain their characteristics **[K3]**

CO 3- Construct different RC and LC oscillators using BJT based on the frequency Range. **[K3]**

CO 4-Construct circuit and analyze different multivibrator circuits.[**K4]**

CO 5- Construct circuits for verifying linear and nonlinear applications using IC 741op-amp and IC 555 timer [**K3]**

CO 6- Sketch the Frequency Response Characteristics of Active filters **[K3]**

Minimum Ten Experiments to be conducted:

1. Linear wave shaping
2. Non Linear wave shaping
3. Voltage-Series Feedback Amplifier
4. Class B Push-Pull Power Amplifier
5. RC Phase Shift/Wien Bridge Oscillator
6. Hartley/Colpitt's Oscillator
7. BistableMultivibrator.
8. Summing, Scaling, Averaging amplifiers using IC 741.
9. Integrator and Differentiator Circuits using IC 741.
10. AstableMultivibrator using IC 555.
11. Active Filters – LPF, HPF (first order)
12. 4 bit Digital to Analog Converter

Course: Communications Lab
Code : V18ECL05

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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO-1- Demonstrate the operation of various pulse modulation and demodulation techniques. **[K3]**

CO-2 -Construct the pre-emphasis and de-emphasis circuits and verify its frequency response. **[K3]**

CO-3 -Demonstrate the spectrum analysis of modulated signal using spectrum analyzer, operation of AGC and PLL **[K3]**

CO-4- Understand the Time division multiplexing and Demultiplexing, Pulse digital modulation techniques, such as PCM, DPCM, and DM, Companding theorem **[K2]**

CO-5- Understand generation and detection of digital modulation techniques, such as ASK, PSK, FSK and DPSK. **[K2]**

CO-6- Verify the Source encoding and decoding (Huffman Coding) technique and channel encoding and decoding techniques. **[K3]**

List of Experiments (Ten experiments are to be done)

A. Analog Communications
   1. Amplitude Modulation - Mod. &Demod.
   2. AM - DSB SC - Mod. &Demod.
   3. Spectrum Analysis of Modulated signal using Spectrum Analyzer
   4. Pre-emphasis & De-emphasis
   5. Frequency Modulation - Mod. &Demod, PLL.
   6. Sampling Theorem - Pulse Amplitude Modulation - Mod. &Demod.
   7. PWM , PPM - Mod. &Demod.

B. Digital Communications
   1. Pulse code modulation, Differential pulse code modulation.
   2. Delta modulation, Companding.
   3. ASK, FSK, PSK.
   4. Differential phase shift keying.
   5. Source Encoder and Decoder
   6. Channel coding-
      i. Linear Block Code-Encoder and Decoder
      ii. Binary Cyclic Code – Encoder and Decoder
      iii. Convolution Code – Encoder and Decoder

Courses Offered by ECE to CST Branch in III SEMESTER

Course : Digital Electronics
Code : V18ECT06
Branch: III Semester CST

L	T	P	C
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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

1. Illustrate the conversion of a number from one number system to another. **[K3]**
2. Classify Boolean theorems & simplify the Boolean functions using the Boolean properties. **[K2]**
3. Use K-map as a tool to simplify and design logic circuits **[K3]**
4. Construct different combinational Logic circuits like MUX, Decodersand Encoders etc. **[K3]**
5. Demonstrate the basic flip-flops in terms of truth table & excitation table **[K2]**
6. Apply the concepts of flip-flops in the designing of different sequential circuits like registers, counters, etc. **[K3]**

UNIT1: Number systems& Binary codes:

Number systems: Number Systems, Radix conversions, complement of numbers. Binary codes: Binary codes, Weighted and non-Weighted codes, BCD code, gray code, excess 3 codes.

UNIT -II: Concept of Boolean algebra:

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms, Logic gates: NOT, OR, AND, NOR, NAND, XOR, XNOR - Universal gates.

UNIT- III: Gate level Minimization:

Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation.

UNIT- IV:Combinational Logic:

Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Decoders, Encoders, Multiplexers.

UNIT V: **Sequential Logic Circuits**:

Introduction –Latches and Flip flops: Basic Flip flop circuit, RS, D, JK and T Flip-flops – Triggering of Flip flops: Master Slave Flip flop, edge triggered flip flop – Conversion of one type of Flip flop to another.

UNIT -VI: Registers and Counters:

Registers and Counters: Shift Register, Universal Shift Register, Applications of Registers, Asynchronous counter, Synchronous counter, Mod-N Counter, binary up/down counter, Ring counter, Johnson counter.

Memories: Introduction to ROM, PROM, EPROM.

TEXT BOOKS:

1. Digital Design by 5/e, M.Morris Mano, Michael D Ciletti, PEA.

2. Fundamentals of Logic Design by 5/e, Roth, Cengage.

REFERENCE BOOKS:

1. Digital Logic and Computer Design byM.Morris Mano, PEA.

2. Digital Logic Design by Leach, Malvino, Saha, TMH.

3. Modern Digital Electronics by R.P. Jain, TMH

Course : Digital Electronics Lab
Code : V18ECL04
Branch: III Semester CST

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COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO1: Apply the Boolean algebra to design digital logic circuits. **[K3]**

CO2: Analyze the behavior of different combinational logic circuits. **[K4]**

CO3: Analyze the behavior of different sequential logic circuits **[K4]**

CO4: Construct and troubleshoot simple combinational and sequential circuits **[K3]**

List of Experiments

Minimum Ten Experiments to be conducted:

Study of Integrated Circuits, Bread board& Power supplies.

1) Verification of Basic LogicGates
2) Verification of Universal Gates, Special Gates.
3) Verify the De-Morganlaws using CMOS IC's
4) Design a Gray code encoder & Decoder using IC 7486
5) Construct a Half Adder using IC's and verify the truth table.
6) Construct a Half Subtractor using IC's and verify the truth table.
7) Verify the truthtableof IC 74138(3x8 Decoder)
8) Verify the truthtable of IC 74153(4x1 MUX).
9) Verify the D Flip- Flop Using IC7474 with PRESET, CLEAR asynchronous Inputs.
10) Verify JK Flip- Flop & T Flip-Flop Using IC7476 with PRESET, CLEAR asynchronous Inputs.
11) Verify Decade counter using IC7490.
12) Design 4-bit right Shift Register using D-Flip-Flop and verify the truthtable.