SCHEME & SYLLABUS

for

M.TECH. COURSE

in

ELECTRONICS AND COMMUNICATION ENGINEERING

(w.e.f. Session 2017-2018)

DEPARTMENT OF ELECTRONICS ENGINEERING

YMCA UNIVERSITY OF SCIENCE AND TECHNOLOGY FARIDABAD

VISION

YMCA University of Science and Technology aspires to be a nationally and internationally acclaimed leader in technical and higher education in all spheres which transforms the life of students through integration of teaching, research and character building.

MISSION

- To contribute to the development of science and technology by synthesizing teaching, research and creative activities.
- To provide an enviable research environment and state-of-the-art technological exposure to its scholars.
- To develop human potential to its fullest extent and make them emerge as world class leaders in their professions and enthuse them towards their social responsibilities.

Department of Electronics Engineering

VISION

To be a Centre of Excellence for producing high quality engineers and scientists capable of providing sustainable solutions to complex problems and promoting cost effective indigenous technology in the area of Electronics, Communication & Control Engineering for Industry, Research Organizations, Academia and all sections of society.

MISSION

- To frame a well-balanced curriculum with an emphasis on basic theoretical knowledge as well the requirements of the industry.
- To motivate students to develop innovative solutions to the existing problems for betterment of the society.
- Collaboration with the industry, research establishments and other academic institutions to bolster the research and development activities.
- To provide infrastructure and financial support for culmination of novel ideas into useful prototypes.
- To promote research in emerging and interdisciplinary areas and act as a facilitator for knowledge generation and dissemination through Research, Institute - Industry and Institute-Institute interaction.

About Electronics Engineering Department

YMCA University of Science & Technology, Faridabad established in 2009, formerly known as YMCA Institute of Engineering, Faridabad, established in year 1969 as a Joint Venture of Govt. of Haryana and National Council of YMCA of India with active assistance from overseas agencies of West Germany to produce highly practical oriented personnel in specialized field of engineering to meet specific technical manpower requirement of industries. Electronics Engineering Department started in 1969 and has been conducting B.Tech. Courses in Electronics Instrumentation and Control and Electronics and Communication Engineering of 4-Years duration since 1997. Students are admitted through centralized counseling nominated by state govt. in 1st Year and 2nd year through lateral entry entrance test. Besides under graduate degree courses, it is also running M.Tech. Courses in VLSI, Instrumentation and Electronics & Communication. Department of Electronics Engineering is also running Ph.D. Programme. All courses are duly approved by AICTE/ UGC. The Electronics Engineering Department has been well known for its track record of employment of the pass out students since its inception.

The Department has good infrastructure consisting of 11 laboratories, 10 Lecture Halls and 1 Conference Room beside 6 workshops. It has excellent faculty with 2 Professors, 4Associate Professors and 23 Assistant Professors. At present, 6 faculty members are PhD in various specializations. The various syllabi of UG/PG courses have been prepared with active participation from Industry. The Department is organizing number of expert lectures from industry experts for students in every semester. Seven month training is mandatory for every B.Tech. Students. Emphasis has been given on project work and workshop for skill enhancement of students. Choice based credit system allows students to study the subjects of his/her choice from a number of elective courses /audit courses.

Program Educational Objectives:

Students of the Master of Technology programs in Electronics & Communication Engineering will demonstrate

1. Employability in the diversified sectors of the core industry, public sector or multinational corporations in the domain of semiconductor, microelectronics, wireless communication, optical and satellite communication, networking etc. and/or pursue higher education in technologies related to communication and networking platforms at institutes of high repute.
2. To provide technical skills in software and hardware tools related to the design and implementation of Communication and Embedded Systems
3. To inculcate research culture in the learners of the program with abilities to publish at national/international level and develop prototype technologies in the related domain.
4. Attitude of lifelong learning and skills of effective inter-person communication resulting in leading diverse teams, with ethical and social behavior.

Program Outcomes:

On successful completion of the Program, the students will be able to

1. Demonstrate in-depth knowledge in the specialized domain of Analog & Digital Electronics, Microelectronics, digital communication, satellite communication, wireless communication, microwave & antenna, signal and image processing, embedded systems
2. Analyze complex engineering problems critically in the domains of Communication Engineering and Electronics Systems for conducting research.
3. Solve engineering problems to arrive at optimal solutions in the fields of Electronics and Communication Systems complying with societal needs.
4. Apply appropriate research methodologies and techniques for the development of scientific and technological knowledge in Analog & Digital Electronics, Microelectronics, Digital Communication, Satellite Communication, Wireless Communication, Microwave & Antenna, Signal and Image Processing, Embedded Systems and Allied Areas.
5. Apply appropriate resources and modern tools to complex engineering activities in the field of Electronics and Communication systems.
6. Contribute to collaborative-multidisciplinary scientific work, demonstrate capacity for self-management, teamwork and decision making.
7. Manage projects as a member and leader with understanding of engineering and management principles with consideration to economic and financial factors.
8. Communicate effectively in professional and personal domains through verbal, written and graphical forms.
9. Engage in life-long learning to improve knowledge and competence in the world of rapid technological changes.
10. Follow ethical code of conduct in professional activities with understanding of responsibility for sustainable development of society.
11. Adapt to reflective self learning for continuous personal and professional development.
12. Participate and succeed in competitive examinations like GATE (for placements in PSU's),GRE (for higher studies).

M. TECH. (Electronics and Communication Engineering)

SCHEME AND SYLLABUS

Total Credits : 78

Total Theory Subjects : 12+1 (AC) + 1(GEC)+ 1(MOOCs)

Total Labs (including Seminars & Projects) : 07

Total Dissertation : 01

Total Teaching Schedule:

Lectures	Practical	Total
54	12	66

Total Marks:

Sessionals	End Term	Total
675	1675	2350

Itemised Break-up:

	No.	Hours	Marks	Credits
Theory Subjects	12+3*	54	1300	51+4(MOOCs)
Labs	6	12	300	6
Seminar	1	2	50	1
Project	1	4	200	4
Thesis	1	1 Semester	500	12
Total	21+3*		2350	75+4(MOOCs)

*MOOCs+GEC+AC

FIRST SEMESTER

Subject Code	Subject Title	Credit / (L-T-P)		Marks Weightage		Total (Theory +Sessional)
				Theory	Sessional	
E16C 601	Advanced Microprocessor &Micro Controllers	4	4-0-0	75	25	100
E16C 603	Satellite &Space communication	4	4-0-0	75	25	100
E16C 605	Data Communication & Networking	4	4-0-0	75	25	100
E16C 607	Information & Communication Theory	4	4-0-0	75	25	100
				External	Internal	
E16C 609	Satellite Communication Lab	1	0-0-2	35	15	50
E16C 611	Advanced Microprocessor &Micro Controllers lab	1	0-0-2	35	15	50
E16C 613	Data Communication & Networking Lab	1	0-0-2	35	15	50
	Total	19	16-0-6	405	145	550

SECOND SEMESTER

Subject Code	Subject Title	Credit / (L-T-P)		Marks Weightage		Total (Theory +Sessional)
				Theory	Sessional	
E16C 602	Advanced Digital Signal Processing	4	4-0-0	75	25	100
E16C 604	Optical Communication	4	4-0-0	75	25	100
E16C 606	Wireless Communication	4	4-0-0	75	25	100
	Elective 1 *	4	4-0-0	75	25	100
	Audit Course	0	3-0-0	-	-	-
	MOOCs**	4	0	-	-	-
				External	Internal	
E16C 610	Optical Communication Lab	1	0-0-2	35	15	50
E16C 612	Advanced Digital Signal Processing Lab	1	0-0-2	35	15	50
E16C 614	Seminar	1	0-0-2	--	50	50
	Total	23	19-0-6	370	180	550

***The student will have to select a subject from list of elective as under.**

****passing the MOOCs course is compulsory as per UGC guidelines, these online courses can be registered on UGC website under "Swayam" program. Four credits for the MOOCS course are to be earned in any semester from II to IV.**

THIRD SEMESTER

Subject Code	Subject Title	Credit (L-T-P)		Marks Weightage		Total (Theory +Sessional)
				Theory	Sessional	
E16C 701	Electronic System Design	4	4-0-0	75	25	100
E16C 703	Digital Communication	4	4-0-0	75	25	100
	Elective II *	4	4-0-0	75	25	100
	Elective III *	4	4-0-0	75	25	100
	General Elective Course	3	3-0-0	75	25	100
				External	Internal	
E16C 719	Minor Project	4	0-0-4	140	60	200
E16C 717	MATLAB	1	0-0-2	35	15	50
	Total	24	19-0-6	550	200	750

***The student will have to select a subject from list of elective as under**

FOURTH SEMESTER

Subject Code	Subject Title	Credit (L-T-P)		Marks Weightage	
				External	Internal
E16C 702	Dissertation	12	0-0-24	350	150
	Total	12	0-0-24	500	

List of Elective `

Elective –I

i. VLSI Design (E16C 608 A)
ii. Nano Technology (E16C 608 B)
iii. Data Structure & Programming Language (E16C 608 C)
iv. Antenna Design Theory (E16C 608 D)

Elective – II

i. Image Processing (E16C 705 A)
ii. Neural Networks And Fuzzy Logic (E16C 705 B)
iii. Advanced Mathematics for Engineers (E16C 705 C)
iv. Semiconductor Device Modeling (E16C 705 D)

Elective – III

i. Multimedia System (E16C 707 A)
ii. Statistical Method (E16C 707 B)
i. Security in Communication Network (E16C 707 C)
ii. Embedded System (E16C 707 D)

Audit Course

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	AC-101C	German- I	2	0
2.	AC-102C	German –II (With German – I as prerequisite)	2	0
3.	AC-103C	French – I	2	0
4.	AC-104C	French –II (With French – I as prerequisite)	2	0
5.	AC-105C	Sanskrit – I	2	0
6.	AC-106C	Sanskrit – II (With Sanskrit– I as prerequisite)	2	0
7.	AC-107C	Personality Development	2	0
8.	AC-108C	Interview and Group Discussion Skills	2	0
9.	AC-109C	Yoga and Meditation	2	0
10.	AC-110C	Art of Living/ Living Skills	2	0

11.	AC-111C	Contribution of NSS towards Nation/Role of NSS	2	0
12.	AC-112C	Physical Education	2	0

GENERAL ELECTIVE COURSES

Students have to select General Elective Course from the given list:

Courses offered by Computer Engineering Department

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	GC-101C	Intelligent Systems	3	3
2.	GC-102C	Cyber laws and Security	3	3
3.	GC-103C	Soft Computing	3	3
4.	GC-104C	Web Technology and Information Retrieval	3	3
5.	GC-105C	Intellectual Property and Rights	3	3

Courses offered by Electrical Engineering Department

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	GL-201C	Installation Testing & Maintenance of Electrical Equipments	3	3
2.	GL-202C	Utilization of Electrical Power & Traction	3	3

Courses offered by Mechanical Engineering Department :

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	GM-301C	Industrial Engineering	3	3
2.	GM-302C	Quality Management	3	3

3.	GM-303C	Automobile Engineering	3	3
4.	GM-304C	CAM and Automation	3	3
5.	GM-305C	Manufacturing Processes	3	3
6.	GM-306C	Power Plant Engineering	3	3

Courses offered by Electronics Engineering Department

(Not for Electronics Engineering students):

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	GE-401C	Microprocessor and Interfacing	3	3
2.	GE-402C	Digital Signal Processing	3	3
3.	GE-403C	Instrumentation and Control	3	3
4.	GE-404C	Data Communication and Networking	3	3

Courses offered by HAS Department

S.No.		Name of Course	No. of Contact Hours	Credits
1.	GA-501C	Soft Skills for Engineers	3	3
2.	GA-502C	Maths –III	3	3

Courses offered by MBA Department

S.No.		Name of Course	No. of Contact Hours	Credits
1.	GB-601C	Human Resource Management	3	3
2.	GB-602C	Financial Management	3	3
3.	GB-603B	Marketing Management	3	3
4.	GB-604B	Entrepreneur Development	3	3
5.	GB-605B	Principles of Management and Economics	3	3

Courses offered under Open Elective

The syllabus of open elective will be standard one taken from reputed Institute/University.

S.No.	Code	Name of Course	No. of Contact Hours	Credits
1.	GO-701C	Physical Education	3	3
2.	GO-702C	Indian History	3	3
3.	GO-703C	General Psychology	3	3
4.	GO-704C	Fundamentals of Linguistics Science	3	3
5.	GO-705C	Swami Vivekanand's Thoughts	3	3
6.	GO-706C	National Integration	3	3
7.	GO-707C	Moral Values	3	3

SESSIONAL MARKS

The allocation of theory and sessional weightage for end semester examination would be as under:-

1. **For Theory**
    a) Sessional Weightage 25%
    b) End Semester Exam 75%
2. **For Practical**
    a) Sessional Weightage 30%
    b) End Semester Exam 70%

The academic performance of a student shall be graded on a TEN-POINT SCALE and the awards for grades based upon marks obtained out of 100 shall be made as follow:

Marks %	Grade	Grade points	Category
90-100	**O**	**10**	**Outstanding**
80<marks<90	**A+**	**9**	**Excellent**
70<marks< 80	**A**	**8**	**Very good**
60<marks< 70	**B+**	**7**	**Good**
50<marks< 60	**B**	**6**	**Above average**
45<marks< 50	**C**	**5**	**Average**
40<marks< 45	**P**	**4**	**Pass**
<40	**F**	**0**	**Fail**
	Ab	**0**	**Absent**

Percentage calculation= CGPA * 9.5

E16C-601 ADVANCED MICROPROCESSOR MICROCONTROLLERS

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objective:

- To introduce students to design of basic microprocessor architectural concepts, memory addressing architectural & ALU.
- To introduce the students to various types of instruction interrupts and I/O devices.
- To introduce the students to 8051architectural, programming model & instructions.
- To introduce the students regarding architectural of advanced microprocessor, addressing models, instruction set & interrupts.
- To introduce the students regarding interfacing I/O devices, A/D converter & D/A convertors to microprocessor.
- To introduce the students for developing microprocessor based products.

Syllabus

Unit 1

Design of basic microprocessor architectural Concepts :Microprocessor architecture, word Lengths, addressable memory, Microprocessor's speed architectural characteristics, registers, instruction, memory addressing architecture ,ALU, GPR's Control logic & internal data bus.

Unit 2

Microprocessor Instructions &Communication: Instruction Set ,Mnemonics, Basic Instruction Types , Addressing modes ,Microprocessor I/O connecting I/O put to Microprocessor ,Polling and Interrupts, Interrupt and OM. Controllers.

Unit 3

Microcontroller: Introduction 8051 architecture and programming model. Internal RAM and registers, I/O ports, Interrupt system &Instruction sets.

Unit 4

Advanced Micro processors: lntel X86 family of advanced Microprocessor, programming model for 86 family. X86 addressing modes, instruction set, hardware of 186, 286, 386, 486 & Pentium processors. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes, instruction set, hardware.

Unit 5

Microprocessor 110: Data Communication, parallel I/O serial communication, Serial interface and UART, modems, I/O devices, D/A,A/D interface, special I/O devices.

Unit 6

Developing Microprocessor Based Products: Introduction to the Design Process, Preparing the specifications, Developing a design, Implementing and Testing and design, Regulatory Compliance Testing, design tool for Microprocessor Development.

Text Books:

1. C.M. Gilmore, "Microprocessors Principals and Application", MGH
2. Rajkamal, "Embedded System, Architecture &Programming",TMH

Reference Books:

1. Berry B. Berry, "Inter Series of microprocessors", PHI
2. D. V. Hall, "Microprocessor &Interfacing", TMH
3. Peatman, "Microprocessor Based System Design", Pearson

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand the microprocessor architecture, programming and instructions.
- Understand the concepts of 8051, instructions, addressing models and programs.
- To interface I/O devices, A/D & D/A converters with microprocessor & microcontroller.
- Understand the advanced microprocessors along with their architecture, programming model & addressing models.
- Understand the testing & design tolls for microprocessor development and its based product.

E16C-603 **SATELLITE AND SPACE COMMUNICATION**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- Evolution & growth of satellite communication, GEO, MEO,LEO satellite.
- Satellite link design equations, System noise temperature, C/N & G/T ratio
- To introduce digital modulation techniques for satellite communication.
- To introduce laser satellite communication, optical satellite communication.

Syllabus

Unit 1

Introduction: Satellite communication, Brief History.

Unit 2

Orbits of satellite: Low, medium and Geo synchronous mam characteristics, Angle period, Returning period, Angle of Evaluation, Propagation Delay, Orbital Spacing.

Unit 3

Satellite Links: Delay transponders, Earth Stations, Antennas and Earth coverage, Altitude and eclipses.

Unit 4

Earth space propagation effects: Frequency window, Free space loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of satellites.

Unit 5

Detection: QPSK offset QPSK and MSK. Coherent and non-coherent detection, Error rate performance.

Unit 6

Synchronization: Principle and techniques, Multiple Access Techniques, FDMA, SPADE system, TDMA system, concept and configuration, system timing frames format, SSMA-Basu Principles, YSAT, Random access, space communication, link design description of operational in TELSAT and INSAT system.

Text Books:

1. J. Martin: Communication Satellite System, PH Englewood.
2. D.C.Aggarwal: Satellite Communication, Khanna Publishers.

Reference Books:

1. Tri Ha Digital Satellite Communication Tata McGraw Hill.
2. Harry and Yam Trees: Satellite Communication, IEEE Proceedings, 1979.

Course Outcomes: On successful complete of this course, the students should be able to:

- Know the Evolution & growth of satellite communication, Synchronous satellite, Satellite frequency allocation & Band spectrum
- System noise temperature, C/N & G/T ratio, Atmospheric & Ionospheric effects on link design
- Understand about Synchronous orbital telemetry, tracking and command, communication and antenna subsystems
- Able to know multiple access techniques
- Learn about Link analysis of laser satellite communication, Optical satellite link transmitter, Optical satellite and Deep Space Optical Communication.

E16C-605 **DATA COMMUNICATION NETWORKING**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To make students know about the data communication and networking
- To make students know about digital data communication
- To make students know about data Link Control, Link Configurations and Protocol principles
- To provide students mathematical formulations and the derivations of various parameters
- To make students know about Communication Networking Techniques
- To make students know about Computer Communication Architecture and ISDN Networks

Syllabus

Unit 1

Introduction to Data Transmission: Overview of Data Communication and networking, Analog and Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding.

Unit 2

Digital Data Communication Techniques: Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces

Unit 3

Data Link Control: Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.

Unit 4

Multiplexing: F.D.M. Synchronous TDM, Statistical TDM

Unit 5

Communication Networking Techniques: Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology, the ring topology, Medium Access control protocols *(CSMAlCD,* Token ring, FDDI, DQDB).

Unit 6

Computer Communication Architecture: OSI and TCP/IP Model, Protocol And Architecture, Networking Access protocols, Inter Networking, Transport layer Protocols, Session Service And Protocols, and Presentation! Application protocols

Unit 7
ISDN Networks: Concepts & Architecture, Protocols

Text Books:
1. William Stallings, "Data and Computer Communication", PHI, 4th Ed.
2. Forouzan, "Data communications and networking",TMH

Reference Books:
1. Andrew Tanenbaum, "Computer Networking", PHI
2. Godbole, "Data communications and network", TMH

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about the data communication and networking
- Understand about digital data communication
- Understand about data Link Control, Link Configurations and Protocol principles
- Understand about mathematical formulations and the derivations of various parameters
- Understand about Communication Networking Techniques
- Understand about Computer Communication Architecture and ISDN Networks

E16C-607 INFORMATION &COMMUNICATION THEORY

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To make students know about the Concept of Information and Entropy, Shanon's theorems and Channel Capacity Self information
- To make students know about digital data communication
- To make students know about Source encoding &channel encoding, Error detection & Correction
- To provide students about codes used in Information Theory
- To make students know about performance of codes

Syllabus

Unit 1

Information Theory: Concept of Information and Entropy, Shanon's theorems, Channel Capacity Self information, Discrete and Continuous entropy, Mutual and joint information, Redundancy.

Unit 2

Coding Theory: Source encoding &channel encoding, Error detection & Correction, Various codes for channel coding, Rate Distortion functions.

Unit 3

Codes used in Information Theory: Linear block codes, systematic linear codes& optimum coding for Binary symmetric channel, The Generator & parity check matrices, Syndrome decoding & Symmetric channels, Hamming codes, Weight enumerator, Perfect codes, BCH codes, Idempotent &Mattson Solomon polynomials, Reed Solomon codes, Justeen codes, MDS codes & generalized BCH codes, Convolution codes & Viterbi decoding algorithm.

Unit 4

Performance of codes: Performance of linear block codes & convolution codes, code incurable error probability Upper & lower bounds.

Text books:

1. Blahut R.E., Theory and practice of error control codes, A WL1983.
2. Wilson, Digital Modulation and coding, Pearson

Reference Books:

1. B.P. Lathi, Communication System, Oxford
2. Ranjan Bose, Information Theory, Coding & Cryptography, TMH

3. Dass. , S.K. Malik & P.K. Chatterjee, Principles of digitals communication

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand the need to measure the information and the way to extract information contents from given messages or from probability of message. To understand the Different types of channels and their characteristics.
- Gain enough knowledge about the concept of channel capacity and the maximum amount of amount of information to be sent by the source so that message can be encoded and decoded successfully.
- Understand the basic concept of source and channel coding and their necessity in communication engineering. To know how it become possible to tolerate a high amount of noise in the communication channel by correcting the resulting error.
- Understand to convert a message signal given in terms of probability into digital bits using different ways of source encoding and calculating and comparing efficiency of different codes.
- Understand the concept of redundancy bits added to the digitally encoded signal and effect of redundancy bits on the channel encoder.
- Understand different types of error correcting coding techniques such as Linear, cyclic, hamming coding, BCH Code, convolution code, MDS etc
- Detect and correct the error occurred in signal and decode/extract message signal from the received signal after correction of error bits.
- Learn and compare the characteristics such as hamming distance, coding gain and error probability of different error correcting coding techniques and lower and upper bound for the minimum error probability.

E16C-609 SATELLITE COMMUNICATION LAB

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. To study about satellite uplink transmitter, downlink receiver and link emulator.
2. To setup an active satellite communication link.
3. To setup a passive satellite communication link.
4. To measure the baseband analog signal parameters in a satellite link.
5. To study the effect of fading and measure the fading margin of a received signal.
6. To measure the S/N ratio, FM improvement and G/T.
7. To study the phenomenon of linear and circular polarization of antenna.
8. To send the telecommand and receive the telemetry data and study the operation of the codec.
9. To measure the C/N ratio.
10. To measure the propagation delay of signal in a satellite communication link.

Course Outcomes:

On successful completion of this course, the students should be able to:

- Understand satellite communication link.
- Understand fading, signal parameters in analog link, polarisation, S/N, G/T, C/N ratios.
- Measure propagation delay in satellite communication link.

E16C-611 **Advanced Microprocessor & Micro Controllers Lab**

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. Study of 8086 Microprocessor kit, its operation and commands.
2. Write a well documented program for copying 12 bytes from source to destination on 8086 Microprocessor kit.
3. Write a program for 8086 for division of a defined double word (stored in a data segment) by given double word.
4. Write a well documented program for finding square root of given number on 8086 Microprocessor kit.
5. Write a program using 8086 and verify for:

(a) Finding largest number from an array.
(b) Finding smallest number from an array.

6. Write a program using 8086 for arranging an array of numbers in descending order.
7. Write a program using 8086 for arranging an array of numbers in ascending order.
8. Write a program for 8086 for finding square of a number using look up table.
9. Write a program to interface a two-digit number using 7 segment LEDs, use 8086 microprocessor and 8255 PPI.
10. Write a program to control the operation of stepper motor using 8086 microprocessor and 8255 PPI.

Course Outcomes:

On successful completion of this course, the students should be able to:

- Understand microprocessor 8086.
- Implement various mathematical functions using microprocessor 8086.
- Implement look up table technique.
- Understand the operation based on strings.
- Understand the concept of interfacing with different peripherals(SSD and Stepper motor).

E16C-613 **Data Communication & Networking Lab**

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. Write a program to implement IP addressing.
2. Write a program to implement Bit Stuffing.
3. Write a program to implement byte stuffing.
4. Write a program to implement Slotted Aloha.
5. Write a program to implement CRC (Cyclic Redundancy Check).
6. Write a program to implement two dimensional parity check.
7. Write a program to implement various topologies.
8. Write a program to implement a shortest path routing protocol.
9. Write a program to implement hamming code.
10. Write a program to implement diffie hellman algorithm.
11. Write a program to implement DES algorithm.

Course Outcomes:

On successful completion of this course, the students should be able to:

- Implement various detection and correction techniques used in Data Communication.
- Able to understand how routing is done in networks.
- Able to understand how data is protected using symmetric and asymmetric key cryptography technique.

E16C-602 **ADVANCED DIGITAL SIGNAL PROCESSING**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To analyze of different type of signals and systems.
- To analyze the DTFT AND DFT and their properties, fast fourier transform (FFT), decimation in time algorithm, decimation in frequency algorithm.
- To understand the use of sampling and reconstruction and to understand the use of z-transform in discrete time systems.
- To analyze the different types of structures of FIR and IIR systems and to design IIR filters, design of FIR using windows, properties of FIR filters.
- To describe the effects of finite word lengths and truncation and rounding in digital signal processing for IIR and FIR filters.

Syllabus

Unit 1

Introduction of DSP: Introduction to Signal Processing, Discrete Linear Systems, superposition Principle, Unit-Sample response, stability &causality Criterion.

Unit 2

Fourier Transform &inverse Fourier transform: Frequency domain design of digital filters, Fourier transform, use of Fourier transform in Signal processing. The inverse fourier transform, Sampling continuous function to generate a sequence, Reconstruction of continuous –time signals from Discrete-time sequences.

Unit 3

DFT &FFT &Z transform with Applications: Discrete Fourier transform, properties of DFT, Circular Convolution, Fast Fourier Transform, Realizations of OFT. The Z transform, the system function of a digital filter, Digital Filter implementation from the system function, the inverse Z- transform, properties &applications, Special computation of finite sequences, sequence of infinite length &continuous time signals, computation of fourier series &time sequences from spectra.

Unit 4

Digital Filter Structure &Implementation: Linearity, time- invariance &causality, the discrete convolution, the transfer function, stability tests, steady state response, Amplitude &Phase characteristics, stabilization procedure, Ideal LP Filter, Physical reliability &specifications.FIR Filters, Truncation windowing &Delays, design example, IIR Filters: Review of design of analog filters &analog frequency

transformation. Digital frequency transformation. Design of LP filters using impulse invariance method, Bilinear transformation, Phase equalizer, digital all pass filters.

Unit 5

Implementation of Filters: Realization block diagrams, Cascade &parallel realization, effect of infinite-word length, transfer function of degree 1&2, Sensitivity comparisons, effects of finite precision arithmetic on Digital filters.

Text Books

1. Alam V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing" PHI.
2. JG Proakis, "Digital Signal Processing", (PHI) 3rd Edition.

Reference Books

1. Rabiner & Gold, "Theory & application of digital Signal Processing", PHI 1992.
2. Roman kuc, "Introduction to Digital Signal Processing," McGraw hill Edition.

Course Outcomes: On successful complete of this course, the students should be able to:

- Analyze of different type of signals and systems.
- Analyze the DTFT AND DFT and their properties, fast fourier transform (FFT), decimation in time algorithm, decimation in frequency algorithm.
- Understand the use of sampling and reconstruction and to understand the use of z-transform in discrete time systems.
- Analyze the different types of structures of FIR and IIR systems and to design IIR filters, design of FIR using windows, properties of FIR filters.
- Describe the effects of finite word lengths and truncation and rounding in digital signal processing for IIR and FIR filters.

E16C-604 **OPTICAL COMMUNICATION**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

1. To introduce the students about Basic of optical communication system and elements of fiber communication link
2. To introduce the students about basic theory of optics, ray theory and electromagnetic mode theory for optical propagation
3. To introduce the students about transmission characteristics of optical fibers, attenuation and their types, Dispersion and mathematical expressions
4. To introduce the students about basic principles of optical sources like LED and LASER and their characteristics and applications.
5. To introduce the students about basic principles of optical detector, characteristics of p-n photodiode and p-i-n photodiode & APD.
6. To introduce the students about Driver circuits for LED and LASER operation, Optical receiver, Link power budget, Rise time budget

Syllabus

Unit 1

Introduction: General Communication system, Elements of fiber communication link, Advantages and disadvantages of optical fiber communication ,Application of optical fiber communications, limitation of optical fiber communications

Unit 2

Optical fiber cross section and index profile, propagation of light wave in optical fiber, Ray theory and electromagnetic mode theory for optical propagation, step index and graded index fibers, critical angle, Acceptance angle, Numerical Aperture.

Unit 3

Attenuation, Material Absorption, scattering losses (Rayleigh Scattering),Fiber bend losses, Core and Cladding losses, Dispersion in optical fiber, Intermodal dispersion, Intermodal dispersion, pulse spread by material dispersion, dispersion shifted and dispersion flattered fiber.

Unit 4

Optical Sources: Principal of light emitting diode (LED), LED Power and Efficiency, Characteristic of LED, LASER, Basic concept: Absorption and Emission of Radiation, population inversion, spontaneous emission, Efficiency of LASER, Laser to fiber Coupling, Advantages of LASER over LED.

Unit 5

Optical Detector: Principal for optical detection, Characteristics of Photo Detectors, P.N Photo Diodes, P.I.N Photo Diodes, Response time of photodiode, Avalanche photodiode, Silicon Reach through Avalanche photodiode, Multiplication factor, Noise in APD.

Unit 6

Introduction of optical communication system, Drive circuits for LED operation, Drive circuits for LASER operation, Optical receiver, Preamplifier, Automatic gain control, Link power Budget, Rise time budget, Homodyne and heterodyne detection, Phase diversity receiver, Optical TDM, WDM.

Text books :

1. John Gowar, "Optical Communication Systems", PHI.
2.Gerd Keiser, "Optical Fiber Communication", TMH

Reference Books:

1. Franz JH & Jain VK, "Optical Communication", Narosa Pub Ins
2. John M. Senior, "Optical Communication", PHI

Course Outcomes: On successful complete of this course, the students should be able to:

1. Understand basic of optical communication system and their advantages over conventional communication systems. Application and limitation of optical communication.
2. Understand basic theory of optics and different types of optical fibers.
3. Understand basic transmission characteristics of optical fiber like attenuation and dispersion.
4. Understand basic principal of optical sources like LED and LASER, their characteristics.
5. Understand principal of optical detectors like p-n photodiode p-i-n photodiode and APD.
6. Understand basic driver circuits for LED and LASER operation, concept of Optical receiver, Link power budget and rise time budget calculation, Optical TDM and WDM.

E16C-606 WIRELESS MOBILE COMMUNICATION

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To study of different type generations (1G,2G,3G,4G) and different types of standards(AMPS,GSM,CDMA,IS-95 etc) and to learn the concept of cellular geometry, concept of cellular system, analog and digital cellular system, architecture of GSM, GPRS.
- To learn the Frequency reuse concept, system capacity, channel assignment strategies, interference, hard handoff, soft handoff of cellular system.
- To understand the different type of multiple access techniques like TDMA, FDMA, SDMA, CDMA, Packet radio protocols.
- To understand the mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumara model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake's channel model.
- To learn the multi path characteristics of radio waves, signal fading, Time dispersion, Doppler spread, coherence time LCR, fading statistics, diversity techniques.

Syllabus

Unit 1

Introduction to mobile radio systems: Paging systems, cordless telephone system, Cellular telephone systems- Cellular concept, frequency reuse, channel assignment strategies, Interference and system capacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO Strategies.

Unit 2

Mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumara model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake's channel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Doppler spread, coherence time LCR, fading statistics, diversity techniques.

Unit 3

Introduction to spread spectrum communication, multiple access techniques used in mobile wireless communication: FDMA ffDMA/CDMA, Cellular CDMA, packet radio protocols, CSMA, reservation protocols, capacity of cellular CDMA, soft HO.

Unit 4

Wireless systems and standards: GSM standards, signaling and call control, mobility management, location tracing, wireless data networking, packet error modeling on

fading channels, Performance analysis of link and transport layer protocols over wireless channels, mobile data networking(mobile IP), wireless data services, IS-95, GPRS.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand of different type generations (1G,2G,3G,4G) and different types of standards(AMPS,GSM,CDMA,IS-95 etc) and to learn the concept of cellular geometry, concept of cellular system, analog and digital cellular system, architecture of GSM, GPRS.
- Learn the Frequency reuse concept, system capacity, channel assignment strategies, interference, hard handoff, soft handoff of cellular system, and to understand the different type of multiple access techniques like TDMA, FDMA, SDMA, CDMA, Packet radio protocols.
- Understand the mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumara model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake's channel model.
- Learn the multi path characteristics of radio waves, signal fading, Time dispersion, Doppler spread, and coherence time LCR, fading statistics, and diversity techniques.

Text Books:

1. T. S. Rappaport, "wireless Communications: Principles and practices", PHI 1996.
2.William C. Y. Lee, "Mobile Cellular Telecommunications, Analog and Digital Systems", 2nd ed, MGH-1995.

Reference Books:

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", Wiley series in Telecommunications and signal processing.
2. Kamilo Feher: Wireless Digital communications, Modulation and Spread Spectrum Applications PHI 2001.

E16C-608A **VLSI**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about Evolution of VLSI technology, VLSI Design Flow, Basic MOS Transistor
- To introduce the students about electrical properties of MOS
- To introduce the students about design process of NMOS and CMOS technology, Stick diagrams, Lambda based design rules and layout
- To introduce the students about MOS transistor switching characteristics
- To introduce the students about Dynamic Logic Circuits, Scaling of MOS Circuits and Subsystem Design

Syllabus

UNIT I REVIEW OF MOS TECHNOLOGY

Evolution of VLSI technology, VLSI Design Flow, Basic MOS Transistor: Enhancement and depletion mode, MOS structure, NMOS, PMOS and CMOS fabrication.

UNIT II ELECTRICAL PROPERTIES OF MOS

Threshold voltage, MOSFET current voltage characteristics, second order effects, MOS inverters: VTC characteristics of NMOS inverter, CMOS inverter and Bi-CMOS inverter. Noise margins, Latch-up in CMOS circuits.

UNIT III DESIGN PROCESS

Physical design of simple and complex logic gates using NMOS and CMOS technology, Stick diagrams, NMOS Design Style. CMOS Design Style, Lambda based Design Rules. Layout.

UNIT IV MOS TRANSISTOR SWITCHING CHARACTERISTICS

Sheet resistance, area capacitance, inverter delay. Switching power dissipation of CMOS inverters.

UNIT V DYANAMIC LOGIC CIRCUITS

CMOS Logic Structure: Complementary CMOS Logic, Pseudo NMOS Logic, Dynamic CMOS Logic, CMOS Domino Logic, Clocked CMOS Logic, Pass Transistor Logic, CMOS transmission gate Logic

UNIT VI SCALING OF MOS CIRCUITS

Scaling models, scaling factor for device parameters, Advantages and Limitations of scaling.

UNIT VII SUBSYSTEM DESIGN

Architectural issues in VLSI, Design of CMOS parity generator, Multiplexer, n-Bit Comparator, Incrementer/ Decrementer, ALU subsystem.

TEXT BOOKS:

1. Kang and Leblebici "CMOS Digital integrated circuits" TMH 2003.
2. Pucknell D.A and Eshrachain K. "Basic VLSI Design Systems & circuits"(PHI)
3. Introduction to Digital Circuits: Rabaey (PH)

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about Evolution of VLSI technology, VLSI Design Flow, Basic MOS Transistor
- Understand about electrical properties of MOS
- Understand about design process of NMOS and CMOS technology, Stick diagrams, Lambda based design rules and layout
- Understand about MOS transistor switching characteristics
- Understand about Dynamic Logic Circuits, Scaling of MOS Circuits and Subsystem Design

E16C-608B **NANO TECHNOLOGY**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To learn basic crystallography, Crystals and their imperfections, Diffusion, Nucleation and crystallization, Phase transformations.
- To study various physical properties of materials, Density of states, Coulomb blockade, Kondo effect, Quantum Hall Effect.
- To study various types of Nanostructures, Properties of Nanomaterials and Applications of Nano structures.
- To learn the Characterization of Nanomaterials.

Syllabus

Unit 1

Atomic structure: Basic crystallography, Crystals and their imperfection, Diffusion, Nucleation and crystallization, metals, Semiconductor & Insulators, Phase transformation, Ceramic materials.

Unit 2

Physical properties of materials: Electrical &Thermal properties, Optical properties of material, magnetic properties of materials, Density of state, Coulomb blockade, Kondo effect, Hall effect, Quantum hall Effect.

Unit 3

Nanostructure: Introduction to Nanotechnology, Zero dimensional Nanostructure – Nano particles, One Dimensional Nanostructue – Nano wires & Nano rods, Two Dimensional Nano structure-Films, Special Nano materials, Nano structures fabricated by physical techniques, Properties of Nano materials, application of Nano structure, Basics of Nano Electronics.

Unit 4

Characterization of Nano materials: SPM Techniques – Scanning Tunneling Microscopy, Atomic force Microscopy, Magnetic force Microscopy, Electron Microscopy – Scanning Electron Microscope, Transmission Electron Microscope.

Text Books:

1. Introduction to solid state physics : C .Kittel
2. Introduction to theory of Solids : H.M. Roenberg
3. Physics & Chemistry of materials : Joel I. Gersten
4. Handbook of Nanotechnology : Bharat Bhushan

Course Outcomes: On successful complete of this course, the students should be able to:

1. Understand atomic structure, diffusion, nucleation and crystallization of materials.
2. Understand the physical properties of materials, coulomb blockade and hall effect.
3. Understand the fundamental of nanostructures and nanoelectronics
4. Understand the fundamental of various characterization techniques like STM, SEM, TEM and AFM.

E16C-608C DATA STRUCTURE & PROGRAMMING LANGUAGE

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about C/C++ fundamentals, expressions, selection statements, loops, pointers and OOPS
- To introduce the students about Primitive and Composite data type
- To introduce the students about Stacks, queues, arrays, linked list, trees and graphs
- To introduce the students about File Structure, Indexing structure and sorting techniques

Syllabus

Unit 1

Re C/C++: fundamentals, expressions, selection statements, loops, functions, recursive functions, pointers, introduction to OOPS ; encapsulation, excess modifiers, polymorphism, inheritance overriding methods, abstract classes.

Unit 2

Fundamental Notation: Primitive and Composite data type, time and space complexity.

Unit 3

Data Structure: Stacks, queues, arrays, linked list, trees and graphs.

Unit 4

File Structure: Indexing structure like B-trees, ISAM, hashing technique for direct method files, inverted list, Multilist.

Unit 5

Sorting: Internal and external sorts, searching techniques, merging algorithm.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about C/C++ fundamentals, expressions, selection statements, loops, pointers and OOPS
- Understand about Primitive and Composite data type
- Understand about Stacks, queues, arrays, linked list, trees and graphs
- Understand about File Structure, Indexing structure and sorting techniques

E16C-608 D **ANTENNA THEORY AND DESIGN**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objective:

- To introduce students to about fundamental concept of antennas.
- To introduce the students to wire and loop antennas.
- To introduce the students to practical antennas
- To introduce the students to antenna array.

Syllabus

Unit 1:

Fundamental Concepts: Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

Unit 2:

Radiation from Wires and Loops: Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop

Unit 3:

Aperture Antennas: Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Fourier transform method in aperture antenna theory.

Unit 4:

Horn and Reflector Antennas: Radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and cassegrain antennas.

Unit 5:

Microstrip Antennas: Basic characteristics, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Unit 6:

Antenna Arrays: Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of antenna arrays using Schelkunoff polynomial method, Fourier transform method, and Woodward-Lawson method.

Text Books:

1. Balanis, C.A., "Antenna Theory and Design", 3rd Ed., John Wiley & Sons.
2. Jordan, E.C. and Balmain, K.G., "Electromagnetic Waves and Radiating Systems", 2nd Ed., Prentice-Hall of India
3. Stutzman, W.L. and Thiele, H.A., "Antenna Theory and Design", 2nd Ed., John Wiley & Sons
4. Elliot, R.S., "Antenna Theory and Design", Revised edition, Wiley IEEE Press.
5. Garg, R., Bhartia, P., Bahl, I. and Ittipiboon, A., "Microstrip Antenna Design Handbook", Artech House

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand fundamental concept of antenna.

- Understand and analyse the wire antenna and loop antennas.
- Understand the various types of practical antennas.
- Understand the concepts of antenna array.

E16C 610 **Optical Communication Lab**

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. To study analog link.
2. To study digital link.
3. To study Numerical Aperture.
4. To study attenuation losses in Optical fibre with change in length.
5. To study losses in optical fibre with change in frequency.
6. To study PWM in optical fibre link.
7. To study PPM in optical fibre link.
8. To study frequency modulation.
9. To study sound transmission system.

Course Outcomes:
On successful completion of this course, the students should be able to:

- Analyse analog and digital link.
- Understand numerical aperture and attenuation losses in optical fibre.
- Analyze PWM and PPM in optical fibre link.

Analyze FM and sound transmission.

E16C 612 **Advanced Digital Signal Processing lab**

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. To plot basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine) using MATLAB.
2. To find and plot convolution of two signals using MATLAB.
3. (a) To generate frequency response of given system using MATLAB.
   (b) To study the frequency response of a function using MATLAB.
4. (a)To generate the correlation of two signals using MATLAB.
(b) To generate sine, cosine and exponential function and generate correlation and convolution using MATLAB.
5. To plot and perform FFT and IFFT of sine signal using MATLAB.
6.To study effect of noise on signal and recover the original signal using MATLAB.
7. (a) To plot amplitude and phase response of chebyshev filter 1 for analog input using MATLAB.
   (b) To plot amplitude and phase response of chebyshev filter 2 for analog input using MATLAB.
8. (a) To plot amplitude and phase response of chebyshev filter 1 for digital input using MATLAB.
   (b) To plot amplitude and phase response of chebyshev filter 2 for digital input using MATLAB.
9. (a) To plot amplitude and phase response of butterworth filter for analog input using MATLAB.
   (b) To plot amplitude and phase response of butterworth filter for digital input using MATLAB.
10. (a) To design FIR low pass filter using rectangular window technique.
    (b) To design FIR high pass filter using rectangular window technique.
    (c) To design FIR bandpass filter using rectangular window technique.
    (d) To design FIR bandstop filter using rectangular window technique.

Course Outcomes:

On successful completion of this course, the students should be able to:

- Plot basic signals, convolution, correlation, FFT & IFFT using MATLAB.
- Analyze frequency response using MATLAB.
- Plot amplitude and phase response of filters using MATLAB.
- Design FIR filters using window technique.

E16C-701 ELECTRONICS SYSTEM DESIGN

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about basics of Digital Electronics.
- To introduce the students about the design of Combinational Circuit
- To introduce the students about design of Sequential Circuit
- To introduce the students about Multi Input System Controller Design
- To introduce the students about Asynchronous Finite State Machines.

Syllabus

Unit 1

Review of Digital Electronics concept

Unit 2

MSI and LSI Circuits And Their Applications: Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.

Unit 3

Sequential Machines: The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set *I* Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock *FIF*, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

Unit 4

Multi Input System Controller Design: System Controllers, Design Phases And System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design. Introduction to the CPLD & FPGA.

Unit 5

Asynchronous Finite State Machines: Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEV Approaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Text Books:

1. Fletcher, "An Engineering Approach to Digital Design" PHI 1990
2. Z. Kohavi, "Switching and Finite Automata Theory", TMH

Reference Books

1. Markovitz, "Introduction to Logic Design", TMH
2. Mano, "Digital Design", PHI

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand all the basic gates, number system and corresponding conversions, various binary codes and codes available for error detection and correction.
- Understand the design and explain working of various types of combinational circuits.
- Understand the design and analysis of different sequential circuits.
- Understand the design and analysis of Multi input system controller.
- Understand the design and analysis of Asynchronous finite state machines.

E16C-703 **DIGITAL COMMUNICATION**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To understand & analyze of different type of signals , to learn the sampling theorem and Quantization, quantization error and to understand the PCM system, Companding, Multiplexing PCM signals, Differential PCM, Delta Modulation, Adaptive Delta Modulation
- To learn the baseband digital communication system, Digital Data formats, Line coding and its properties, to understand the various PAM formats or line codes, Unipolar RZ & NRZ, Polar RZ & NRZ, Bipolar NRZ, Split Phase Manchaster format, Polar Quaternary NRZ format.
- To understand the different types of filters like optimum filter, Matched Filter, Calculation of Probability of error for matched filter, Inter symbol Interference(ISI), Cause of inter symbol interference, Nyquist's criterion for distortion less baseband binary transmission.
- To learn the concept of Additive White Gaussian Noise(AWGN) Channel, Optimum Receiver, Geometric representation of signals, Gram –Schmidt Orthogonalisation procedure, to understand the generation and reception of BASK,BPSK ,BFSK, DPSK, QPSK,MSK and to calculate the probability of error of BPSK, BFSK, QPSK, to understand the Relationship between bit error rate, symbol error rate.

Syllabus

Unit 1

Analog to Digital Conversion: Sampling Theorem, Pulse Amplitude Modulation, Channel bandwidth for PAM signal, Natural sampling, Flat top sampling, quantization of signals, Quantization error, Pulse Code Modulation (PCM), The PCM system, Companding, Multiplexing PCM signals, Differential PCM, Delta Modulation, Adaptive Delta Modulation.

Unit 2

Digital Baseband Transmission : A baseband digital communication system, Digital Data formats, Line coding and its properties,Various PAM formats or line codes, Unipolar RZ and NRZ, Polar RZ and NRZ, Bipolar NRZ, Split Phase Manchaster format, Polar Quanternary NRZ format, The Optimum filter, Matched Filter, Calculation of Probablity of error for matched filter, Intersymbol Interference(ISI), Cause of intersymbol interference, Nyquist's criterion for distortion less baseband binary transmission.

Unit 3

Signal Space Analysis: Concept of Additive White Gaussian Noise (AWGN) Channel, Concept of Optimum Receiver, Geometric representation of signals, Gram – Schmidt Orthogonalisation procedure.

Unit 4

Digital Modulation Techniques: Coherent binary modulation techniques, Coherent binary amplitude shift keying, Binary Phase Shift Keying (BPSK), Coherent Binary Frequency Shift Keying (BFSK), Noncoherent binary modulation, Differential Phase Shift Keying (DPSK), Quadrature Phase Shift Keying (QPSK), Minimum shift Keying (MSK), Calculation of probability of error of BPSK, BFSK, QPSK, Relationship between bit error rate, symbol error rate, Comparison of modulation techniques.

Text Books:

1. Taub and Schilling, "Principal of Communication System",TMH
2. S.Haykin, "Digital communication",Willey Pub.

Reference Books:

1. WayenTomasi, "Electronic Communication System" ,Pearson pub.
2. J.Dass, S.K.Mullick& P.K. Chatterjee, "Principal of Digital Communication" , Willey Eastern Pub

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand & analyze of different type of signals , to learn the sampling theorem and Quantization, quantization error and to understand the PCM system, Companding, Multiplexing PCM signals, Differential PCM, Delta Modulation, Adaptive Delta Modulation
- Learn the baseband digital communication system, Digital Data formats, Line coding and its properties, to understand the various PAM formats or line codes, Unipolar RZ & NRZ, Polar RZ & NRZ, Bipolar NRZ, Split Phase Manchaster format, Polar Quaternary NRZ format.
- Understand the different types of filters like optimum filter, Matched Filter, Calculation of Probability of error for matched filter, Intersymbol Interference(ISI), Cause of intersymbol interference, Nyquist's criterion for distortion less baseband binary transmission.
- Learn the concept of Additive White Gaussian Noise(AWGN) Channel,Optimum Receiver, Geometric representation of signals, Gram – Schmidt Orthogonalisation procedure and to understand the generation and reception of BASK,BPSK ,BFSK, DPSK, QPSK,MSK and to Calculate the probability of error of BPSK, BFSK, QPSK, to understand the Relationship between bit error rate, symbol error rate.

E16C-705A **IMAGE PROCESSING**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about the concepts of digital Image processing fundamentals and image Transforms and their properties
- To introduce about various techniques of Image Enhancements and resolution.
- To introduce the students about various techniques of Image Compression and Segmentation
- To introduce the students about pattern recognition techniques

Syllabus

Unit 1

Introduction: Elements of Storage, Processing Communication Display.

Unit 2

Digital Image Fundamentals: Visual Perception, simple image models, concept of uniform and nonuniform sampling &quantization, Relationships between pixels-neighbors of pixel, connectivity labeling of connected components. Relations, equivalence and Transitive closure, Distance measures, Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging.

Unit 3

Image Transforms: Discrete Fourier transform, 2-D Fourier Transforms and its properties. Fast Fourier transform and its uses. Walsh, Hadamard Discrete cosine, Heir and slant transforms hostelling their algorithms and computer implementations.

Unit 4

Image Enhancement: Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo-morphic felling, generation of spatial marks, Color image processing.

Unit 5

Image Restoration: Degradation model, digitalization of circulate and block circulate metrics, Algebraic approved invoice filtering, wiener filter, constrained least square restoration, Interactive restoration in spatial domain geometric transformation.

Unit 6

Image Compression: Redundancy models, error free compression, Lossy compression, Image compression standards.

Unit 7

Image Segmentation: Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation use of motion in segmentation.

Unit 8

Representation and Description: Image analysis, Pattern and their classes, Decision theoretical methods, Structural methods, Interpretation.

Text Books:

1. Anil K Jain, "Fundamentals of Digital Image Processing", PHI Edition 1997.
2. Keenneth R Castleman, “Digital Image Processing", Pearson

Reference Books:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing",
2. Pearson Chanda & Majumder, "Digital Image Processing &Analysis", PHI

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand the concepts of digital Image processing fundamentals and image Transforms and their properties
- Understand various techniques of Image Enhancements and resolution.
- Understand various techniques of Image Compression and Segmentation.
- Understand about pattern recognition techniques.

E16C-705B NEURAL NETWORKS &FUZZY LOGICS

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students regarding Neural network characteristics and history of development of neural network principles.
- To introduce the students regarding Learning methods and neural network models, types of learning, supervised, unsupervised, reinforced learning etc
- To give the exposure to the students regarding Recurrent back propagation, introduction to counter propagation networks, CMAC networks and ART networks
- To introduce the students regarding applications of neural network
- To introduce the students regarding the concepts of Fuzzy logic, Fuzzification and Defuzzification

Syllabus

Unit 1

Introduction: Neural networks characteristics, History of development In neural networks principles, Artificial neural net terminology, Model of a neuron, Topology.

Unit 2

Learning Methods &Neural network models: types of learning, Supervised, Unsupervised, Reinforcement learning. Knowledge, representation and acquisition. Basic Hop field model, Basic learning laws, Unsupervised learning, Competitive learning, Kmeans clustering algorithm, Kohonen's feature maps.

Unit 3

Artificial Neural Networks: Radial basis function neural networks, Basic learning laws in REF nets, Recurrent back propagation. Introduction to counter propagation networks, CMAC network, and ART networks.

Unit 4

Applications of neural nets: Applications such as pattern recognition, Pattern mapping, Associative memories, speech and decision-making.

Unit 5

Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy vs. Crisp set, linguistic variables, Membership functions Fuzzy sets & Operations of fuzzy sets Fuzzy IF-THEN rules, Variable inference techniques,De-Fuzzification, Basic fuzzy inference algorithm, Fuzzy system design, Antilock Breaking system(ABS),Industrial applications.

Text Books:

1. J.M. Zurada, "Introduction to artificial neural systems", Jaico Pub.
2. ROSS J.T , "Fuzzy logic with engineering application", TMH

Reference Books:

1. Simon Haykin, "Neural Networks", PHI
2. Ahmad M.Ibrahim, "Introduction to applied Fuzzy Electronics", (PHI)
3. P.D. wasserman, "Neural computing theory &practice", (ANZA PUB).

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand Neural network characteristics and history of development of neural network principles.
- Understand Learning methods and neural network models, types of learning, supervised, unsupervised, reinforced learning etc
- Understand Recurrent back propagation, introduction to counter propagation networks, CMAC networks and ART networks
- Understand applications of neural network
- Understand the concepts of Fuzzy logic, Fuzzification and Defuzzification

E16C-705C **ADVANCED MATHEMATICS FOR ENGINEERS**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students regarding Fourier Transforms, Fourier Integral Theorem, Fourier Sine, Cosine Integral, Complex form of Fourier Integrals
- To introduce the students regarding Z-transform and its properties
- To introduce the students regarding Matrices and Linear System of Equations
- To introduce the students regarding Conformal Mapping and Calculus Of Variations

Syllabus

Unit 1

Fourier Transforms: Introduction, Fourier Integral Theorem, Fourier Sine and Cosine Integral, Complex form of Fourier Integrals, Fourier Transforms, Inverse Fourier Transform, Properties, Modulation Theorem, Convolution Theorem for Fourier Transforms, Parseval's Identity, Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform.

Unit 2

Z -Transform: Introduction, Properties of Z- Transform, Evaluation of inverse Z Transform.

Unit 3

Matrices and Linear System of Equations: Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout'striangularization method, Iterative methods-Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

Unit 4

Conformal Mapping: Conformal mappmg, linear transformations, Bi-linear transformations, Schwarz's-Christoffel transformations.

Unit 5

Calculus Of Variations: Euler-Lagrange's differential equation, The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation.Rayleigh-Ritz method, Galerkin method.

Course Outcomes: On successful complete of this course, the students should be able to:

- To introduce the students regarding Fourier Transforms, Fourier Integral Theorem, Fourier Sine, Cosine Integral, Complex form of Fourier Integrals
- To introduce the students regarding Z-transform and its properties
- To introduce the students regarding Matrices and Linear System of Equations
- To introduce the students regarding Conformal Mapping and Calculus Of Variations

Text Book:

1. Dr. B.S. Grewal; "Higher Engineering Mathematics", Khanna Publishers
2. Churchill, "Fourier Series and Boundary Values Problems", McGraw Hill.
3. Galfand&Fomin, "Calculus of Variations", Prentice Hall.

Reference Books:

1. Churchill, "Complex Variables &Applications", McGraw Hill.
2. Elsgole, "Calculus of Variations", Addison Wesley.
3. LN. Sneddon.The Use of Integral Transforms", Tata McGraw Hill.

E16C-705D **SEMICONDUCTOR DEVICE MODELLING**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the semiconductor physics.
- To introduce the student to physical parameters and numeriacal solution methods.
- To elaborate the student regarding modeling and simulation.
- To introduce the students to modeling of inversion layer charges in MOS devices.

Syllabus

Unit 1

Review of Semiconductor Physics : Basic semiconductor equations: Poisson's equations, Current continuity and boundary conditions.

Unit 2

The Physical Parameter: Doping profiles, carrier mobility, generation – recombination rates, bandgap narrowing effect and other physical parameters.

Unit 3

Numerical Solution Methods: Scaling of variables and parameters, finite difference scheme, Discretization of Poisson's and current continuity equations, truncation error, discretization of time dependent problems, designing a mesh. The Newton – Raphson method of solving non-linear algebraic equations. Direct method of matix inversion, iterative and other methods, rate of convergence, error estimation.

Unit 4

Examples of actual device Modeling : numerical treatment of boundary conditions, general procedures of device modeling, short channel effects in MOSFET's, breakdown voltage in Si-P-Paineu diodes, permeable base transistor (PBT)

Unit 5

Monte Carlo Simulation : the Boltzmann transport equation, electron motion in the momentum space, Determination of free-flight time, selection of scattering processes, scattering rates, selection of momentum states after collisions, mean velocity and mean energy, Monte Carlo Simulation of BJT's, Non isothermal and Hot-Carrier problems heat transfer equation, discretization of energy balance equations, application to hot-carrier phenomenon .

Unit 6

Modeling of Hetero devices :bandgap engineering, bandgap offset at abrupt hetro-junctions, modified current continuity equations, material parameters, hetro-junction bipolar transistor (HBT's)

Unit 7

The Schrodinger – Poission solver : Modeling of inversion layer charges in MOS devices.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand the basics of semiconductor physics.
- Understand physical parameters and numerical solution methods.
- Understand modeling and simulation of semiconductor devices.
- Understand modeling of inversion layer charges in MOS devices.

TEXT BOOKS:

1. S. M. Sze, Modern Semiconductor Device Physics, Wiley, 1998.
2. R. S. Muller and T. I. Kaminis, Device Electronics for Integrated Circuits, Second Edition, Wiley, 1986.

REFERENCE BOOKS:

1. B. G. Streetman, Solid State Electronic Devices, Fourth Edition, PH, 1995
2. D. Foty, MOSFET Modeling with SPICE : Principles and Practices, PH, 1997.
3. P. W. Tuinenga, SPICE : A Guide to Circuit Simulation and Analysis Using P-SPICE, Third Edition, PH, 1995.
4. P. Antognetti and G. Massobrio, Semiconductor Device and Modeling with SPICE, Second Edition, MH, 1993.
5. T. A. Fjeldly, T. Ytterdal and M. Shur, Introduction to Device Modeling and Circuit Simulation, Wiley, 1997.
6. D. Nagchoudhuri, Microelectronic Devices, Pearson, 2001.
7. R. Raghuram, Computer Simulation for Electronic Circuits, Wiley, 1989.
8. G. W. Roberts and A. S. Sedra, SPICE, Second Edition, OUP, 1996.
9. A.S. Sedra and K. C. Smith, Microelectronic Circuits, Fourth Edition, OUP, 1997.
10. M. Shur, Introduction to Electronic Devices, Wiley, 1995.
11. M. Shur, Physics of Semiconductor Devices, PH, 1990.
12. M. S. Tyagi, Introduction to Semiconductor Materials and Devices, Wiley, 1991.
13. S. M. Sze, Physics of Semiconductor Devices, Second Edition, Wiley, 1981.
14. S. M. Sze, Semiconductor Devices : Physics and Technology, Wiley, 1985.
15. W. Liu, MOSFET Models for SPICE Including BSIM3v3 and BSIM4, Wiley, 2001.
16. Y. Cheng and C. Hu, MOSFET Modeling and BSIM3 User's Guide, Kluwer, 1999.

17. M. Satyam and K. Ramkumar, Foundations of Electronic Devices, Wiley, 1990.

E16C-707A MULTIMEDIA SYSTEMS

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about Concept of Multimedia, Emerging Applications, Multimedia Systems, appliances and distributed multimedia systems.
- To introduce the students about digital audio representation and processing.
- To introduce the students about speech recognition and generation; and digital video and image compression techniques.
- To introduce the students about multimedia information and communication systems and internet.

Syllabus

Unit 1

Introduction: Concept of Multimedia, Emerging Applications, Multimedia Systems and Appliances. Distributed Multimedia Systems, Synchronization, Orchestration and QOS Architecture standards.

Unit 2

Digital audio representation and processing: Audio in computer applications, its digital representation, transmission and digital processing, speech recognition and generation.

Unit 3

Digital video and image compression: Video compression techniques and standardization of algorithms, JPEG, MPEG, DVI technology.

Unit 4

Multimedia Information Systems: Workstation OS, New OS support, Real Time Mach, Multimediasystem service architecture, Media Stream Protocol, service and window system, client control ofcontinuous media, Hyper applications. Multimedia Information systems, File system support, DataModels.

Unit 5

Multimedia communication systems: Public Network services and N/W Protocols, Quick timeMovie File (QMF), format, OMFI, MHEG, Format function Real time Interchange, Track Modeland Object Model Teleconferencing systems, Shared Amlication Architectures, EmbeddedDistributed objects, Multimedia conferencing architecture, architecture of team workstation.

Unit 6

Multimedia and Internet: The internet, client server technology, Communication Protocols, Internet

Addressing, WWW, HTML, and Web Authorizing, Web page browsers and development,bandwidth .and applications considerations, Design Considerations for Web pages, Accessing Content on internet

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about Concept of Multimedia, Emerging Applications, Multimedia Systems, appliances and distributed multimedia systems.
- Understand about digital audio representation and processing.
- Understand about speech recognition and generation and digital video and image compression techniques.
- Understand about multimedia information and communication systems and internet.

TextBooks:

1 John F. KoegelBufod, "Multimedia Systems", Addison Wesley, Edition. 2000

2.David Hillman, "Multimedia Technology and Application", Galgotia Publication - Edition 1998.

Reference Books:

1. Fred Halsall, "Multimedia Communications", Pearson

2. Rao, Bojkovic&Milovanovic, "Multimedia Comm. System: Techniology , Std. & Network", PHI

E16C-707B **STATISTICAL METHODS**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students about Random variables, distribution function, characteristics function and moment generating function.
- To introduce the students about the various types of Probability distributions functions like compound distribution, Random walk Gambler's ruin problem.
- To introduce the students about Markov chains, higher transition probabilities
- To introduce the students about Poisson process, Queueing systems, general concepts, Queueing models.

Syllabus

Unit1

Random variables and distribution function. Probability mass and probability density function, Two dimensional random variables: joint, Marginal and conditional distributions, Independence of random variables. Moments, Expectation, Variance covariance, conditional expectation.

Unit 2

Probability generating and Moment generating functions, Characteristic function, Inversion and uniqueness theorems of characteristic function.

Unit 3

Probability distributions; Binominal, Poisson, Geometric, Negative Binomial, Uniform, Exponential, Beta, Gamma, Weibull and Normal

Unit 4

General/Stochastic Process, definition, classification and examples, compound distribution, Random walk Gambler's ruin problem.

Unit 5
Markov chains, higher transition probabilities. Classification of states and chain, determination of higher transition probabilities, Stability of Markov systems, limiting behavior.

Unit 6
Poisson process and related distribution, Generalization of Poisson process. Birth process. Generalized Birth death processes, Linear Birth death processes.

Unit 7
Queueing systems, general concepts, Queueing models *IMIM/l, MIMIl/R, MIMIC,* MIM/<XJ, MIM/C/C, MlE$_k$models. Machine interference problem.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about Random variables, distribution function, characteristics function and moment generating function.
- Understand about the various types of Probability distributions functions like compound distribution, Random walk Gambler's ruin problem.
- Understand about Markov chains, higher transition probabilities
- Understand about Poisson process, Queueing systems, general concepts, Queueing models.

TEXT Books:
1. Bailey, N.T.J: Elements of Stochastic Process
2. K.S Trivedi : Probability and Statistics, PHI, 3rdedition

Reference Books:
I. Medhi, J , New International publication
2. Bhatt B.R, Stochastic models
3. Kashyap, B.R.K and Chaudhary, M.L.: An introduction to Queuing Theory

E16C-707C SECURITIES IN COMMUNICATION NETWORKS

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To study the basic requirements of network security Network
- To introduce the meaning of Confidentiality and study various methods to achieve it.
- To introduce the meaning of integrity and study various methods to achieve it.
- To introduce the meaning of authenticity, Non repudiation and study various methods to achieve it.
- To study the concept of email security, Ip Security Overview, Secured Electronic Transaction

Syllabus

Unit -1

Introduction: Security trends, The OSI security architecture, Security attacks, Security services, Security mechanisms, Models of Internetwork security.

Unit -2

Symmetric Encryption and Message Confidentiality: Symmetric encryption principles, Algorithms, Stream ciphers and RC4, Cipher block modes of operation, Location of encryption devices, Key distribution.

Unit -3

Public Key Cryptography and message Authentication: Different approaches to message authentication, HMAC, public key cryptography principles and algorithm, Digital signature, Key management.

Unit -4

Network Security Application: Electronic Mail Security, IP security overview, Architecture, Authentication Header, Encapsulating Security payload, Combining Security Association, Key management.

Unit -5

Web Security Requirement, Secure Socket layer and transport layer security, Secure Electronic Transaction, Network management Security.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand the need for network security fundamentals and how network model helps in providing security.
- Understand how various network security services are achieved.
- Understand symmetric and asymmetric key cryptographic mechanism and difference between them.
- Understand the Concept of digital signature and how it helps in making the document authentic.
- Understand the basics of email and how security is incorporated in email.

- Understand Firewalls and its usage in network for providing unwanted access

Reference Books

1. Network Security Essentials: Application and standard, William Stalling(Third edition)
2. Computer network and data communication by Frozen

E16C7-707D **EMBEDDED SYSTEMS**

L T P CR			
4 0 0 4	**Theory**	**:**	**75**
	Class Work	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

- To introduce the students regarding Background and History of Embedded System
- To introduce the students regarding Major programming languages for embedded systems, Embedded System on a Chip (SOC) and the use of VLSI designed circuits
- To introduce the students regarding Processor and Memory Organization
- To introduce the students about internal serial-communication devices –UART and HDLC –Parallel Port Devices
- To introduce the students about architecture, 8051 pin functions, architecture, addressing modes and programming
- To introduce the students about Timers and interrupts of 8051
- To introduce the students about interfacing of peripherals to 8051
- To introduce the students about Embedded System Operating system

Syllabus

Unit 1

Introduction to embedded system : Background and History of Embedded System, Defination and Classification, Programming language for embedded system: desirable characterstic of programming language for embedded system, low-level versus high-level language, main language implementation issue : control, typing. Major programming languages for embedded systems. Embedded System on a Chip (SOC) and the use of VLSI designed circuits.

Unit 2

Processor and Memory Organization : Structural units in processor, Processor selection for an embedded system, Memory devices, Memory selection, Allocation for memory to program segments and blocks and memory map of a system, DMA, Interfacing Processor. I/O Devices-Device I/O types and examples V Synchronous – Iso-synchronous and Asynchronous Communication from serial devices – Examples of internal serial-communication devices –UART and HDLC –Parallel Port Devices –Sophisticated interfacing features in Device/ports –Timer and Counting Device.

Unit 3

Microcontroller: Introduction to microcontrollers, Evolution, Microprocessors vs Microcontrollers, MCS-51 Family Overview, Important Feature, Architecture. 8051 Pin functions, Architecture, Addressing Modes, and Instruction set, Instruction Types.

Unit 4

Programming : Assembly Programming . Timer Registers, Timer modes, Overflow flags, clocking sources, timer counter interrupts, baud rate generation. Serial port register, mode of operation, initialization,accessing, multiprocessor communications, serial port baud rate.

Unit 5

Interrupts: Interrupt Organisation, Processing interrupts, Serial port interrupts, External interrupts, interrupt service routines. Microcontroller specification, Microcontoller design, testing, timing subroutines, look up tables, serial data transmission.

Unit 6

Application : Interfacing Keyboards, Interfacing Displays, Interfacing A/D and D/A converters, Pulse Measurement, Loud Speaker Interface, Memory Interface.

Unit 7

Laboratory work : Implementation using Embedded operating systems like RT Linux, WindowsCE,Windows XP Embedded, Assembly language for 8051 on Pinnacle.

Course Outcomes: On successful complete of this course, the students should be able to:

- Understand about Background and History of Embedded System and about Major programming languages for embedded systems, Embedded System on a Chip (SOC) and the use of VLSI designed circuits
- Understand about Processor and Memory Organization and about internal serial-communication devices –UART and HDLC –Parallel Port Devices
- Understand about architecture, 8051 pin functions, architecture, addressing modes, programming, Timer, interrupts of 8051, interfacing of peripherals to 8051
- Understand about Embedded System Operating system

Text Books:

1. John B.Peatman, “Design with PIC Microcontroller” Pearson Pub.
2. Predko, “programming and customizing the 8051 microcontroller” TMH.

Reference Books:

1. Mazidi, “The 8051 microcontroller and embedded system” Pearson Pub.
2. Deshukh, “Microcontroller” TMH.

E16C 717 **MATLAB**

L T P CR			
0 0 2 1	**External**	**:**	**35**
	Internal	**:**	**15**
	Total	**:**	**50**
	Duration of Exam	**:**	**3 Hrs.**

List of Experiments

1. To study and implement various input output statements in MATLAB.
2. To study and implement if conditional statements in MATLAB.
3. To study and implement switch conditional statement in MATLAB.
4. To study and implement for and while loop statements in MATLAB.
5. To study and implement functions in MATLAB.
6. To study and implement recursion in MATLAB.
7. To study and implement various operations on vectors and matrices.
8. To study and implement plot functions in MATLAB.
9. To study and implement file handling operations in MATLAB.
10. To study and implement DES algorithm in MATLAB.
11. To study and implement watermarking in MATLAB.
12. To study and implement RSA algorithm in MATLAB.
13. To study and implement Deffieman in MATLAB.
14. To study and implement Streamcipher in MATLAB.

Course Outcomes:

On successful completion of this course, the students should be able to:

- Write the basic codes in MATLAB.
- Draw various 2D and 3D plots used to analyze the security algorithm.
- Implement various asymmetric and symmetric cryptography.
- Understand the basics of watermarking.

GO-705C **SWAMI VIVEKANANDA'S THOUGHTS**

L T P CR			
0 0 3 4	**External**	**:**	**75**
	Internal	**:**	**25**
	Total	**:**	**100**
	Duration of Exam	**:**	**3 Hrs.**

Course Objectives:

1. To introduce biography and philosophical thought of Swami Vivekananda
2. To present Swami Vivekananda's views on major religions of the world and Universal Religion
3. To present Swami Vivekananda' teaching and views on social issues.

Syllabus

Unit – 1

Swami Vivekananda – a Brief biography – Influence of Ramakrishna on Vivekananda – Parliament of Religions – Establishment of Ramakrishna mission.

Unit – 2

Philosophy of Swami Vivekananda - Nature of Reality , Nature of Self , Nature of the universe – The doctrine of Maya, Identity of Self and God, Karma Yoga, Raj Yoga , Bhakti Yoga, Gyan Yoga.

UNIT-3

Swami Vivekananda's observations on major religions of the world (a) Hinduism (b) Christianity (c) Islam

Unit - 4

The concept of Universal Religion and its characteristics – Fundamental unity of all religions – acceptance and not tolerance is the principle.

UNIT-5

Vivekananda and Nationalism – The message of patriotism – spirituality as the basis of patriotism, Sociological views of Vivekananda – His views on caste and untouchability - status of women – His views on Education – Swami Vivekananda's concept of Vedantic Socialism

Books:

1. The Complete Works of Swami Vivekananda Vol. 1 to 8 Relevant Chapters.