Indira Gandhi University, Meerpur
Rewari

Syllabus for M.Tech. – Ist Year
(Semester I and II)
(Electronics & Communication Engineering)

Session –w.e.f. 2019-2020

Programme Educational Objectives M. Tech (Electronics and Communication)

1. Be technically competent in design, development and implementation of electronics and communication technology and extends into applications in the different thrust areas.
2. Possess suitable knowledge for analyzing, modelling, and evaluating the research problems in major thrust areas of electronics.
3. Possess interpersonal skills, team work capabilities, communication skills, leadership and awareness of the social, ethical and legal responsibilities leading to lifelong learning and career development.
4. Be successfully employed in electronics profession in industry/ research organization and to have entrepreneurial skill.

Programme Outcomes M. Tech (Electronics and Communication)

1. An ability to independently carry out research / investigation and development work to solve practical problems
2. An ability to write and present a substantial technical report / document
3. Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be a level higher than the requirements in the appropriate bachelor program.
4. An ability to attain, identify and apply knowledge of mathematics, soft computing & soft skill and management for various academic and industrial needs.
5. Students should be able to use techniques and modern engineering tools for engineering practices in their immediate employment and/or entrepreneurial activities.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI
SCHEME OF STUDIES AND EXAMINATION M.TECH
1st YEAR (ELECTRONICS & COMMUNICATION)
SEMESTER 1
CBCS Scheme effective from 2019-20

Sl. No	Course Code	Subject	Credit Pattern				Examination Schedule (Marks)				Duration of Exam (Hours)	No of Hours /week
			L	T	P	Total Credits	Marks of Class work	Theory	Practical	Total		
1	MECE101	Advance Microprocessor & Microcontroller	4	0	-	4	50	100	-	150	3	4
2	MECE102	Satellite and Space Communication	4	0	-	4	50	100	-	150	3	4
3	MECE103	Information and Communication Theory	4	0	-	4	50	100	-	150	3	4
4	MECE104	Advanced Digital Signal Processing	4	0	-	4	50	100	-	150	3	4
5	MECE105	Data Communication Networks	4	0	-	4	50	100	-	150	3	4
6	MECE106	Seminar	-		-	1		-	-	25		-
7	MECE107	Satellite Lab	-	-	2	2	50	-	50	100	3	4
8	MECE108	Advance Microprocessor & Microcontroller Lab	-	-	2	2	50	-	50	100	3	4
9	MECE109	Self Study Paper				1				25		-
		TOTAL	**26**									

NOTE:

Examiner will set nine question in total. Question One will be compulsory and will comprise short answer type questions from all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

INDIRA GANDHI UNIVERSITY, MEERPUR, REWARI
SCHEME OF STUDIES AND EXAMINATION M.TECH
1st YEAR (ELECTRONICS & COMMUNICATION)
SEMESTER 2
CBCS Scheme effective from 2019-20

Sl. No	Course No.	Subject	Credit Pattern				Examination Schedule (Marks)				Duration of Exam (Hours)
				T	P	Total Credits	Marks of Class works	Theory	Practical	Total	
1	MECE201	Wireless Mobile Communication	4	0	-	4	50	100	-	150	3
2	MECE202	Optical Communication	4	0	-	4	50	100	-	150	3
3	MECE203	Seminar	-		-	1		-	-	25	
4	MECE204	VLSI Lab	-	-	2	2	50	-	50	100	3
5	MECE205	Optical Communication Lab	-	-	2	2	50	-	50	100	3
6	MECE206A or ECE206B or ECE206C or ECE206D	Elective-1 (DCEC)	4	0	-	4	50	100	-	150	3
7	MECE208	Foundation Elective				2					
8	MECE209	Self Study Paper				1				25	
		TOTAL	**20**								

NOTE: Examiner will set nine questions in total. Question One will be compulsory and will comprise short answer type questions from all sections and remaining eight questions to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.

Elective 1 : Choose any one from the following four papers:

MECE206A - Electronic System Design
MECE206B - Image Processing
MECE206C - ADVANCED MATHEMATICS FOR ENGINEERS
MECE206D - VLSI Design

Foundation Elective: A candidate has to select this paper from the pool of Foundation Electives provided by the University.

General Instructions

1. **Seminar**

Max.Marks-25

Students are required to prepare a presentation on any topic, not from syllabus, assigned by the teacher concerned in the department on the theme/topic such as review of research papers/articles published in national or internal journal or any other research based paper in his/her area of interest. Every candidate will have to deliver a seminar of 15-20 minutes duration on the assigned topic. The seminar will be delivered in the presence of students and teachers of the department on any fixed week day of the semester.
The seminar will be evaluated by an internal committee of two internal teachers, constituted by the Chairperson of the Department. The evaluation (internal evaluation only) will be based on the presentation of the student, depth of subject matter of the topic and answer to questions. There will be a Coordinator to be nominated by the Chairperson of the Department among the teachers of the Department..

Distribution of marks will be as follows:
1. Presentation = 10 Marks

2. Relevancy & Depth of subject matter of the topic = 10 Marks

3. Answers to the Questions = 5 Marks

2. **Self Study Paper**

The objective of this course is to create habits of reading books and to develop writing skills in a manner of creativity and originality. The students will select a topic of their interest with consultation with their teachers/In charge/mentors. After selecting a suitable title for the paper, the student will be required to prepare a hand written report about 6-10 pages in his/her own handwriting. The student will be required to submit the report after getting it checked by the concerned teacher and will be asked to resubmit the report after making the required correction (s) if any before the commencement of the examination of that semester.
The structure of the paper will include the following:

- Introduction
- Main Body
- Conclusion

The thoughts presented in the paper must be original work of the students.
The paper will be evaluated by the panel (one external and one internal examiner) to be appointed by the Chairperson of Department from the prescribed panel of the University.
The evaluation of Self Study paper will be done as given below:

- Evaluation of the paper 15 Marks
- Viva-voce on the paper 10 Marks
- Total 25 Marks

MECE101 **ADVANCED MICROPROCESSOR & MICROCONTROLLERS**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Understanding the basic concepts of microprocessor & its different charactertistics to analyse the functionality components.

OB- To illustrate the architecture of 8051 & introducing its working module.

OC- To introduce the family of Advanced Microprocessors and understaning its instructionset and addressing modes.

OD- Understanding the idea of interfacing of different pheripherals with microprocessor

SECTON - A

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.

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 DM. Controllers.

SECTION B

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

SECTION C

Advanced microprocessors: Intel X86 family of advanced Microprocessor, programming model for 86 family. X85 addressing modes, instruction set, hardware. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes , instruction set, hardware.

SECTION D

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

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:

M. Gilmore, "Microprocessors Principals and Application", MGH

Rajkamal, "Embedded System, Architecture & Programming", TMH

Reference Books:

Berry B. Berry, " Inter Series of microprocessors", PHI

C. V. Hall, " Microprocessor & Interfacing", TMH Peatman, "Microprocessor Based System Design", Pearson

COURSE OUTCOMES

COA- Developing the idea of design of basic microprocessor architectural concepts and its basic charactertistics

COB- Understanding the basic architecture of 8051 and its programming model.

COC- To know about the family ofadvanced microprocessor with its instruction set and their respective addressing modes.

COD- Acquinted with the knowledge of interfacing of microproccessor andhaving the idea of development of microprocessor based products.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE102 SATELLITE AND SPACE COMMUNICATION

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA-Visualize the architecture of satellite system as a means of high speed, high range communication system.

OB-To illustrate various aspects related to satellite system such as orbital equations.

OC-Understanding various earth space propagation effects corresponding to a satellite.

OD- To illustrate the access techniques related to the satellite and its synchronization principle.

Section-A

Introduction : Brief History of evolution & growth of communication satellite, Synchronous satellite, Satellite frequency allocation & Band spectrum, Advantages of satellite communication, Active & Passive satellite. Applications of satellite communication.

Section-B

Orbits of satellite: Kepler`s Laws , Low, medium and Geo synchronous main characteristics, Angle period, Returning period, Angle of Evaluation, Propagation Delay, Orbital Spacing.

Satellite Links: Design of down links, up link design, Delay transponders, Earth Stations, Antennas and Earth coverage, Altitude and eclipses

Section-C

Earth space propagation effects: Free space loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and command of satellites. **Detection:** QPSK offset QPSK and MSK. Coherent and non coherent detection. Error rate performance.

Section-D

Synchronization: Principle and techniques, Multiple Access Techniques, FDMA, TDMA system: concept and configuration, system timing frames format, VSAT, Random access, space communication, TELSAT and INSAT system. GPS systems

Text Books

1. Satellite Communications : Dennis Roddy, TMH
2. Satellite Communication : D.C. Aggarwal ; Khanna Publishers.

Reference Books

1 J. Martin: Communication Satellite System, PH Englewood.
2 Satellite Communication: T. Pratt and C.W. Boston, John Willey and sons
3 Satellite Communication : Monojit Mitra, PHI
4 Fundamentals of satellite Communication: K.N.Raja Rao, PHI

COURSE OUTCOMES

COA- Learn about the working of satellite system and its corresponding components.

COB- Understanding the concepts related to orbits of satellite and its various links.

COC- To analyze the various earth space propagation effects related to the satellite andvarious detection system.

COD- Understanding the different synchronisation techniques related to the satellite with the help of various access techniques.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE103 **INFORMATION & COMMUNICATION THEORY**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Application of the basic concepts related to the information theory and describing the charactertistics like entropy, self information.

OB- Developing an understanding of the features of coding theory, able to know about various codes used in coding theory.

OC- To learn about the application of various codes used in information theory.

OD- To know about the performance of different codes like linear block codes and covolutional codes.

SECTION A

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

SECTION B

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

SECTION C

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.

SECTION D

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, AWL1983.
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. J. Dass. , S.K. Malik & P.K. Chatterjee, Principles of digitals communication

COURSE OUTCOMES

COA- Develop an understaning about the information theory and its related charactertistics.

COB- Critically understanding the concepts of source encoding and channel encoding.

COC- To analyze the various codes used in information theory and their application in the corresponding area.

COD- To demonstrate the performance of different codes .

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE104 **ADVANCED DIGITAL SIGNAL PROCESSING**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- To know the concepts related to digital signal processing and study its basic charactertistics.
OB- To understand the theory of discrete fourier transform and fast fourier transform with the application of Z transform.
OC- To understand the theory of various digital filter structure and its implementation.
OD- To learn the implementation of filters and their particular realization.

SECTION A

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

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.

SECTION B

DFT & FFT & Z transform with Applications: Discrete Fourier transform, properties of DFT, Circular Convolution, Fast Fourier Transform, Realizations of DFT. 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.

SECTION C

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.

SECTION D

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:

COA- To develop the basic understanding of signal processing and fourier transform.
COB- Able to understand the theory of DFT ,FFT and Z transform with their respective applications.
COC- Aquinted the knowledge of implementation of various digital filter structures.
COD- Critically understand the implementation of various filters with their respective realization.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions

ECE105 DATA COMMUNICATION NETWORKS

L	T	P		Marks	Credits
4	-	-	Exam :	1 0 0	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Understanding the basic concepts of data transmission and concepts of data communication.
OB- To illustrate different digital data communication techniques related to error detection and error correction.
OC- To introduce various multiplexing techniques .
OD- Understanding the idea of communication network technique.

SECTION A

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

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

SECTION B

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

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

SECTION C

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 (CSMA/CD, Token ring, FDDI, DQDB).

SECTION D

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

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

COA- Develop an understaning about concept of data transmission and data communication.
COB- Critically understanding the concepts of data link control and multiplexing.
COC- To analyze the various communication networking techniques in data communication.
COD- To demonstrate the performance computer communication architecture.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE106 **SEMINAR**

L	T	P		Marks	Credits
-	-	-	Sessional :		
			Total :	25	1

Every student will be required to present a seminar talk on a topic approved by the Deptt. except on his/her dissertation. The committee constituted by the Head of the Deptt. will evaluate the presentation.

MECE107 **SATELLITE LAB**

L	T	P	Marks	Credits
-	-	4		
			Exams : 50	
			Sessionals : 50	
			Total : 100	2
			Duration of Exam : 3 hrs.	

Objectives:

O1-Visualize the architecture of satellite system as a means of high speed,high range communication system.

O2-To illustrate various aspects related to satellite system such as orbital equations.

1. To Study the process of Transmitting Signal.
2. To Study the Base band Signal in a Satellite Link.
3. To estimate C/N Ratio.
4. To estimate S/N Ratio.
5. To setup digital satellite Communication Link.
6. To Study Black & White and Color T.V.
7. To plot radiation pattern of parabolic reflector.
8. To Study Satellite Communication Receiver.
9. To set up a PC to PC Sat. Com.Link using RS –232 port.
10. To measure the propagation delay of signal in a Sat.Com. Link.
11. To transmit & receive the function generator waveform through a Sat.Com. Link.
12. To set up a active & passive satellite communication link & study their difference.

COURSE OUTCOMES

C1- Learn about the working of satellite system and its corresponding components.
C2- Understanding the concepts related to orbits of satellite and its various links

NOTE:

The scheme of awarding the grades to a student in the course will be supplied by the University to the examiner

MECE108 **ADVANCED MICROPROCESSOR & MICROCONTROLLER LAB**

L	T	P	Marks	Credits
-	-	4		

Exams : 50
Sessionals : 50
Total : 100 2
Duration of Exam : 3 hrs.

Objectives:

O1- Understanding the basic concepts of microprocessor & its different charactertistics to analyse the functionality components.
O2- To introduce the family of Advanced Microprocessors and understaning its instructionset and addressing modes.
O3- Understanding the idea of interfacing of different pheripherals with microprocessor

(A few experiments may be designed & included in this list depending upon the infrastructure available in the institute)

1. To study the architecture of 8086 Kit
2. Write an ALP to convert a hexadecimal No. to decimal No. in single step execution (DEBUG)
3. Write an ALP to enter a word from keyboard and to display
1. Write an ALP for addition of two one digit Numbers.
2. Write an ALP to display a string
3. Write an ALP reverse a string
4. Write an ALP to check whether the No. is Palindrome
5. To study the Microcontroller Kit
6. Write an ALP to generate 10 KHz frequency square wave
7. Write an ALP to generate 10 KHz & 100KHz frequency using interrupt
8. Write an ALP to interface intelligent LCD display
9. Write an ALP to interface intelligent LED display
10. Write an ALP to Switch ON alarm when Microcontroller receive interrupt
11. Write an ALP to interface one microcontroller with other using serial / parallel communication.

COURSE OUTCOMES

CO1- Developing the idea of design of basic microprocessor architectural concepts and its basic charactertistics
CO2- Aquinted with the knowledge of interfacing of microproccessor and having the idea of development of microprocessor based products.

NOTE: The scheme of awarding the grades to a student in the course will be supplied by the University to the examiner.

MECE201 WIRELESS MOBILE COMMUNICATION

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- To know the concepts related to mobile radio systems and cellular system capacity
OB- To understand the theory of mobile radio propagation and fading statistics.
OC- To understand the theory of various spread spectrum communication and multiple access techniques.
OD- To learn the implementation of wireless systems and GSM standards.

SECTION A

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.

SECTION B

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

SECTION C

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

SECTION D

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

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.
Kamilo Feher: Wireless Digital communications, Modulation and Spread Spectrum Applications PHI 2001.

COURSE OUTCOMES

COA- Develop an understaning about the mobile radio systems and cellular telephone systems.
COB- Critically understanding the concepts of mobile radio propagation and its various models.
COC- To analyze the various multiple access techniques used in mobile wireless communication.
COD- To demonstrate the various wireless systems and its standards.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question,which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE202 **OPTICAL COMMUNICATION**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
	¤		Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:
OA- To understand the theory of optical

SECTION A

Introduction: Advantage of optical fiber communication, Elements of fiber communication link, Ray theory .and electromagnetic mode theory for optical propagation, step index and graded index fibers, Numerical Aperture.

Optical fibers, Losses & Dispersion: Attenuation, Absorption, Linear and non-linear scattering losses, Dispersion, overall fiber dispersion, polarization, fiber bending losses, multimode step index and graded index fibers, single mode fiber, plastic clad and all- plastic fibers, optical fiber cables, dispersion shifted and dispersion flattered fibers, practical fiber profiles.

SECTION B

Optical Sources: Basic concepts: LED for Optical Communication, Burrus type double hetro-structure, Surface emitting LEDs, Shape geometry, Edge emitting LEDs, LED to fiber launch systems semiconductor Lasers Theory, modulation and characteristics, Fabry-Perot lasers quantum well lasers and distributed feedback lasers.

Photo Detectors: P.I.N Photo Diodes: Theory and their characteristics, Avalanche photo diode detectors, Theory and their band width noise in APD.

SECTION C

Optical fiber communication System: Optical transmitter circuit : LED and laser drive circuits, optical receiver circuit; Structure, Pre amplifier, AGC, Equalization, Optical power budgeting line loading , analog systems : analog modulation , direct modulation , sub carrier modulation , distribution system, Optical TDM sub-carrier multiplexing ,WDM .

SECTION D

Coherent Systems : Coherent receiver, Homodyne and heterodyne detection, noise in coherent receiver, polarization control, Homodyne receiver , Reusability and laser line-width, heterodyne receiver , synchronous, Asynchronous and self synchronous demodulation, phase diversity receivers.

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 Publns

John M. Senior, “Optical Communication”, PHI

COURSE OUTCOMES:

CO1-The students have leared about allcomponents of optical communication.

CO2- Gained the fundamental knowledge about optical communication in designing of optical link.

CO3- Studied the optical transmitter and reciever and their desired charactertics.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE203 **SEMINAR**

L	T	P		Marks	Credits
-	-	-	Sessional :		1
			Total :	25	1

Every student will be required to present a seminar talk on a topic approved by the Deptt. except on his/her dissertation. The committee constituted by the Head of the Deptt. will evaluate the presentation.

MECE204 **VLSI LAB**

L	T	P
-	-	4

Credits

Marks

Exams : 50
Sessionals : 50
Total : 100 2
Duration of Exam : 3 hrs.

Objectives:

O1- Able to learn Layout, stick diagram, Fabrication steps, Static and Switching characteristics of inverters.

O2- Students will be able to design digital system using MOS circuits.

1. Write a spice programme for CMOS inverter with following details.
   pmos L = .8ym W=12.0um, nmos = 8um W=2.4um, nmos (kp=60u Vto=0.6v)
   pmos(kp=20u Vto=-0.8v)
2. Write a spice programme for CMOS nand gate with following details :
   Vdd=5 volt, pmos L=.8 um W=20um, nmos L = 8um W=um, nmos (kp=45u V to = 1.0v)
   pmos (kp=25u Vto=-1.2v)
3. Write a spice programme for CMOS nor gates with following details :
   Vdd=5volt, pmos L=8um W=20um, nmos L=Burn W=8um, nmos (kp=45u Vto-1.0v)
   Pmos (kp=25u Vto=-1.2v)
4. Design a d-latch with clk time period=6ns using nand gates with following specification :
   L=2U W=100U for n&p-mos, For n-mos Kn'=60U Vto = 0.6V) for p-mos kp=20U
   Vto=0.8V)
5. Design a half adder using nand gates with following specifications :
   for n-mos : L=20 W=100U, for p-mos L=2U W=650U, for n- mos Kn'=600 Vto=0.6V)
   for P-mos Kp=20U Vto=0.8v)
6. Design a full adder using half adder designed above.
7. Design the layout for PMOS in layout editor.
8. Design the Layout for NMOS in layout editor.
9. Design the layout for CMOS inverter with equal rise and fall time in layout editor.
10. Design the layout for 2-Input NAND gate.
11. Design the layout for 2-Input NOR gate.
12. Design the layout for clocked S-R flip-flop.

COURSE OUTCOMES:

CO1- Compare various MOS technologies.

CO2- Foster ability tosimulate combinational logic circuits.

CO3- Be able to understand interworking of various gates and their combinations for testing.

MECE205 OPTICAL COMMUNICATION LAB

L	T	P		Marks	Credits
-	-	4	Exams :	50	
			Sessionals :	50	
			Total :	100	2
			Duration of Exam :	3 hrs	

Objectives:

O1-Learn to demonstrate the optical fibre link.

O2- To use optical source and decoders for the linkserviceableforthe reliablecommunication.

(A few experiments may be designed & included in this list depending upon the infrastructure available in the institute)

1. Study of optical devices.
2. Study of fiber optical detector.
3. Study of fiber optical transmitters
4. Determination of numerical aperture of optical fiber
5. Study of characteristics of LED.
6. Study of characteristics of LASER diode.
7. Setting a fiber optic analog link.
8. Setting a fiber optic digital link.
9. Study of modulation demodulation of light source by direct amplitude modulation techniques.
10. Forming a PC to PC communication link using optical fiber & RS 232.
11. Setting up a fiber optic voice link.
12. Study of modulation & Demodulation of light source by PPM technique.
13. Studyofmodulation&DemodulationoflightsourcebyPWMtechnique.
14. Study of Propagation loss & sending loss in optical fiber.

COURSE OUTCOMES:

CO1- Will be ableto designthe optical network of various laye and need.

CO2- To use optical source and decoders for the link for voice data communication.

MECE206A **ELECTRONIC SYSTEM DESIGN**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Critically analyzing the different digital types of circuits with their applications.
OB- To illustrate the concept of sequential machines and explaining their state diagram procedures.
OC- To unddrstand the working of different multi input system controller design and its specifications.
OD- Understanding the designing of asynchronous finite state machines.

SECTION A

Review of Digital Electronics concept

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.

SECTION B

Sequential Machines: The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop, Design Of Clock F/F, 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.

SECTION C

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.

SECTION D

Asynchronous Fini te State Machines: Scop e, 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:

COA- Understand the operation and architecture of flip-flops,registers and multiplexers.
COB- Learn to provide clock and power supply requirements
COC- Use of MSI decoders , multiplexers in system controllers in the electronics circuit design.
COD- Application design and testing of ROM, PLA and PAL

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE206B **IMAGE PROCESSING**

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Understanding the basic concepts of digital Image fundamentals and relationship between its charactertistics.

OB- To explain the fundamentals of image transforms and image enhancement techniques.

OC- Critically understand the concepts of image restoration and image compression.

OD- Understanding the idea of image segmentation and description of image analysis.

SECTION A

Introduction: Elements of Digital Image Processing Systems, Image Acquisition, Storage, Processing Communication Display.

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.

SECTION B

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.

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.

SECTION C

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.

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

SECTION D

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

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”, Pearson
2. Chanda & Majumder, “Digital Image Processing & Analysis”, PHI

COURSE OUTCOMES:

COA- Review the fundamental concept of digital image processing system.

COB- Analyze images in the frequency domain using various transforms.

COC- Evaluate the techniques for image enhancement and aimage restoration.

COD- Categorize various image compression techniques.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE206C ADVANCED MATHEMATICS FOR ENGINEERS

L	T	P		Marks	Credits
4	-	-	Exams :	100	4
			Sessionals :	50	
			Total :	150	4
			Duration of Exam :	3 hrs.	

Objectives:

OA- Understanding the idea of fourier transform and its properties
OB- To explain the Z transform and its properties.
OC- To introduce various linear system of equations and matrices.
OD- Understanding the idea of calculus of variations and conformal mapping.

SECTION A

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.

SECTION B

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

SECTION C

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

SECTION D

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

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.

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. I.N. Sneddon.The Use of Integral Transforms", Tata McGraw Hill.

COURSE OUTCOMES:

COA- Analyze the fundamental concepts of Fourier Transform and Z transform and their applications.

COB- Evaluate the exact and numerical methods for the solution of Linear system of equations.

COC- Interpret the conformal mapping and their properties for the function of complex variables.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will beset from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.

MECE206D **VLSI DESIGN**

L	T	P
4	-	-

Exams : Credits
Sessionals : 50 4
Total : 150 4
Duration of Exam : 3 hrs

Objectives:

OA- Understanding the basic concepts of MOS technology and different aspects of its processing.
OB- To illustrate different electrical properties of MOS circuit and its transistor circuit model.
OC- To introduce the design process of MOS devices and its basic circuit concepts.
OD- Understanding the idea of scaling of MOS circuits with its design examples

SECTION A

Review of MOS technology: Basic MOS Transistors, Enhancement and Depletion mode transistors, N MOS and C MOS process, thermal aspects of processing, Production of masks.

SECTION B

Electrical properties of MOS circuit : Parameters of MOS transistors, pass transistors, N MOS inverter, Pull-up to pull down ratio for an N MOS inverter, C MOS inverters, MOS transistor circuit model, Latch up on C MOS circuits.

SECTION C

Design processes : MOS Layers, stick diagrams, Design rules, AWA OX C MOS process description, double metal single poly silicon, C MOS process.
Basic circuit concepts: Sheets resistance, area capacitance, delay unit, inverter delay, super buffers, propagation delays.

SECTION D

Subsystem Design & Layout : Architectural issues in VLSI, switch logic, gate logic, Examples of Combinational logic, Clocked sequential circuits, other system consideration.
Scaling of MOS circuits : Scaling factor, limitations, scaling of wires and interconnection, PLA and Finite state Machines.
Design Examples : Design of an ALU subsystems, carry look ahead address, parallel.

Text Books:

1. Pucknell D. A. and Eshrachain K, "Basic VLSI Design System & Circuits". (PHI), 1988.
2. Geiger, Rr, Allen P. E. Strader N. R., "VLSI Design Techniques for Analog and Digital Circuit", MGH1990`

Reference Books:

1. Wolf, "Modern VLSI Design", Pearson SZE, "VLSI Technology", TMH

COURSE OUTCOMES:

COA: To be aware about the trends in semiconductor technology,and how it impacts scaling and performance.
COB- Synthesis of digital VLSI systems from register-transfer or higher leveldescriptions in hardware design languages.
COC- To understand MOS transistor as a switch and its capacitance.

NOTE: For setting up the question paper, Question No. 1 will be set up from all the four sections which will be compulsory and of short answer type. Two questions will be set from each of the four sections. The students have to attempt first common question, which is compulsory, and one question from each of the four sections. Thus students will have to attempt 5 questions out of 9 questions.