MTEC-502-B **ADVANCED ELECTRONICS INSTRUMENTATION**

L	T	P	Credits		Sessional Marks:	25
4	-	-	04		Theory Marks:	75
				Duration of Exams:	3 Hours	

OBJECTIVES:

1. To make students able to understand the fundamentals of advanced instrumentation system.
2. To make them aware to understand and to analysis the performance characteristics of transducers/sensors and their applications.
3. To provide students with good depth of knowledge of electronic equipment, and to provide good depth knowledge of recent trends in intelligent instrumentation technology.
4. To make students to study the applications of SCADA in industrial applications.
5. To make students to learn the basic of programming concepts in LabVIEW.

OUTCOME:

1. After successful completion of the course, student will be able to develop ability to understand and analysis intelligent instrumentation systems.
2. Able to develop ability to develop real time applications using LabVIEW.
3. Able to develop ability to apply the knowledge and skill gained to research and industrial uses.

BOOKS :

1. Digital Instrumentation: Bouwens, A.J., MGH.
2. Measuring Systems- Applications & Design: Doebelin, MGH.
3. Electronic Measurements and Instrumentation: BM Oliver & JM Cage, MGH.
4. DCADA supervisory control and data acquision: Stuart A Boyer
5. Programmable Logic Controllers- Programming Methods and Applications: JR Hackworth and FD Hackworth Jr, Pearson.

LECTUREWISE PROGRAMME :

Unit	Topic	No. of classes
I	**Sensors for Transducers**: Introduction, potentiometers, differential transformers,	2

	Resistance strain gauses, Capacitor sensors	2
	Eddy current sensors, Piezo-electric sensor,	2
	RTD and thermocouple sensors	2
	Digital Instruments: Analog to digital converters and their types, Digital to analog converter and their types,	2
	Data loggers, automation of digital instruments,	1
	DMM, Digital frequency meter, universal counter and applications	2
II	**Oscilloscope and Signal Analyzers:** Data storage oscilloscope and its features, and applications, Sampling oscilloscope, current trends in oscilloscope technology	3
	Wave analyzer and its applications, FET analyzers, Network analyzers and their applications,	2
	Current Trends in Digital Instrumentation: Introduction to special function Add on card, Computer Aided Software Engineering (CASE) Tool and its use in designing and development of Automated Metering Systems,	3
	Interfacing IEEE cards, intelligent and programmable instruments using computers,	
III	**SCADA & PLC:** Introduction, data acquisition system, evaluation of SCADA ,	2
	Communication technologies used in SCADA	2
	Functions of SCADA system,	1
	Introduction of PLC, block diagram, functions, programming, and applications,	3
	Interfacing of PLC with SCADA	1
IV	**PLC Programming**: Instructions, operational procedures,	1
	PLC registers: Timer functions and industrial applications, counters, counter function and industrial applications, Arithmetic functions, number comparison functions, number conversion functions	3
	Virtual Instrumentation: Introduction, block diagram and architecture, advantages and disadvantages	2
	Data Flow Techniques, graphical programming in data flow, development of VI using GUI,	3
	Real Time Systems	1

HOME ASSIGNMENTS: 4-5 assignments are given during the semester

EVALUATION PROCEDURE:

1.	Surprise Quiz/ Tutorial Test	5 Marks
2.	Assignments/Project/performance in class	5 Marks
3.	Minor Tests (Two tests having equal weightage) Minor Test I Minor Test II	15 Marks
4.	Major test (University Examination)	75 Marks

Award of Grades Based on Absolute Marks: The University is following the system of grading based on absolute marks (after applying moderation if any). Following grading will be done based on the % of marks obtained in all the components of evaluation part of the subject.

A+ (90% - 100 %), A (80% - 89%), B+ (70% - 79%) , B(62% - 69%), C+ (55% - 61%),C (46% - 54%), D (40% - 45), F (Less than 40 %)

For F grade, a candidate shallbe required to appear in the major test of concerned course only in the subsequent examination(s) to obtain the requisite marks/grade.

Attendance Record – Candidate should attend at least75% attendance of the total classes held of the subject

Chamber consultation hour: Any vacant period.

Note:

1. In the semester examination, the examiner will set 08 questions. The students will be required to attempt only 5 questions selecting at least one question from each unit. All questions will carry equal marks.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

(Dr. Surender Kumar)

MTEC-504-B ADVANCE OPTICAL COMMUNICATION

L	T	P	Credits		Sessional Marks: 25
4	-	-	04	Theory Marks:	75

Duration of Exams: 3 Hours

OBJECTIVES:

1. To understand the fundamental behaviour of the individual optical components
2. To describe their interactions with other devices in an optical fiber.
3. To study the basic components of Optical fiber Communication systems.
4. To understand the operational principle of WDM, SONET, ATM, DWDM.
5. To understand and design different optical fiber based systems and networks based on power budget analysis.

OUTCOME:

1. Able to describe and analyze the optical fiber based systems.
2. ;Able to identify and design optical fiber based networks.

TEXT BOOKS:

Horal Kolimbris "fiber optical communication"Pearson

REFERENCE BOOKS:

John Gowar, "Optical Communication Systems", PHI

Gerd Keiser, "Optical Fiber Communication", TMH

LECTUREWISE PROGRAMME: (from 08.01.18 to 27.04.18)

Introduction of the subject (08.01.18)	1
UNIT- I	
INTRODUCTION TO OPTICAL FIBER (09.01.18 to 20.01.18)	
Introduction to ray theory and Theory of optical wave propagation	1
Optical fiber attenuation, fiber absorption, Scattering and bend losses	1
Classification of optical fiber, Dispersion, dispersion shifted fiber	2
Dispersion modified fibers, dispersion compensated fibers	1
Optical fiber non linear effects and numerical	2

OPTICAL AMPLIFIER (23.01.18 to 01.02.18)

Types of optical amplifier	
Semiconductor optical amplifier	1
Erbium doped fiber amplifier	1
Raman optical amplifiers	1
Application: 155Mb/s sonnet/OC3-stm transducer amplifier	1
	1

UNIT- II

OPTICAL TRANSMITTER AND RECEIVER (05.02.18 to 22.02.18)

Introduction to multiplexer, 32:1 2.488Gb/s multiplexer with clock generator (VSC 8131)	1
External modulated laser diode , The effect of noise and power supply noise rejection	
10Gb /s DWDM optical transmitter , Data pattern	1
Photo detector diodes	
Classification of optical receiver, Optical receiver performance characteristics	2

OPTICAL TRANSRECEIVERS (26-2-18 to 01.03.18)

	3
LED transreceivers	3
LASER diode Trans receiver	
Design guide lines for optical channel transreceivers	
High speed optical channel transreceivers	1
	1
	1
	1

UNIT III

OPTICAL MODULATION (05.03.18 to 12-3-18)

Introduction, The mach zander interferometer, The mech zander (LINBO3)Optical modulator MZLIBNO, design process, modulator drivers	2
	2
DFB laser diode with PMFs for external modulator.	1

MULTIPLEXING (13-3-18 to 22.03.18)

Introduction ,WDM	1
Future optical devices for DWDM schemes	1
DWDM multiplexing	1
AWG multiplexer/demultiplexer for dwdm system	1
Add/drop multiplexer/demultiplexers	1
2.5 GB/s 16:1 multiplexer	2

UNIT IV

OPTICAL SYSTEM (26-3-18 to 11-4-18)

Introduction ,optical power budget analysis , 10Mb/ s optical link designs for industrial applications optical fiber link design dispersion effect wave polarization effect in optical systems under sea optical system soliton transmission	3 2 1 1 1

NETWORK (12-4-18 to 27-4-18)

Introduction	
optical networks review of data communication links networks	1
network transport architecture	1
LAN standards	1
fiber channel	2
asynchronous transfer mode	2
synchronous transfer mode	1 1

Home Assignments:4 –5 assignments are given during the semester.

Evaluation Procedure

1.	Surprise Quiz/ Tutorial Test	5 Marks
2.	Assignment / Project / Performance in the Class	5 Marks
3.	Minor Tests (Two tests having equal weightage) Minor Test I : 14-16 Feb, 2018 Minor Test II : 4 -6 April, 2018	15 Marks
4.	Major test (University Examination)	75 Marks

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For F grade, a candidate shallbe required to appear in the major test of concerned course only in the subsequent examination(s) to obtain the requisite marks/grade.

Attendance Record – Candidate should attend at least75% attendance of the total classes held of the subject

Chamber consultation hour: Any vacant period.

Note:

3. In the semester examination, the examiner will set 08 questions in all selecting two from each unit (1 & 2 from unit I, 3 & 4 from unit II, 5 &6 from unit III and 7 & 8 from unit IV). The students will be required to attempt only 5 questions selecting at least one question from each unit. All questions will carry equal marks.
4. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

(Dr. Amit Kumar Garg)

MTEC-506-B DIGITAL IMAGE PROCESSING

L	T	P	Credits	Sessional Marks:	25
4	-	-	04	Theory Marks:	75
				Duration of Exams:	3 Hours

OBJECTIVES:

6. To introduce fundamental as well as advanced topics of digital image processing.
7. To make students aware of Image representation, storage, enhancement.
8. To introduce the concept of restoration, compression, segmentation and other image processing techniques.

OUTCOME:

1. Able to understand image representation and how one can process image for different applications.
2. Able to choose particular processing techniques based on application requirement.
3. Able to interpret results and image deformations meaningfully.

Books :

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson
2. Anil K Jain, "Fundamentals of Digital Image Processing", PHI Edition 1997.
3. Keenneth R Castleman, " Digital Image Processing", Pearson
4. Chanda & Majumder, "Digital Image Processing & Analysis", PHI
5. M. K. Pakhira, "Digital Image Processing and Pattern Recognition", PHI.

LECTUREWISE PROGRAMME : (from 08.01.18 to 27.04.18)

Introduction of the subject (08.01.18)	1
UNIT- I	
Review of Digital Image Processing (DIP) Fundamentals and Filtering (09.01.18 to 12.01.18)	
Review of DIP basics and systems	1
sampling and Quantization, Representation of digital images	1
spatial and Gray-level resolution, Relationships between pixels: neighbours of pixel, Adjacency, connectivity, regions, and boundaries	1
distance measures, Image operations on a pixel basis.	1

Intensity Transformations and Spatial Filtering(15.01.18 to 24.01.18)

Intensity Transformation Functions: Image negatives, log transformations, Power-Law (Gamma) transformations, piecewise –Linear Transformation functions;	1
Histogram Processing: Histogram Equalization	1
Histogram Matching (Specifications), Local Histogram Processing,	1
Using Histogram Statistics for Image Enhancement, spatial filtering: Spatial Correlation and Convolution	1
Vector Representation of Linear filtering, Generating Spatial Filter Masks	1
Smoothing Spatial Filters: Smoothing Linear Filters, Order Statistics (Nonlinear) Filters;	2
Sharpening Spatial Filters: Using the second derivative for Image Sharpening-The Laplacian; Unsharp Masking and Highboost Filtering.	2

UNIT- II

Filtering in Frequency Domain (25.01.18 to 02.02.18)

Relationship between the sampling and Frequency intervals, 2-D Impulse and shifting Properties	1
2-D Sampling & 2-D Sampling Theorem, Aliasing in Images, 2-D Discrete-Fourier Transform and its Inverse, Properties of 2-D DFT	1
Additional Characteristics & Filtering Fundamentals in the frequency domain	1
correspondence between filtering in the spatial and frequency domains	
Smoothing frequency domain filters: Ideal Lowpass Filters, Butterworth Lowpass Filters, Gaussian Lowpass Filters; sharpening frequency domain filters: Ideal Highpass Filters, Butterworth Highpass Filters, Gaussian Highpass Filters, Lapalacian in Frequency Domain; Unsharp Masking, Highboost Filtering, and High Frequency Emphasis Filtering, Homomorphic filtering, Implementation of DFT: computing 2-D DFT using 1-D DFT Algorithm, Computing IDFT	1
using DFT Algorithm.	1
	2

Wavelets and MultiResolution Processing (5.02.18 to 16.02.18)

Wavelet Transforms in One Dimension: Wavelet Series Expansion, Discrete Wavelet Transform,	1
Introduction to Multiresolution Expansions	
Wavelet Transforms in One Dimension: Wavelet Series Expansion, Discrete Wavelet Transform	2
Continuous wavelet transform, The Fast Wavelet Transform,	1
Wavelet Transforms in two Dimensions, Wavelet Packets.	1

UNIT – III

Image Restoration and Reconstruction (19.02.18 to 08.03.18)

Restoration in presence of Noise only: A model of the image degradation/ restoration process, Noise models:	**1**
Spatial and frequency properties of noise, some important noise probability density functions,	1
Periodic Noise, Estimation of Noise Parameters;	1
Restoration in the presence of noise only spatial filtering: Mean Filters, Order Statistic Filters,	1
Adaptive Filters; Periodic noise reduction by frequency domain filtering: Bandreject Filters, Bandpass Filters, Notch Filters	2

Restoration in presence of Degradations(09.03.18 to 16.03.18)

Linear, Position –Invariant Degradations,	1
Estimating the Degradation Function: Estimation by Image Observation, Estimation by Experimentation, Estimation by Modeling;	1
Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering	1

UNIT – IV

Image Compression(20.03.18 to 12.04.18)

Fundamentals: Coding Redundancy, Spatial and Temporal Redundancy, Irrelevant Information,	1

measuring Image Information, Fidelity Criteria,	1
Image Formats, Containers, and Compression Standards	1
Basic Compression Methods: Huffman Coding, Arithmatic Coding, LZW Coding, Run length Coding,	2
Symbol Based Coding, Bit Plane Coding, Block Transform Coding,	1
Predictive Coding, Wavelet Coding, Digital Image Watermarking.	2

Image Segmentation (13.04.18 to 27.04.18)

Detection of Discontinuities: Point, Line, and Edge detection	
Boundary detection, Thresholding: Role of Illumination basic global thresholding	1
Optimum global thresholding using Otsu's method, Using Image Smoothing to improve global thresholding,	1
Using Edges to improve global thresholding, Multiple thresholds, Variable Thresholding,	1
Multivariable Thresholding, Regional –Based segmentation: Region growing, region splitting and merging, Segmentation Using Morphological Watersheds: Background, Dam Construction, Watershed Segmentation Algorithm, Use of Markers, use of motion in segmentation: Spatial Techniques, Frequency Domain Techniques.	1 2

Home Assignments :4 –5 assignments are given during the semester.

Evaluation Procedure

1.	Surprise Quiz/ Tutorial Test	5 Marks
2.	Assignment / Project / Performance in the Class	5 Marks
3.	Minor Tests (Two tests having equal weightage) Minor Test I : 14-16 Feb, 2018	15 Marks

	Minor Test II : 4 -6 April, 2018	
4.	Major test (University Examination)	75 Marks

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A+ (90% - 100 %), A (80% - 89%), B+ (70% - 79%) , B(62% - 69%), C+ (55% - 61%),C (46% - 54%), D (40% - 45), F (Less than 40 %)

For F grade, a candidate shallbe required to appear in the major test of concerned course only in the subsequent examination(s) to obtain the requisite marks/grade.

Attendance Record – Candidate should attend at least75% attendance of the total classes held of the subject

Chamber consultation hour: Any vacant period.

Note:

In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attemptfive questions in all, atleast one from each unit. All questions carry equal marks.

(Dr. Priyanka)

MTEC-510-B MULTIMEDIA COMMUNICATION

L	T	P	Credits
4	-	-	4

Class Work	:	25 Marks
Theory	:	75 Marks
Total	:	100 Marks
Duration of Exam.	:	3 Hrs.

OBJECTIVE

1.The objectives of a multimedia system is to send information, educate the public and provide entertainment.

2. Multimedia includes television, radio, newspapers and online news sources.

3.Multimedia will help to improve computer penetration in various spheres of life.

4.In the present scenario, Multimedia and web design technology play an important role in the field of education, agriculture, product launch, science and technology, corporate development and enhanced business opportunities.

5.With the increasing variety and range of hardware and software used for Multimedia and Web-Site Design, the demand for the manpower in these fields has escalated. This training program has been envisaged with an objective to develop specialized manpower required for these activities.

OUTCOMES

1. Describe the basic concept of multimedia information representation. Delve into the requirement of multimedia communication in today's digital world. Describe the different multimedia networks. Compare circuit mode and packet mode.Explain QoS and its applications.

2.Explain the various multimedia information representations. Describe different multimedia data in digital formats. Compare text, audio, image and video data.

3.Describe data compression principle. Compute Arithmetic, Huffman, Lempel –Ziv and Lempel–Ziv Welsh coding. Summarize Joint Photographic Expert Group (JPEG).

Explain fundamentals of audio and video data compression. Summarize audio compression PCM, DPCM, ADPCM, LPC, CELPC and MPEG. Compare MPEG1, MPEG2 and MPEG4. Describe H.26X compression standards.

4.Explain LANS's. Summarize LAN protocols. Describe multisite LAN interconnection Technologies.

5.Define the Network Layer and describe its functions. Discuss the format of Ipv4 Addresses. Deploy appropriate addressing for networks. Discuss Ipv6 addresses. Compare Ipv4 and Ipv6 addresses.

Explain cell format and switching principle of broadband ATM networks.

UNIT I

Multimedia & Information Representation (16/1/2018 to 30/1/2018)

Multimedia Introduction: multimedia networks, Telephone networks, Data networks, Broadcast television networks, Integratedservices digital networks, Broadband multiservice networks (2)
types of Multimedia Applications: Movie on Demand, (1)
Near Movie on Demand, (1)
communication modes, (1)
multipoint conferencing, (1)
network QOS, (1)
Application QOS (1)

Multimedia Information Representation:**(01/2/2018 to 13/2/2018)**
Digitization principles (1)
Encoder Design, Decoder Design (1)
Unformatted Text, FormattedText, Hypertext (1)

Images: Graphics, Digitized documents, Digitized pictures (2)

Audio: PCM speech, CD-quality audio, Synthesized audio (1)

Video: Broadcast television, Digital video, PC video, video content (1)

UNIT II

Text and Image Compression(19/2/2018 to 06/3/2018)

Compression Principles & Text Compression: Compression Principles: Source encoders and Destination decoders (1)

Losslessand lossy compression (1)

Entropy encoding (1)

Source encoding; Text Compression: Static Huffman coding (2)

Dynamic Huffman Coding (1)

Arithmetic Coding (1)

Image Compression: (07/3/2018 to 14/3/2018)

Graphics Interchange Format (1)

Tagged image file format (1)

digitized documents (1)

digitized pictures (1)

UNIT III

Audio and Video compression: (15/3/2018 to 21/3/2018)

Audio Compression: Differential Pulse Code Modulation (1)

Adaptive Differential PCM, Adaptivepredictive coding, Linear Predictive coding (1)

Code excited LPC, Perceptual Coding (1)

MPEG Audio coders, Dolby audio coders (1)

Video compression: (22/3/2018 to 28/3/2018)

video compression principles (2)

Motion Pictures Expert Group (MPEG), MPEG1, MPEG2 (2)

UNIT IV INTERNET

AND DESIGNING FOR THE WORLD WIDE WEB(2/4/2018 to 13/4/2018)

The internet and multimedia: The internet, Internetworking: Internet addresses, connections (2)

The Bandwidth Bottleneck, Internetservices (1)

\MIME-Types, The world wide web and HTML (1)

Dynamic web pages and XML (1)

multimedia on the web, Tools for the World Wide Web: web browsers (1)

web servers, web page makers and site builders, plug-ins and delivery vehicles (2)

Designing For The World Wide Web: (16/4/2018 to 27/4/2018)

Developing for the web: HTML is a Markup Language (2)

The Desktop Workspace, The SmallDevice Workspace, nibbling (1)

Text for the web: making columns of text, flowing text around images (1)

images for the web: GIF and PNG Images, JPEG Images (1)

Using Photoshop, Backgrounds, clickable buttons (1)

Client side image maps, sound for the web, animation for the web (1)

Text Books:

1. Fred Halsall, Multimedia Communications , Pearson
2. Tay Vaughan, Multimedia, making it work Eighth edition, Tata McGraw-Hill Edition
3.

Reference Books

1. Rao, Bojkovic&Milovanovic, Multimedia Comm. System: Techniology , Std. & Network , PHI
2. John F. KoegelBufod, Multimedia Systems , Addison Wesley, Edition. 2000

NOTE:

In the semester examination, the examiner will select two questions from each unit (total eight questions in all), covering the entire syllabus. The student will be required to attempt five questions selection at least one question from each unit.

MTEC520BADVANCE SATELLITE COMMUNICATION

L	T	P	Credits		
				Sessional Marks:	25
4	-	-	04	Theory Marks:	75
				Duration of Exams:	3 Hours

OBJECTIVES:

1. To give the idea and basic knowledge of satellite Communication Systems.
2. To familiarize the students with the Earth Station Technologyi.e design of Earth Station, antennas, Tracking, satellite Packet Communications.
3. To give the idea about the GPS orbits and satellite position determination and to teach the students about the Very small Aperture Terminal Networks.

OUTCOME:

4. After reading the course, students will be able to understand the basics of satellite communication systems, earth Station Technology, GPS, VSAT.
5. Students may utilize their knowledge of the subject for the research and development in future.

Books :

Text Books:

1. T. Pratt and C.W., —Bostian Satellite Communications||.
2. Tri T. Ha, —Digital Satellite Communication|| (2 ed) 3 Robert J. Mailloux
3. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, —GPS – Theory and Practice||, Springer – Wien, New York (2001).

Reference Books:

1. James Ba – Yen Tsui, —Fundamentals of GPS receivers – A software approach||, John Wiley & Sons (2001).
2. Phased Array Antenna Hand Book|| , Artech House, Boston, London, 1994. 4.
3. Dr. D.C. Agarwal, —Satellite Communications|| .

LECTUREWISE PROGRAMME : (from 15.01.18 to 27.04.18)

Introduction of the subject (15.01.18)	1
UNIT- I	
Introduction (16.01.18 to 30.01.18)	
Kepler's Laws of motion, Orbital aspects of Satellite Communications,	1

Look Angle and Orbit determinations, Orbital effects in communication system Performance,	1
Space craft subsystems, AOCS, TTC&M, Power system,	2
Satellite transponder, spacecraft Antennas,	1
Satellite Link DesignSystem Noise temperature and G/T ratio –	1
Design of downlink, Uplink - Design of satellite links for specified C/N,	1
Implementation of error Detection on satellite links	1

Multiple Access(1.02.18 to 7.02.18)

FDMA, TDMA,	1
CDMA, SSMA	1
comparison of multiple access techniques, Practical Demand Access systems,	1
Multiple Access With on board processing.	1

UNIT – II

Earth Station Technology (8.02.18 to 16.02.18)

Earth Station Design, Design of Large Antennas,	1
Tracking, Small earth station Antennas, Equipment for earth station;	1
Satellite Packet Communications- Message transmission by FDMA: The M/G/1 Queue,	1
Message transmission by TDMA - Pure ALOHA:	1
Satellite packet switching - slotted ALOHA - Packet Reservation - Tree algorithm.	1

Overview of GPS (19.02.18 to 26.02.18)

Basic concept, system architecture, space segment, user segment,	1
GPS aided Geo-augmented navigation (GAGAN) architecture.	1
GPS Signals**:** Signal structure, anti spoofing (AS), selective availability,	2
Difference between GPS and GALILEO satellite construction.	1

UNIT – III

GPS orbits and satellite position determination (27.02.18 to 7.03.18)

GPS orbital parameters, description of receiver independent exchange format (RINEX) –	1

Observation data and navigation message data parameters, 2

GPS position determination. 1

GPS Errors (8.03.18 to 16.03.18)

GPS error sources – clock error, ionospheric error, 2

tropospheric error, multipath, ionospheric 1

error estimation using dual frequency GPS receiver. 2

2

UNIT – IV

Very small Aperture Terminal Networks (19.03.18 to 31.03.18)

VSAT Technologies – Network Configurations - Multi access and Networking Network Error Control – 2

Polling VSAT Networks; 2

Mobile Satellite Networks--Operating Environment – MSAT Network concept – 2

CDMA MSAT Network-Statistics of mobile propagation. 2

Phased Arrays in Radar and Communication Systems (2.04.18 to 27.04.18)

System requirements for radar and communication antennas, 2

Array characterization for radar and communication systems, 3

Fundamental results from array theory, 2

Array size determination. 2

Home Assignments :4 –5 assignments are given during the semester.

Evaluation Procedure

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Attendance Record – Candidate should attend at least75% attendance of the total classes held of the subject

Chamber consultation hour: Any vacant period.

Note:

5. In the semester examination, the examiner will set 08 questions in all selecting two from each unit (1 & 2 from unit I, 3 & 4 from unit II, 5 &6 from unit III and 7 & 8 from unit IV). The students will be required to attempt only 5 questions selecting at least one question from each unit. All questions will carry equal marks.
6. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.

(Kusum Dalal)

ECE 312B COMMUNICATION SYSTEM AND TECHNOLOGY

L	T	P	Credits			
3	1	-	4	Class Work	:	25 Marks
				Theory	:	75 Marks
				Total	:	100 Marks
				Duration of Exam. :		3 Hrs.

Course Objective:

OBJECTIVES:

6. This course provides a thorough introduction to the basic principles and techniques used in analog and digital communications.
7. The course will introduce analog and digital modulation techniques, communication receiver and transmitter design, baseband and bandpass communication techniques, line coding techniques, noise analysis and multiplexing techniques.
8. The course also introduces analytical techniques to evaluate the performance of communication systems.

OUTCOME:

1. On successful completion of the course students will be able to understand basic elements of a communication system.
2. Conduct analysis of baseband signals in time domain and in frequency domain and Demonstrate understanding of various analog and digital modulation and demodulation techniques.
3. Analyse the performance of modulation and demodulation techniques in various transmission environments and appreciate the importance of synchronisation in communication systems.

Books:

1. Communication Systems, By Manoj Duhan – I. K. International.
2. Electronic Communication Systems, By Kennedy – TMH.
3. Communication Systems, By Singh & Sapre – TMH.
4. Electronic Communication, By Roody Coolen – Pearson.
5. Analog Communication, By P. Chakarbarti – DR & Co.
6. Communication Systems, By Simon Haykins – Wiley Seeger.

LECTUREWISE PROGRAMME: (from 08.01.18 to 27.04.18)

UNIT- I

INTRODUCTION TO COMMUNICATION SYSTEM (09.01.18 to 20.01.18)

Introduction: Modulation, Demodulation	1
Radio Frequency Spectrum, Signals & their classification	1
Limitations & Advantages of a Communication System, Comparison of Analog & Digital Communication Systems	1
Historical Perspective, Modes & Medias of Communication.	2

NOISE (23.01.18 to 31.01.18)

Sources of Noise, External & Internal Noise, Noise Calculations, Noise Figure, Noise Figure Calculation,Noise Temperature, Noise in Communication Systems, Band Pass Noise Model	3
Cascaded States & its Noise Figure Calculation, Signal in presence of Noise, Pre-Emphasis & De- Emphasis, Noise Quieting Effect, Capture Effect and Noise in Modulation Systems.	2

UNIT- II

LINEAR MODULATION and ANGLE MODULATION (02.02.18 to 23.02.18)

Amplitude Modulation: Basic definition & derivation for Modulation & Modulation Index, Modulation & Demodulation of AM, Suppressed Carrier Modulation, Quadrature Amplitude Modulation	2
SSB-SC, DSB-SC, VSB Modulation & Demodulation, Comparison of various AM Systems, Generation of AM waves.	3
Angle Modulation: Basic definition & derivation for Modulation & Modulation Index, Generation of FM waves, Comparison between PM & FM, Frequency Spectrum of FM, B.W. & required spectra, Types of FM, vector representation of FM	3
Universal Curve, Multiple FM, Demodulation of FM waves, Demodulation of PM waves, Comparison between AM & FM.	2

UNIT – III

PULSE ANALOG MODULATION (26.02.18 to 14.03.18)

Sampling theory	1
Time Division Multiplexing, Frequency Division Multiplexing	1
Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation	3

PULSE DIGITAL MODULATION (16.03.18 to 26.03.18)

Elements of Pulse Code Modulation, Noise in PCM Systems, Bandwidth of PCM Systems, Measure of Information, Channel Capacity, Channel Capacity of PCM System	2
Differential Pulse Code Modulation (DPCM), Delta Modulation (DM), Digital Modulation: ASK, FSK, PSK, DPSK.	3

UNIT – IV

OPTICALCOMMUNICATION SYSTEMS (27.03.18 to 17.04.18)

Types of Optical Fibres: Step Index & Graded Index, Multi mode & Single mode	2
Attenuation & Dispersion in fibres, Optical transmitters LEDS & Laser Diode	2
Optical Receivers-PIN & APDS, optical fiber link.	2

MICROWAVE COMMUNICATIONS (18.04.18 to 27.04.18)

Transmit & receive antennas, link budget, line of sight systems, Satellite-link-GT ratio of earth stations	2
VSATS & GPSS.	2

Home Assignments: 4 –5 assignments are given during the semester.

Evaluation Procedure

1.	Surprise Quiz/ Tutorial Test	5 Marks
2.	Assignment / Project / Performance in the Class	5 Marks
3.	Minor Tests (Two tests having equal weightage) Minor Test I : 14-16 Feb, 2018 Minor Test II : 4 -6 April, 2018	15 Marks
4.	Major test (University Examination)	75 Marks

Award of Grades Based on Absolute Marks: The University is following the system of grading based on absolute marks (after applying moderation if any). Following grading will be done based on the % of marks obtained in all the components of evaluation part of the subject.

A+ (90% - 100 %), A (80% - 89%), B+ (70% - 79%) , B(62% - 69%), C+ (55% - 61%),C (46% - 54%), D (40% - 45), F (Less than 40 %)

For F grade, a candidate shallbe required to appear in the major test of concerned course only in the subsequent examination(s) to obtain the requisite marks/grade.

Attendance Record – Candidate should attend at least 75% attendance of the total classes held of the subject

Chamber consultation hour: Any vacant period.

Note:

In the semester examination, the examiner will select two questions from each unit (total eight questions in all), covering the entire syllabus. The student will be required to attempt five questions, selecting at least one question from each unit.

(Dr. Poonam Singal)