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Course	Name of the Course	Lect./ Hrs./ Week	Internal Marks	External Marks	Total Marks	Course Credits
ELE-501	Thin film technology	**4**	**30**	**70**	**100**	**4**
ELE-502	Control Systems-II and Programming in C Language-II	**4**	**30**	**70**	**100**	**4**
ELE-503	Microcontroller-II and Digital Signal processing – I	**4**	**30**	**70**	**100**	**4**
ELE-504	Microwaves-II and Instrumentation-II	**4**	**30**	**70**	**100**	**4**
ELE-505 PR	Practicals	**6**	**30**	**70**	**100**	**4**
ELE-506 PT	Projects	**6**	**30**	**70**	**100**	**4**
TOTAL		**28**	**180**	**420**	**600**	**24**

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ELE– 501: THIN FILM TECHNOLOGY

Fundamentals of modern thin film technology used in microelectronics have been covered in depth. Several vacuum generation & measurement techniques are covered. The syllabus covers all most all the characterization techniques used in modern microelectronics & thin film technology. Fabrication methods of active & passive thin film devices are also incorporated in detail.

Unit I: Vacuum Techniques and deposition
Creation of Vacuum with different Vacuum Pumps, Measurement of Vacuum with different Gauges. Evaporation Theory. Physical Vapour Deposition methods, Direct, Flash, Electron Beam, Inductive Heating Evaporation. Uniform deposition. Types of substrate holders. Deposition Monitoring.

Unit II: Thin film growth
Diode Sputtering, DC and RF mode. Magnetron Sputtering DC and RF mode. Ion Beam Sputtering Yield and Influenced factors. ECR Sputtering Technique. CVD methods. Various types of CVD reactions.
Growth of thin films: Substrates Cleaning, Condensation, Nucleation Structural Consequences. Growth stages.

Unit III: Thin film Characterization
Surface and bulk structure determination techniques: X-ray Diffraction, Grazing Incidence XRD, Electron Diffraction, LEED, RHEED Techniques, Electron Microscopy: Scanning Electron Microscopy, Transmission Electron Microscopy, Chemical analysis: Electron Probe Microanalysis-EDAX, Auger Electron Spectroscopy, X-ray photoelectron spectroscopy, ESCA.

Unit IV: Thin Film Devices
Thin Film Passive Devices: Resistors Materials, Design of Resistors. Measurement of Sheet Resistance, Trimming of Resistors, TCR of resistor. Thin Film Capacitors: TFC materials criteria, TFC materials, Design flow.
Thin Film Active Devices: Thin Film Field Effect Transistors, Designing techniques, Effect of design process on I-V characteristics, Thin Film Diodes, Thin Film circuits: complementary invertors.

Reference Books:

1. Leon I. Maissel and Reinhard Glang, Handbook of Thin Film Technology, Tata McGraw Hill Int. Edition
2. K. L. Chopra and L. K. Malhotra, Thin film technology and applications, Tata McGraw Hill, India
3. J. J. Coutts, Active and passive Thin Film Devices, Academic Press
4. Milton Ohring, The Materials Science of thin films, Academic Press
5. K. L. Chopra, Thin Film Phenomena, Tata McGraw Hill, India
6. John L. Vossen and Werner Kern, Thin Film processes, edited, Academic Press

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ELE– 502: Control Systems II and Programming in C Language II

In Sem-II the students are already made familiar with the components and characteristics of control systems. The study of control system by root locus design, stability analysis and frequency response analysis using Bode plots are being taken up here. Students will also learn about different control actions used in industrial controllers. Describes advanced topics of C- language such as function, structures, pointers, file management, graphics etc.

Unit I: Stability Analysis

System stability bounds, Location of poles and stability, Relative stability and range of stability, stability criterion, Hurwitz criterion, Routh's stability criterion, Routh's criterion special cases, Application of Routh's criterion.
Root Locus: Relation between OLTF and CLTF poles and Zeros, Angle and magnitude criterion, General method for drawing root Loci.
Frequency Domain analysis: Limitation of time domain analysis, Frequency response, Performance specifications in frequency domain, Effect of adding zeros and poles.

Unit II: Frequency Response analysis using Bode plot

Log scales, standard form for $GH(j\omega)$, Bode plots of standard factors, Advantage of Bode plots, Frequency domain specifications, Determination of resonant frequency (ωp) and Resonant peak (Mp), Relative stability
Frequency Response analysis using Nyquist plot: Polar plot, Polar plots of standard functions, Finding GM& PM from polar plots, Relative stability from polar plots, Nyquist analysis & plots, Nyquist stability plot, Nyquist stability criteria.
Control Actions: Two positions or ON-Off controllers, Proportional controller (P), Integral controller (I), Rate Feedback Controller, Proportional + Derivative controllers (PD), PI controller, PID controllers.

Unit III: Functions & structures in C

Functions: Need for user defined functions, the form of C functions, return values and their types, calling a function, category of functions, non-integer functions, nesting of functions, recursion, functions with arrays, scope and lifetime of variables, ANSI C functions.
Structures and Unions: Structure definition, giving values to members, structure initialization, arrays of structures, arrays within structures, structures within structures, structures and functions, Unions, size of structures, bit fields.

Unit IV: poniters and File Management

Pointers: Concept, accessing the address of variables, declaring and initializing pointers, accessing variables through pointers, pointer expressions, pointer increments and scale factor, pointers and arrays, pointer and character strings, pointers and functions, pointers and structures.
File management in C: Defining, opening and closing a file, I/O operations on files, error handling during I/O operations, random access to files, command line arguments.
Preprocessors, Bitwise operations, Graphics in C.

Reference Books:

1. R. A. Barapate, Feedback Control Systems, Tech-Max Publication.
2. S.C. Goyal & V.A. Bakshi, Princples of control systems, Tecnical Publications
3. I. J. Nagrath & M. Gopal, Control System Engineering, Wiley Eastern
4. B.C. Kuo, Automatic Control Systems, PHI
5. H.T. Kashipura, Control System Engineering, Akshat Publication.
6. Balagurusamy E., Programming in ANSI C, (8^{th} Edition), TMH Pub., New Delhi, 2004
7. P. Day and M. Ghosh, Programming in C, (2^{nd} Edition), Oxford Univ. Press, New Delhi, 2007
8. Gottfried B.S. and Chhabra, Programming with C, TMH, New Delhi, 2000.
9. Kenetker Y., Let us C, (17^{th} Edition) BPB Pub, N.Delhi, 1991.
10. Kernighan B.W. and Ritchie D.K., C Programming language PHI., New Delhi, 1999

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ELE– 503: Microcontroller-II and Digital Signal processing – I

Microcontroller design, testing, writing programs and serial data communication & networking are detailed in this syllabus. Few techniques like interfacing displays, keyboards etc. are taught. Finally some applications are included.
Digital Signal Processing is an area of science and engineering which has developed recently. Such development is a result of the significant advances in digital computer technology and IC fabrication. This has very wide applications in medicine, remote sensing and communications

Unit I: 8051 microcontroller design
Introduction, A microcontroller specification, A microcontroller design, testing the design, timing subroutines look-up tables for the 8051, serial data transmission, serial data communication: Introduction, Network configuration, 8051 data communication modes, example programs.

Unit II: Applications of Microcontroller
Applications: Introduction, keyboard, displays, pulse measurement, D/A and A/D conversions, multiple interrupts, putting it all together. Microcomputer board using Intel 8031.

Unit III: Discrete Time signal and systems
Discrete time signals, Discrete time systems, Analysis of discrete time linear time invariant systems. Solving difference equations using Z – Transformation, Responses of systems Voice processing, Application of radar, Application to image processing, Adaptive canceling of mother's ECG infoetal ECG, Adaptive telephone echo cancellation.

Unit IV: Discrete Fourier Transform
Introduction, computation of DFT, inverse discrete Fourier transformation, periodicity and symmetry properties of DFT, Comparison between DTFT and DFT, Circular convolution property of DFT, Solving convolution problems using various methods, Additional properties of DFT, Block convolution Application of digital signal processing: Introduction, Application of DSP classification, Applications in broader sense.

Reference Books:

1. Kenneth J. Ayala, The 8051 Microcontroller, Architecture, Programming and application, Penram International.
2. B. Somanathan Nair, Digital signal processing: Theory, Analysis and Digital filter designing, PHI Publishers.
3. John G. Proakis and D.G. Manolakis, Digital signal processing principles, Algorithms and applications, PHI Publishers.

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ELE– 504: Microwaves-II and Instrumentation-II

The students of this course have already studied microwave tubes in Semester – II. In continuation to this they will learn about the operation, properties and behavior of some of the microwave solid state active devices.
Topics on measurement techniques of some parameters are also included in one of these units. This will make the students familiar with the microwave measurement techniques.
Advanced instrumentation is used in medical field covering ultrasonic and ecg etc. Other transducers find wide applications in industry.

Unit I:

Microwave bipolar transistors (physical structure, power frequency limitations), Heterojunction bipolar transistors (HBTs), Microwave Tunnel Diodes (Principles of operation, Microwave characteristics), Microwave Field effect Transistors (Metal semiconductor Field-effect Transistors MESFETS, physical structure, principle of operation, small-signal equivalent circuit, drain current Id, cutoff frequency and maximum oscillation frequency, High electron-Mobility Transistors HEMTs (Physical structure, operational mechanism, performance characteristics, equivalent circuit, electronic applications).
Transferred Electron Devices TEDS Gunn-effect diodes-GaAs diode, background, Gunn effect, Ridley-Watkins-Hilsum (RWH) Theory, differential negative resistance, two valley model theory, High field domains, modes of operation), microwave generation and amplifications).

Unit II:

Avalanche Transit-time Devices (Read diode, avalanche multiplication, carrier current and external current, output power and quality Factor Q, IMPATT Diode, physical structure, negative resistance, power output and efficiency, Trapatt diode, physical structure, principle of operation, power output and efficiency). Parametric Devices (Physical description, non-linear resistance and Manley-Rowe power relations, parametric amplifiers, applications).
Microwave Measurements:
Frequency measurements, measurement of power, attenuation measurements, measurement of Phase Shift, measurement of voltage standing wave ratio VSWR, measurement of impedance, measurement of insertion loss, measurement of dielectric constant, measurement of noise factor, measurement of Q of a cavity resonator.

Unit III:

Strain gauges and measurement of strain, Ballast circuit, Wheastone bridge, Gauge sensitivity, Temperature compensation, Temperature compensation and cancellation techniques, strain gauge calibration, load cell, strain gauge circuitry, uses of strain gauges. Thickness measurements, measurement of thermal conductivity (gas analyser)

Unit IV:

Ultrasonic transducer types, Magnetostrictive and piezoelectric, Principle of ultrasonic measurement, Generation of ultrasonic wave, applications of ultrasonic waves, testing of materials by ultrasonic, ultrasonic in means of communication, cutting and machining of hard material, soldering and welding by ultrasonic. Digital methods for measurement of angular velocity. Measurement of Liquid levels, Flow measurement using hot wire and thermistor.

Reference Books:

1. Samuel Y.Liao, Microwave Devices and circuits, P H I.
2. M. Kulkarni, Microwave and Radar Engineering, Umesh Publications.
3. K. C. Gupta, Microwaves, Wiley Eastern Limited, India.
4. H. A. Watson (ed.), Microwave semiconductor Devices and their circuit Application, McGraw Hill Book Company.
5. D.C.Dube, Microwave Devices and Applications, Narosa Publishing House
6. Kenneth J. Ayala, The 8051 Microcontroller, Architecture, Programming and application, Penram International.
7. K.Padmanabhan & S.Ananthi, Learn to use microprocessor (EFY).
8. R.S.Khandpur, Handbook of Analytical Instruments (TMH)
9. R.S.Khandapur, Hand Book of biomedical Instrumentation, (TMH)
10. A. K. Sawhney, Electrical and electronic measurements and Instrumentation (Dhanpatrai and Sons).
11. Bennedict and Weiner, Industrial Electronics
12. G. K. Mittal, Industrial Electronics, Khanna Pub..
13. H. S. Kalsi, Electronic Instrumentation, TMH
14. Joseph J. Carr, Elements of Electronic Instrumentation and measurement, Restor Book PHI.

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ELE– 505PR : PRACTICALS

LIST OF PRACTICALS:

1. R.C. CONTROL CKT. FOR SCR
2. RESISTANCE TRIGGER CKT. FOR SCR
3. RC TRIGGERED CKT FOR SCR CONNECTED IN A BRIDGE
4. TIME DIVISION MULTIPLEX AND DEMULTIPLEX
5. LOGIC CONTROLLER INTERFACE
6. ELEVATOR INTERFACE
7. KEYBOARD INTERFACE
8. MESSAGE DISPLAY (LCD KIT) USING MICROCONTROLLER
9. SQUARE WAVE GENERATION USING MICROCONTROLLER
10. SQUARE OF A NUMBER ≤ 9 USING MICROCONTROLLER
11. ADDITION OF NUMBERS USING MICROCONTROLLER
12. RESISTIVITY BY FOUR PROBE METHOD
13. PROGRAMMING IN ‘C’ – I
14. PROGRAMMING IN ‘C’ – II

15% of new experiments can be introduced AND / OR replaced as per the need, with the permission of the Chairman of the Board of Studies.

M. SC. (ELECTRONIC SCIENCES) SEMESTER - III
(EFFECTIVE FROM – 2021-2022)

ELE-506PT: POJECT

- In-house project work of 4-credit to be performed by each student.
- Alternatively, MOOC, Swayam or any other UGC recognized online course equivalent to 4-credit and approved under the GU_SWAYAM_POLICY by the Gujarat University for credit transfer in will also be considered for 4-credit in this course.

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Course	Name of the Course	Lect./ Hrs./ Week	Internal Marks	External Marks	Total Marks	Course Credits
ELE-507	Integrated Circuit Technology	**4**	**30**	**70**	**100**	**4**
ELE-508	Data Acquisition Systems and Power Electronics II	**4**	**30**	**70**	**100**	**4**
ELE-509	Fiber Optics and its Applications	**4**	**30**	**70**	**100**	**4**
ELE-510	Electronic Communication – II	**4**	**30**	**70**	**100**	**4**
ELE-511 PR	Practicals	**6**	**30**	**70**	**100**	**4**
ELE-512 PT	Project	**6**	**30**	**70**	**100**	**4**
TOTAL		**28**	**180**	**420**	**600**	**24**

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ELE– 507: Integrated Circuit Technology

Modern micro electronic fabrication technology with relevant example based on silicon has been covered in depth. The course gives an over view of silicon I C technology. VLSI techniques are also included.

UNIT I: SILICON GROWTH TECHNOLOGY

Classification of IC's, Electronic grade Silicon, Czoschralski and Float zone crystal, Growing Methods, Oxygen and carbon in silicon, segregation coefficients, silicon shaping and wafer preparation, Different silicon orientation. Epitaxy: Vapour Phase epitaxy.

UNIT II: OXIDATION, LITHOGRAPHY AND ETCHING

Oxidation-Thermal, Dry and Wet, High pressure and plasma oxidation, Lithography - Optical Lithography, Photomask, Photo resist and process, Electron Lithography, Ion beam Lithography. Etching - wet chemical Etching, Reactive Plasma etching

UNIT III: DOPING, METALLIZATION AND PACAGING

Impurity Doping – Diffusion: Models of Diffusion in Solids, Fick's One dimensional Diffusion equations, Measurement Techniques, Ion implantation, Metallization - Desired properties of metals for contact and interconnect metallization, Metallization choices, AlSi and AlSiCu Alloy for Shallow junction devices, Electromigration resistance. Packaging: Package types, Design considerations of Typical ICs, Die Bondings.

UNIT IV: VLSI DESIGN AND FABRICATION REQUIREMENTS

Integrated Elements, Isolation of circuits, Bipolar Technology: NPN Transistors, Integrated Diodes, Semiconductor resistor and capacitor. MOS Technology: NMOS & CMOS IC Technology. Non silicon Technology (GaAs ICs), Future trends. Fabrication Facilities and Environment-pure water system and clean room. Causes of IC failures - Electrostatic Discharge Damage and Alpha particle Induced soft errors

Reference Books:

1. S. M. Sze, VLSI Technology (Tata McGraw Hill 2nd Edition).
2. W.R. Wesley and K.E. Bean, Semiconductor Integrated, Integrated Circuit Processing technology (Addison - Wesley Publishing Co.).
3. Peter Gise and Rechard Blanchard, Modern Semiconductor Fabrication Technology (Reston Book - Prentice Hall)
4. James W. Mayer and S. S. La, Electronic Materials Science: For Integrated circuit in Si and GaAs (McMillan Publishing Co., New Delhi).
5. Hong H. Lee, Fundamentals of microelectronics processing, (McGraw Hill publishing Co.).
6. S. M. Sze, Semiconductor Devices: Physics and Technology (John Wiley and Sons).
7. Douglas A. Packness and Kamran Eshraghian, Basic VLSI Design: Systems and circuits (Prentice Hall of India, New Delhi).

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ELE– 508: Data Acquisition Systems and Power Electronics II

Modern instruments use pc based data acquisition systems. These also use microcontroller hardware and various softwares. The important methods of data acquisition are discussed in this paper.
The paper also takes up Polyphase rectifiers, relays and induction heaters highlighting their applications in industries. Hence the paper is designed to give know-how regarding Data Acquisition Systems and Power electronics.

UNIT I: Data Acquisition systems

Analog input, Analog Output, Digital I/O, Timing I/O, Data Acquisition Configurations-Local Data acquisition, GPIB Data Acquisition, Data Acquisition Using Serial Interfaces, Networked Data Acquisition
Data Acquisition Using GPIB Overview, GPIB Commands, GPIB Programming, Expanding GPIB; IEEE-488.2, SCIPI 417, HS488 Protocol

UNIT II: Data Acquisition Using Serial Interfaces

Serial Communication, Serial interface Standards, PC serial port, Microcontroller Serial Interfaces, USB, IEEE1394, Remote I/O Modules

Unit III: Polyphase Rectifiers

Polyphase rectifier, three phase half wave delta-wave rectifier, six phase star half wave rectifier, three phase delta-wye bridge rectifier, voltage and current relationship in polyphase rectifier, general m-phase rectifier circuit, transformer utility factor, rectifier performance. Resistance welding, digital weld control timer, types of resistance welding, energy storage welding systems, spot welder timer with time sequence.

Unit IV: Induction heaters and relays

Principle of induction/dielectric heating, Theory of induction/dielectric heating, Merits of induction heating, dielectric properties of materials, thermal losses in dielectric heating, Applications of induction/dielectric heating.
Resistance sensitive relay, voltage sensitive relay, photosensitive relay, fast photo relay solid-state relays. LCD displays.

Reference Books:

1. R.A. Barapate, Feedback Control Systems,Tech-Max Publication.
2. S.C. Goyal &V.A. Bakshi, Princples of control systems,Tecnical Publications
3. I.J. Nagrath & M.Gopal,Control System Engineering,Wiley Eastern
4. B.C. Kuo, Automatic Control Systems PHI
5. M.D.Singh & K.B. Khancdandani, Power electronics, THM.
6. M.H.Rashid, Power electronics, PHI.
7. P.S.Bimbhra, Power electronics, KP
8. H.C. Rai, Power electronics, devices and system

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ELE– 509: FIBER OPTICS AND ITS APPLICATIONS

The students have completed study of LED and LASER sources. Here they study optical fiber, couplers & connectors. There is a unit on incoherent & coherent communication systems. Optical fiber measurements and other applications are also included in the course.

Unit I: Optical fiber waveguide and its transmission characteristics
Step Index and graded Index fibers, Ray theory, Electromagnetic Mode theory, Group and phase velocity, Cylindrical fiber (qualitative), Normalized frequency, Single mode fiber -cutoff wavelength.

Unit II: Optical fibers fabrication, fiber couplers and connectors
Optical fiber losses: Material absorption losses, linear scattering losses, non-linear scattering losses (qualitative), bend loss, mid-IR transmission, Dispersion: Intramodal dispersion, Intermodal dispersion, overall fiber dispersion.
Stability of the fiber transmission characteristics, fiber alignment and joint losses, fiber splices: fusion splices, mechanical splices, fiber optic connectors - cylindrical and bioconical ferrule connectors, expanded beam connectors, fiber couplers, Optical fiber to Source connection techniques.

Unit III: Optical fiber fabrication:
Fiber material requirements, Fabrication methods: liquid phase techniques, Double crucible technique, Vapour phase deposition technique – Outside vapour phase oxidation (OVPO), Vapour Axial deposition (VAD), MCVD)
Optical fiber measurements: Attenuation, dispersion, refractive index profile, cutoff wavelength, numerical aperture, reflectance and optical return loss, OTDR.

Unit IV: Communication Systems
Communication Systems I: Optical transmitter circuit-LED & Laser drive circuits, optical receiver circuit-detector, AGC and receiver block diagram, digital systems, analog systems -direct intensity modulation.
Communication Systems II: Basic system, detection principles, modulation formats-ASK, FSK, PSK and Polarization Shift Keying demodulation schemes-Heterodyne synchronous detection, Heterodyne non-synchronous detection, Homodyne Detection and Phase diversity reception.

Reference Books:

1. J.M. Senior, Optical fiber communication-principles and practices, Prentice Hall, 1999.
2. R.P. Khare, Fiber Optics and Optoelectronics, Oxford University Press 2004
3. Gerd Keiser, Optical fiber communications, McGraw Hill Int. edition, 3rd Edition 2000.
4. S.C. Gupta, Text Book on Optical fiber Communication and its Applications by P H I, 2005
5. J. Gowar, Optical communication systems by Prentice Hall, 1993.

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ELE– 510: Digital Signal Processing II & Electronic Communication - II

Theory and designing of FIR & IIR Digital filters are included in this course of digital signal processing. Radar, is one of the most prevalent applications of microwave technology. Students of this course have studied principles of microwaves and also the microwave devices in detail in previous semesters. Now they are introduced with a communication system: radar, which uses microwaves. The students will also study fundamentals of satellite communication, which is a backbone of modern communication systems. Further mobile communication is also included here.

Unit I: Theory and design of IIR digital Filters

Introduction, Finding the expression for H(s) in the digital domain: The impulse invariant transformation, Designing of Butterworth digital IIR filters, Chebyshev digital IIR filters: Type-I and Type-II, Design of digital filter using Bilinear transformation, Frequency transformation: Low-pass frequency transformation, High-pass frequency transformation, Band-pass frequency transformation, Band-stop frequency transformation, IIR filter Structures: Direct form-I IIR filter structures, Direct form-II IIR filter structures, Transposed form IIR filter structures, Parallel form IIR filter structures, Cascade form IIR filter structures, Signal flow graph in filter structure realization, Lattice structure of IIR filter.

Unit II: Theory and design of FIR digital filters

Introduction, Basic principles of FIR filter design, Low-pass FIR filter without using window function, Gibb's phenomenon, Designing other type of FIR filters: High-pass FIR filter, Band-pass FIR filter, Band-stop FIR filter, FIR filter Structures: Direct form-I FIR filter structure, Cascade form FIR filter structure, Lattice structure of FIR filters, Comparison of IIR and FIR digital filters, Examples.

Unit III: Radar and Satellite communication

Radar system, Basic principles, Fundamentals, Radar performance factors, Pulse system, Basic pulse Radar system, Antennas and scanning. Display methods, Pulse radar systems, Moving target indicator (MTI), Radar beacon, CW Doppler radar, FM CW radar.

Satellite communication: Introduction, Kepler's Laws, Satellite orbits, Geostationary orbit, Power Systems, Attitude Control, Satellite station Keeping, Antenna look angle and limits of visibility (description), Frequency Plans and Polarization, Satellite antenna radiation patterns, Transponders, Satellite system parameters, Uplink Power Budget Calculations, Downlink Power Budget Calculations, Overall Link Budget Calculations, Multiple-access Methods : FDMA, TDMA, CDMA, Satellite radio navigation and GPS, INSAT

Unit IV: Mobile communication

Cellular telephone, Frequency reuse, Interference, Cell splitting sectoring segmentation and dualization, Cellular system topology, Roaming and handoff, Cellular telephone network components, First generation analog cellular telephone, Personal communication system, Second generation cellular telephone systems, N-Amps, Digital cellular telephone. Interim standard 95. Global system for mobile communication, Personal satellite communication systems.

Reference Books:

1. B. Somanathan Nair, Digital signal processing theory, analysis and digital filter design,
2. John G. Proakis and D.G. Manolakis, Digital signal processing principles, Algorithms and applications
3. S. Salivahanan, A Vallavraj and C. Gnanapriya, Digital Signal processing,TMH

4. D. Roddy and J. Coolen, Electronic Communication, PHI, 4th edition, 2005
5. W. Tomasi, Advanced Electonics Communications Systems, 6th ed., PHI, 2007
6. G. Kennedy, Electronic Communication Systems, Tata McGraw Hill, New Delhi
7. M. Kulkarni, Microwave and Radar Engineering, Umesh Publications

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ELE– 511PR: PRACTICALS

LIST OF PRACTICALS:

1. POWER ELECTRONICS – DIAC – TRIAC
2. POWER ELECTRONICS – UJT CONTROLLED SCR FIRING
3. FIBER OPTICS – NUMERICAL APERTURE
4. FIBER OPTICS – BENDING LOSS
5. FIBER OPTICS – ANALOG COMMUNICATION SYSTEM
6. FIBER OPTICS – DIGITAL LINK
7. LASER – GRATING ELEMENT
8. LASER – WAVELENGTH MEASUREMENT
9. FSK – MODULATION – DEMODULATION
10. PSK – MODULATION – DEMODULATION
11. PCM – MODULATION – DEMODULATION
12. DELTA MODULATION – DEMODULATION
13. ADAPTIVE DELTA MODULATION – DEMODULATION
14. INTERFACING EXPERIMENT – EXPEYES -I
15. INTERFACING EXPERIMENT – EXPEYES -II

15% of new experiments can be introduced AND / OR replaced as per the need, with the permission of the Chairman of the Board of Studies.

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PHY 512PT: POJECT

- In-house project work of 4-credit to be performed by each student.
- Alternatively, MOOC, Swayam or any other UGC recognized online course equivalent to 4-credit and approved under the GU_SWAYAM_POLICY by the Gujarat University for credit transfer under will also be considered for 4-credit in this course.