Gondwana University, Gadchiroli

Board of Studies in Electronics

Faculty of Science

Syllabus

Choice Based Credit System (CBCS)

M. Sc. Electronics

(Under the Faculty of Science)

Approved by the Board of Studies in Electronics

Syllabus

M. Sc. Electronics
Semester-I

Code	Paper	Credits
PSELT101(Core-1)	Fundamentals of Semiconductor Devices	4
PSELT102 (Core-2)	Digital Design and Applications	4
PSELT103(Core-3)	Advanced Microprocessors	4
PSELT104 (Core-4)	Programming in C	4

Practicals

Code	Practical	Credits
PSELP101(core Pr 1)	Lab Course I- Analog and Digital Electronics Lab	4
PSELP102(core Pr 2)	Lab Course II- Computer Interfacing and Programming in C	4
Ability Enhancement	Seminar I	1
Total Credits		**25**

Semester II

Code	Paper	Credits
PSELT201(Core 5)	Embedded Systems and Applications	4
PSELT202(Core 6)	Biomedical Instrumentation	4
PSELT203(Core 7)	Computer Organisation and Interfacing	4
PSELT204(Core 8)	Virtual Instrumentation	4

Practicals

Code	Practical	Credits
PSELP201 (core Pr 3)	Lab Course III – Embedded Systems and Applications; and Biomedical Instrumentation	4
PSELP202 (core Pr 4)	Lab Course IV- Advanced PC Interfacing, Virtual instrumentation and Programming in Lab VIEW	4
Ability Enhancement	Seminar II	1
Total Credits		**25**

Semester III

Code	Paper	Credits
PSELT301(core 9)	Network Analysis and Synthesis	4
PSELT302 (core10)	Fuzzy Logic and Artificial Neural Networks	4
PSELT303 (DSE1) / PSELT303 (DSE2)	Digital signal Processing / Digital Image Processing	4
PSELT304 (SEC 1) / PSELT304 (SEC2)	Basic Electronics / Mechatronics	4

Practicals

Code	Practical	Credits
PSELP301 (Core Pr 5)	Lab Course V- Network Analysis; Fuzzy Logic and Artificial Neural Network using MATLAB	4
PSELP302 (Core Elective Pr 6)	Lab Course VI- Digital Signal Processing using MATLAB	4
Ability Enhancement	Seminar III	1
Total Credits		**25**

Semester IV

Code	Paper	Credits
PSELT401(Core 11)	Electromagnetic Fields and Antennas	4
PSELT402(Core 12)	Digital Communication	4
PSELT403(DSE3) / PSELT404(DSE4)	Microwave and Optical Communication / Computer Communication	4
PSELT405 (SEC3) / PSELT406(SEC4)	PC and PC Interfacing / Mobile and Satellite Communication	4

Practicals

Code	Practical	Credits
PSELP401 (core Pr. 7)	Lab Course VII – Antenna and Digital Communication Lab; and Microwave & Optical Communication/ Mobile and Satellite Communication	4
PSELP402 (Ability Enhancement)	Project and Seminar	4
Ability Enhancement	Seminar IV	1
Total Credits		**25**

M. Sc. Electronics
Semester III
Paper I (PSELT301-Core 9)
Network Analysis and Synthesis

Credits:04

Unit I: Network Analysis

Mesh analysis, mesh equations, super-mesh analysis, nodal analysis, nodal equations, source transformation technique, state variable analysis.

Unit II: Network Theorems and Applications

Star-delta transformations; Superposition, Thevenin's, Norton's and reciprocity theorems, duals and duality, Tellegen's and Millman's theorem.

Unit III: Laplace Transform and Properties

Laplace transformation, properties of Laplace transforms, partial fraction expansion, Heaviside's expansion theorem: illustrative examples.

Unit IV: Network Functions and synthesis Techniques

One-port and two-port networks, poles and zeors of network functions, time domain behavior from the pole zero plot; stability of active networks, Hurwitz polynomials, positive real functions, Ruth-Hurwitz array and R-H criteria, Foster and Cauer methods of synthesis of RC and LC networks.

Books:

1. Network Analysis: M. E. Van Valkenberg, PHI, New Delhi
2. Circuits and Networks: Analysis and Synthesis: A. Sudhakar and S. P. Shyammohan, Tata McGraw Hill, New Delhi

M. Sc. Electronics
Semester III
Paper II (PSELT302-Core 10)
Fuzzy Logic and Artificial Neural Networks

Credits:04

Unit- I: Fuzzy sets and Membership functions

Fuzzy set operations, properties of fuzzy sets, fuzzy relations, features of the membership function, Lambda – cuts, De-Fuzzification methods.

Unit - II: Extension principle, Approximate reasoning, Representing set of rules, fuzzy rule-based systems. Graphical techniques of inference; Fuzzy classification, Fuzzy c-means clustering (FCM).

Unit- III: Fundamental concepts of ANN

Model of an artificial neural network (ANN), Network architectures, feed forward networks, Learning processes, Delta learning rules for multi-perception layer, back propagation algorithm.

Unit- IV: Associative memories and self organizing networks:

Basic concepts and performance analysis of recurrent associative memory, bidirectional associative memory (BAM); the counter-propagation network (CPN), self-organising feature maps, Adoptive Resonance Theory (ART-I).

References:

1. Fuzzy Logic with Engineering Applications: Timothy J. Ross, McGraw Hill, Inc.
2. Neural Networks, A comprehensive Foundation: Simon Haykin, Pearson Education, Asia

Other Books:

1. Neural networks: Algorithms, applications & Programming Techniques: J.A. Freeman & D. M. Skapura, Pearson Education Asia
2. Artificial Neural Networks: K. Mehrotra, C. K. Mohan & Sanjay Ranka, Penram International Publications, New Delhi
3. Introduction to Artificial Neural Systems: J. M. Zurada, Jaico Publishing House, New Delhi
4. Neural Network with MATLAB: Sivanandan
5. Fuzzy Logic with MATLAB: Sivanandan, Springer Verlag
6. Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence: Jyh-Shing Roger Jang, Chuen-Tsai Sun & Eiji Mizutani, Pearson Education, New Delhi

M. Sc. Electronics
Semester III
Paper III (PSELT303-DSE 1)
Digital signal Processing

Credits:04

Unit I: Discrete-time Signals and Systems

Discrete time signals: types, operations, D-T system classification; linear time-invariant systems: convolution, linear constant-coefficient difference equations, correlation functions.

Unit II: Transform methods

Introduction to Fourier series and Fourier transform, properties of Fourier transform, discrete Fourier transform and its properties, inverse Fourier transform, twiddle factor, circular convolution, z-transform: definition, region of convergence (RoC), pole zero plot, the inverse z-transform and its methods.

Unit III: Digital Filter Design

FIR filter structures, IIR filter structures, IIR filter design: impulsive invariance method, bilinear transformation method and matched z-transform method, FIR filter design: Fourier series method, windowing technique, Kaiser window filter design method, frequency sampling method.

Unit IV: DSP Chips and Applications

Introduction to DSP processors, types of DSP processors and architecture, general purpose DSP processors; implementation of noise removal techniques, echo, chorus and flange effects introduced in music.

Practicals:

1. Study of some discrete- time signals
2. Design and study of some FIR filters
3. Study of triangular and Blackman windows
4. Design of FIR filters using windowing technique
5. Design of filters based on pole-zero placements
6. Study of linear convolution
7. Design and study of FFT using programming
8. Design and study of digital filters (HF and LF) using programming
9. Study of experiments based on DSP chips

Books:

1. Digital Signal Processing: N. G. Palan (Tech Max Publications, Pune)
2. DSP Processor Fundamentals: Architectures and Features: Phil Lapsley, Jeff Bier, Amit Shoham & Edward A. Lee
3. Discrete Time Signal Processing: Allen V. Oppeheim & Ronal W. Schafer (PHI, New Delhi)
4. Introduction to Digital Signal Processing: Roman Kuc (MGH)
5. Digital Signal Processing- Principles, Algorithms and Applications: J. G. Proakis and D. G. Manolakis (PHI, New Delhi)

References:

1. Introduction to Digital Signal Processing: Johny R. Johnson (PHI, New Delhi)
2. Digital Signal Processing: Sanjit K. Mitra (TMH, New Delhi)
3. Signal Processing using MATLAB: C. Sidney Burrus, J. K. Mc Clellan, A. V. Oppenheim, R. W. Schafer and H. W. Schuessler
4. Digital Filtering: An Introduction – Edward P. Cunningham

M. Sc. Electronics
Semester III
Paper III (PSELT303-DSE 2)
Digital Image Processing

Credits:04

Unit-1: Introduction to Digital Image Processing

Basic components of image processing system, image sensing and acquisition, digital camera working principle; image sampling and quantization; representation of digital images, matrix, pyramid, quad-tree; elements of color image processing, hue, saturation and intensity, chromaticity diagram.

Unit-2: Image Enhancement, Filtering and restoration

Enhancement in spatial domain; pixel grey level transformation, image negatives, logarithmic transformation; bit-plane slicing, histogram processing; enhancement in frequency domain; image smoothing (low pass filter), image sharpening (high pass filter), selective filtering (band pass and band reject filters); noise models for images, signal-to-noise ratio, image restoration in the presence of noise using spatial filtering, periodic noise reduction by frequency domain filtering; estimating the degradation function, inverse filtering.

Unit-3: Color Image Processing and Image Segmentation

Color fundamentals, color models, RGB, CMY and CMYK color models, HSI model; pseudo-color image processing, basics of full color processing, color transformations, smoothing and sharpening; noise in color images, grey level to color transformation;

Image Segmentation: fundamentals, edge-based segmentation; image thresholding, intensity thresholding; basic global thresholding, multi-variable thresholding.

Unit-4: Image compression and Digital Image Watermarking

Pixel and data redundancy, fidelity criteria, image compression models; Image file formats and compression standards, BMP, GIF, TIFF, JPEG, CDR; types of compression, lossless coding techniques, LZW coding, Lossy transform coding, DCT

Wavelet coding, discrete wavelet transform, Haar wavelets, digital image watermarking, need for image watermarking; visible and invisible watermarks, a typical watermarking system, watermark insertion and extraction methods.

Text / Reference Books:

1. Rafel C. Gonzalez and Richard .E. Woods, *Digital Image Processing*, Third Edition, Pearson (2008)
2. Malay K. Pakhira: Digital Image Processing and Pattern Recognition. PHI (2011)
3. Rafel C. Gonzalez, Richard .E. Woods and Steven L. Eddins, *Digital Image Processing using MATLAB*, Pearson 2004
4. Anil K. Jain, *Fundamentals of Digital Image Processing*, Pearson, 2002
5. Keenneth R Castleman, *Digital Image Processing*, Pearson Education, 1995

M. Sc. Electronics
Semester III
Paper IV (PSELT304-SEC 1)
Basic Electronics

Credits: 04

Unit I: Circuit Variables and network theorems

Circuit variables: Circuit concepts, units, standards and dimensions; electric current, electric charge, potential difference, electric power; circuit elements: passive and active; network Laws: Ohm's law, application of network laws to simple dc networks; junction laws- Kirchoff's current law (KCL), Mesh law (KVL); network theorems: superposition, maximum power transfer, Thevenin, Norton, Millman; application of network theorems to simple electronic circuits.

Unit II: Semiconductor devices

Semiconductor, conductor, Insulator and their energy band diagrams; Intrinsic and extrinsic semiconductors, effect of temperature on extrinsic semiconductors and mechanism of current conduction; junction diodes: p-n junction, forward and reverse biased p-n junction, energy band structure of unbiased p-n junction, biased p-n junction; V-I characteristics of p-n junction; special p-n junctions: avalanche, Zener, Schottky, photodiode, LED, PIN, IR, solar cells, Laser diode; junction transistor: UJT and BJT, transistor characteristics in CB, CE and CC mode; hybrid parameters, JFET and MOSFETs, static characteristics.

Unit III: Digital Electronics

Introduction to digital electronics: number system, digital codes: BCD ASCII; logic gates: AND, OR, NOT/Inverter, NAND, NOR, EXOR, XNOR - truth table and symbols; combinational and sequential logic circuits: adder, subtractor, flip-flops: RSFF, Clocked RSFF, DFF, TFF, JKFF, JKMSFF; counters: asynchronous, synchronous, applications of counters.

Unit IV: Op-amp and Special ICs

Op-Amp: difference amplifier, op-amp configuration, ideal op-amp characteristics, applications of op-amp: inverting, non-inverting, adder, subtractor, integrator, differentiator, peak detector, clipper, clamper, instrumentation amplifier, waveform generators- sine, triangular and saw tooth; voltage comparator, window detector, Schmitt trigger, precision rectifier, peak detector, sample-hold circuits, and log/antilog amplifiers, first order low pass, high pass filters; 555 timer applications- monostable and astable multivibrator, monolithic waveform generators, V-F and F-V converters; analog multipliers, PLL, voltage regulator ICs: LM 317, 78xx, 79xx series.

Reference Books

1. Basic Electronics: Grob, McGraw Hills Publishers Ltd.
2. Basic Electronics: Mitchel E. Schultz
3. Basic Electronics: B. L. Theraja, S. Chand & Co. Ltd. New Delhi
4. Monograph of Electronic Design Principle: Goel, Khaitan
5. Network Analysis: Van Valkenburg, Prentice Hall of India Pvt. Ltd. New Delhi
6. Textbook of Electronic Circuit: R. S. Sedha
7. Electronics Devices and Circuit: J Jimmi, Schaum Series
8. Circuit Fundamental and Basic Electronics: J. P Agrawal
9. Digital Principles And Applications: A. P. Malvino, Tata McGraw Hills Publishers Ltd. New Delhi
10. Modern Digital Electronics: R. P. Jain, Tata McGraw Hills Publishers Ltd. New Delhi
11. Electronic Principle: Malvino Bates, Tata McGraw Hills Publishers Ltd. New Delhi
12. Electronic Devices: Floyd,
13. Fundamentals of Digital Circuits: A.Anand Kumar, Prentice Hall of India Pvt. Ltd. New Delhi, 2001
14. Op-amp: Ramakant Gayakawad
15. Digital Electronics: Malvino and Leach

M. Sc. Electronics
Semester III
Paper IV (PSELT304-SEC 2)
Mechatronics

Credits:04

Unit I: Basic Elements of a mechatronic system

General introduction to mechatronic systems, traditional and mechatronics designs, control systems, open and closed-loop systems, sensors and transducers; performance parameters of transducers, static and dynamic characteristics, potentiometer sensor, LVDT, push-pull displacement sensor, eddy current proximity sensors, optical encoders.

Unit II: Basic System Models

A mathematical model of a system, elements in mechanical system, mass, moment of intertia, elements in electrical systems, resistors, capacitors, inductors, comparison of elements in these systems and their defining equations, dynamic responses of systems: examples of first and second order systems

Unit III: System transfer Functions

Conversion of differential equation into Laplace transform, transfer function of R-C series circuit, first order system with step input: illustrative examples, systems with negative feedback, location of poles on the s-plane, poles of stable and unstable systems, frequency response of a system of sinusoidal input, phasor equations, frequency response for a first-order system, Bode plots.

Unit IV: Closed-loop controllers

Lag, steady-state error, control modes, op-amps as signal conditioners, electronic proportional controller, system response, PD and PI control, PID controller, digital controllers, controller tuning, process reaction method, ultimate cycle method, Ziegler and Nichols criterion, adaptive control, self-tuning.

Reference:

1. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering: William Bolton, Pearson Education Publishers, New Delhi

M. Sc. Electronics
Semester IV
Paper I (PSELT401-Core 11)
Electromagnetic Fields and Antennas

Credits:04

Unit I: Electromagnetic waves

The equation of continuity for time varying fields, Maxwell's equations, EM waves in a homogeneous medium, wave equations for a conducting medium, conductors and dielectrics, Poynting's theorem, interpretation of E x H, complex Poynting vector.

Unit II: Antenna Basics

Basic radiation equation, radiation resistance, antenna patterns, half-power bandwidth, radiation intensity, directivity and gain, resolution, apertures, effective heights, Fii's transmission formula, field zones, linear, elliptical and circular polarization.

Unit III: Antenna types

The antenna family, short dipole antenna, antenna arrays, broad-side and end-fire arrays, linear arrays, folded dipole, Yagi-Uda array, helical beam antenna, horn antenna, rhombic antenna, parabolic reflectors.

Unit IV: Antennas for mobile communications and antenna measurements

Antennas for terrestrial mobile communications, base station antennas, switched beam and beam forming antennas, antennas on cellular handsets, micro-strip lines and antenna.

Antenna measurements: The reciprocity theorem, antenna ranges, compact antenna test ranges (CATR), instrumentation for measurement of radiation properties of antenna under test (AUT).

References:

1. Electromagnetic waves and Radiating Systems: E. C. Jordan and R. E. Balmain, PHI, New Delhi
2. Antennas: For All Applications: John D. Kraus and R. J. Marhefka, TMH, New Delhi
3. Antennas and Radiowave Propagation: R. E. Collin, MGH, International Edition

M. Sc. Electronics
Semester IV
Paper II (PSELT402-Core 12)
Digital Communication

Credits:04

Unit I: Signals and spectra

Classification of signals, energy and power signals, energy spectral density, power spectral density, unit impulse function, sifting property of the Dirac delta function, Fourier series, Parseval's theorem, Fourier transforms, properties of Fourier transforms, convolution properties, graphical convolution.

Unit II: Digital Communication system

Elements of digital communication system, the sampling theorem, aliasing error, PAM, PPM & PWM signals generation and detection, Pulse code modulation, uniform and non-uniform quantization, SNR, companding characteristics, Inter-symbol interference, Nyquist criteria of zero ISI, eye pattern.

Unit III: Digital Modulation Techniques

Coherent binary modulation techniques, PSK, FSK, QPSK, MSK differential pulse code modulation, predictor, delta modulation, adaptive delta modulation, slope overload and granular noise, M-ary signaling.

Unit IV: Information Coding

Measure of information, entropy, mutual information, Shannon's coding theorem, channel capacity, capacity of Gaussian channel, source coding, Huffman code, channel coding, block codes, syndrome decoding, convolutional coding, code tree, spread spectrum communication: PN sequences, direct sequence and frequency hopping spread spectrum systems.

Practicals:

1. Study of PCM circuit and quantization
2. Study of PAM, PWM and PPM circuits and detection of these signals
3. Study of a Delta modulator
4. Study of a DBPSK communication system
5. Study of an adaptive Delta modulator
6. Study of a convolutional encoder
7. study of a PN sequence generator
8. Study of a spread spectrum direct sequence communication system

Books:

1. Digital communications: Bernard Sklar (Pearson Education, Asia Publ)
2. Modern Digital and Analog Communications Systems: B. P. Lathi (Oxford Univ. Press)
3. Analog and Digital Communications: Hwei Hsu (Schaum Outline MGH)

References:

1. Digital communications: Symon Haykin (John Wiley & Sons)
2. Modern Digital communications Systems : Leon W. Couch (PHI, New Delhi)
3. Digital communications: J. G. Proakis (MGH)

M. Sc. Electronics
Semester IV
Paper III (PSELT403-DSE 3)
Microwave and Optical Communication

Credits:04

Unit I: Microwave Generators and wave guides

Failure of vacuum tubes at high frequency, Two cavity klystron, reflex klystron oscillator, magnetron oscillator, TWT amplifier, backward wave oscillator, GaAs oscillator; Propagation of EM waves through wave guide, TE, TM and TEM waves.

Unit II: Microwave components and Measurements

Microwave components: scattering matrix, attenuators, Tees, directional couplers, circulators, isolators, phase shifters, cavity resonators, Microwave measurements: Measurement of VSWR, phase shift, frequency, power, attenuation, dielectric constants of liquids and solids, Q of cavity.

Unit III: Fiber optics

Principles of optical communication, single mode and multi mode fibers, step index, graded index, ray model, multi path dispersion, material dispersion, optical fiber as wave guide, fiber sources and detectors.

Unit IV: Manufacture and Measurements of fibers

Optical fiber cable, fiber joints, splices, couplers and connectors, measurement in optical fibers, attenuation measurement, dispersion measurement, refractive index profile measurement, transmission links, optical transmitters and receivers.

Practicals:

Practicals on X-band test bench

1. Characteristics of reflex Klystron
2. Attenuation Measurement
3. Coupling and directivity of a directional coupler
4. Standing wave plotting and measurement of guide wavelength
5. Measurement of low VSWR and high VSWR
6. Measurement of unknown impedance using Smith chart

Practicals on optical fiber

1. Transmission characteristics of optical fiber link
2. Attenuation measurement
3. Dispersion measurement
4. Refractive index profile measurements

Books:

1. Microwave devices and Circuits: Liao
2. Microwave Engineering: David Pozar
3. Electronics and Radio Engineering: Terman
4. Introduction to Microwave Theory and Measurement: A. L .Lance
5. Optical Fiber Communication : B. Keiser, McGraw Hills
6. Optical Communication Systems: J. Gower, Prentice Hall Publ.
7. Optical Fiber Systems: Kao (MGH)
8. Fiber Optic Communication: D. C. Agrawal, A. H. Wheeler Co., New Delhi

M. Sc. Electronics
Semester IV
Paper III (PSELT403-DSE 4)
Computer Communication

Credits:04

Unit I: Introduction

The use of computer network, Network structure, Network Architecture, The OSI reference models, The TCP/IP reference model, Services, Network Standardization, Example networks.

Unit II: **The Physical Layer Transmission And Switching:**

Frequency and time division multiplexing, circuit switching, Packet Switching Hybrid Switching ISDN-Integrated services digital network, ISDN services, Evolution of ISDN, ISDN system architecture, The digital PBX, ISDN interface, ISDN signaling Perspective on ISDN, Terminal, handling: Polling, Multiplexing versus concentration

Unit III: The Medium Access Sub-layer

The local and metropolian area networks, the ALOHA protocols, IEEE standard 802 for LAN, Fiber optic networks, satellite networks, pocket radio networks. The Data Link Layer: Data Link Layer design issues, Error detection and correction, Elementary data link protocols, sliding window protocols performance, Protocol specification and verification.

Unit IV: The Network Layer

Network layer design issue, Routine algorithms, Congestion control algorithms, Internet Working, Network layer in the Internet and ATM networks; Transport Layer: Transport service, transport protocols, Internet transport protocol (TCP & UDP).

Reference books:

1. "Computer Networks", Tanenbaum, Prentice Hall of India Pub. New Delhi

2. "Computer Networks, Protocols, Standard and Interfaces", Ulyses Black, Prentice Hall of India Pub. New Delhi

M. Sc. Electronics
Semester IV
Paper IV (PSELT404-SEC 3)
PC and PC Interfacing

Credits:04

Unit I: Introduction to Personal Computers

Architecture: pipeline, super scalar architecture; motherboard components: CPU-microprocessors (8086/8088, 80186, 80286, 80386, 80486, Pentium, Pentium MMX, PI, PII, PIII, PIV); memory organisation, I/O ports, plug in slots, operator interface; Need for interfacing: characteristics of an interface: electrical and mechanical, data transfer schemes: programmed data transfer- synchronous, asynchronous, interrupt driven; DMA mode of transfer.

Unit II: Standard Peripheral Devices

System and Standard peripheral interfaces: Programmable Peripheral Interface (8255A), Priority Interrupt Controller (8259A), DMA controller (8237), Programmable Interval Timer (8254), serial I/O, UART (PC 16550D), video controller, AGP card, keyboard controller.

Unit III: Data Acquisition

Data acquisition basics- sampling concepts, Shannon sampling theorem, aliasing, over-sampling, interpolation, characteristics; ADC: Integrating type, successive approximation, parallel/flash, sigma- delta converter, characteristics of ADC; DAC: weighted resistor network, R-2R ladder network, characteristics of DACs; Data acquisition systems: microprocessor, PC based, GPIB based data acquisitions, standard data acquisition cards (DAQ)

Unit IV: I/O Buses and Ports

Expansion buses: ISA, EISA, PCI; parallel port: standard parallel port, enhanced parallel port, enhanced capabilities port; serial port: serial communication format, error checking, encoding, compression, serial communication modes, transmission medium; Bus standards-RS232, RS422, RS485; USB: features of USB, USB system, USB transfer, USB microcontrollers, SPI, I2C, CAN buses.

Practicals:

1. printer port access for input-output
2. interfacing of character display (5x7) to the printer port of IBM PC
3. Interfacing of Stepper motor to the printer port of IBM PC
4. Interfacing of DAC to the printer port of IBM PC for generation of various waveforms
5. Interfacing of ADC to the printer port of IBM PC
6. Development of Graphical User Interface (GUI) using suitable programming language
7. Serial port access
8. Design of simple PC based DAS

Books:

1. PC based Instrumentation: Concepts & Practice: N. Mathivanan, PHI, New Delhi, 2007
2. Microprocessors and Interfacing; D.V. Hall, MGH International Publication
3. Computer Control of Processes : M. Chidambaram, Narosa Publishers, New Delhi, 2003

Reference:

2. Microprocessors, PC Hardware and Interfacing: N. Mathivanan, PHI, New Delhi, 2003
3. PC Interfacing and Data Acquisition: Kevin James, Elsevier Publication

M. Sc. Electronics
Semester IV
Paper IV (PSELT404-SEC 4)
Mobile and Satellite Communication

Credits:04

Unit I: Cellular Concepts and Equalization

Cellular telephone system, frequency reuse, channel assignment and land off strategies, elements of cellular radio system design, switching and traffic, data links and microwaves, system evaluation, interference and system capacity, Improving coverage capacity; Fundamentals of equalization, space polarization.

Unit II: Diversity, channel coding and GSM system for Mobile

Frequency and time diversity techniques, channel coding; service and features, GSM system architecture, GSM channel types, GSM frame structure, intelligent cell concept and applications; Features of handset, SMS, security; Interfacing of mobile with computer, application of mobile handset as modem, data storage device, multimedia device; Measurement of signal strength; Introduction to CDMA digital cellular standard

Unit III: Satellite Communication

Satellite orbits, frequencies, stabilization, orbital parameters, coverage area, work angle, Attitude and orbit control system, telemetry tracking and command power system; Satellite Link design: system noise temperature and G*/*T ratio, down link design, domestic satellite system; eclipse on satellite.

Unit IV: Multiple Access Techniques

FDMA and TDMA, TDMA synchronization and timing, code division multiple access. Applicability of CDMA to commercial system, Earth's path propagation effects; satellite services for communication – Weather forecasting, remote sensing, direct to home (DTH) TV.

Practicals:

1. Measurement of field strength – mobile towers
2. Any suitable practicals on the above topics

Books:

1. Mobile Cellular Telecommunication: William C. Y. Lee, MGH Inc., 1995
2. Mobile communication : Jochen Schiller, Pearson Education, 2nd Edition, 2004
3. Satellite Communication: T. Pratt, Wiley Eastern Publication
4. Satellite Communication: D. C. Agrawal, Khanna Publications, New Delhi