

SRI VENKATESWARA UNIVERSITY::TIRUPATI
S.V.U.COLLEGE OF SCIENCES
DEPARTMENT OF PHYSICS

(Common Syllabus for SV University College and affiliated colleges under SVU Area)
 (Revised Scheme of Instruction and Examination, Syllabus etc., with effect from the
 Academic Years 2016-17 for I and II Semesters and 2017-18 for III and IV Semesters)

M.Sc. ELECTRONICS

SCHEME OF INSTRUCTION AND EXAMINATION

I SEMESTER

Code	Title of the course	Credit Hrs/week	No. of Credits	Core/ Elective	Uni. Exams(Hours)	IA	Sem end exam	Total Marks
ELE-101	Analog Integrated Circuits, Applications and Systems	6	4	Core	3	20	80	100
ELE-102	Digital Integrated Circuits and Applications	6	4	Core	3	20	80	100
ELEP-103	Analog and Digital IC's (Lab)	6	4	practicle	--	20	80	100
ELEP-104	Programming in C (Lab)	6	4	practicle	--	20	80	100
ELE-105	Programming in C with data structures	6	4	Compul Founda	3	20	80	100
ELE-106	Human values and Professional Ethics paper – I	6	4	Elective foundati	3	20	80	100
	TOTAL	36	24					600

II SEMESTER

Code	Title of the course	Hrs / week	No. of Credits	Core/ Elective	Uni. Exams(Hours)	IA	Se me nd exam	Tot al Ma rks
ELE-201	Microcontrollers and Applications	6	4	Core	3	20	80	100
ELE-202	Digital Communications	6	4	Core	3	20	80	100
ELEP-203	Microcontrollers (Lab)	6	4	--	--	20	80	100
ELEP-204	Digital Communications (Lab)	6	4	--	--	20	80	100
ELE-205	Mathematical Methods of Signal & System analysis	6	4	Compu Founda	3	20	80	100
ELE-206	Human values and Professional Ethics paper- II	6	4	Elective foundat	3	20	80	100
	TOTAL		24					600

III SEMESTER

Code	Title of the course	Hrs / week	No. of Credits	Core/ Elective	Uni Exams (Hours)	IA	Se me-ster end exam	Tot al Marks
ELE 301	Digital Signal Processing	6	4	20	3	20	80	100
ELE 302	Digital system Design-VHDL	6	4	20	3	20	80	100
ELE303P	Digital Signal Processing (Lab)	6	4	20	--	20	80	100
ELE304P	VHDL (Lab)	6	4	20	--	20	80	100
ELE 305 Generic Elective	A: Advanced Microprocessor and Microcomputers	6	4	20	3	20	80	100
	B: Control Systems	6	4			20	80	100
ELE 306 Open Elective to others	A: Computer organization B: Optical Communication	6	4	20	3	20	80	100
	TOTAL	36	28					700

IV SEMESTER

Code	Title of the course	Hrs / week	No. of Credits	Core/ Elective	Uni Exams (Hours)	IA	Se me-ster end exam	Tot al Marks
ELE 401	Advanced Communication Systems	6	4	Core	3	20	80	100
ELE402	Introduction to VLSI circuits	6	4	Core	3	20	80	100
ELE403P	Communication (Lab)	6	4	--	--			100
ELE404P	Project	6	4	--	--			100
ELE 405 Generic Elective	A: Microwaves	6	4	elective	3	20	80	100
	B: Data Communications and Networking	6	4			20	80	100
ELE 406 (For other department students)	A: Nanomaterials and Devices B: Semiconductor Materials and Devices	6	4	open elective	3	20	80	100
	TOTAL	36	28					700

SEMESTER-I

ELE-101: ANALOG INTEGRATED CIRCUITS, APPLICATIONS AND SYSTEMS

UNIT-1 : Voltage Regulators and Signal generators

Linear regulators, Linear regulator applications, Switching regulators, Monolithic Switching Regulators, Sine, Triangular, Sawtooth wave form generators, Multivibrators, Monolithic timers, Monolithic waveform generators, V-F and F-V converters.

UNIT-II: Nonlinear Circuits, Amplifiers, and Phase-Locked Loops

Voltage comparators, Comparator applications, Schmitt Triggers, Precision Rectifiers, Analog Switches, Peak detectors, Sample- and Hold Amplifiers, Log/Antilog Amplifiers, Analog multipliers, Phase-Locked Loops, Monolithic PLLs.

UNIT-III : A-D and D-A Converters

Performance Specifications, D-A conversion Techniques – Weighted Resistor DACs, Voltage mode R-2R ladder DAC, Bipolar DACs, Multiplying DAC applications.

A-D conversion Techniques– DAC based A-D conversion, Successive-Approximation ADC, Flash Converters, Integrating Type Converters.

UNIT – IV: Digital Instruments

Dual slope Integrating Type DVM, Integrating Type DVM, Continuous Balance DVM, 3-1/2 digit, Resolution and sensitivity of Digital meters, General specification of DVM, MP based Ramp type DVM, Digital multimeters, Digital Frequency meter, Digital measurement of time and frequency, Digital PH meter, Automation in Digital Instruments, Digital Phase meter, Digital capacitance meter, IEEE 488 Bus.

Books for study:

1. Sergio Franco, “Design with Operational Amplifiers and Analog Integrated Circuits”, 3/e, TMH, 2002 (UNIT-I to UNIT-III)
2. H.S. Kalsi, “Electronic Instrumentation”, TMH, 1995. (UNIT IV & V) Books for reference:

Books for reference:

1. J. Michael Jacob, “Application and Design with Analog Integrated Circuits” 2/e, PHI, 1996.
2. D. Roy Choudhury and Shail Jain, “Linear Integrated Circuits”, New Age International (P) Limited, 1991.
3. R.F. Coughlin and F.F. Driscoll, “Operational Amplifiers and Linear Integrated Circuits”, PHI, 1992.
4. D.K. Anvekar and B.S. Sonde, “Electronic Data Converters: Fundamentals & Applications”, TMH, 1994.
5. A.D. Helfric and W.D. Cooper, “Modern Electronic Instrumentation and Measurement Techniques”, PHI, 1996.

ELE-102: DIGITAL INTEGRATED CIRCUITS AND APPLICATIONS

UNIT – I : Combinational Logic Circuits

Simplifying Logic Circuits, Sum-of-product form, Algebraic simplification, Designing combinational logic circuits, Karnaugh map method, Looping-pairs, quads, Octets, Complete simplification Process, Don't Care-Conditions.

Digital Arithmetic Operations and Circuits- ALU, Parallel binary adder, Design of a full adder, Carry propagation, IC parallel adder, 2's-complement system, IEEE/ANSI symbols.

UNIT – II : Flip-Flops, Counters and Registers

NAND and NOR gate latches, Clocked signals and Clocked flip-flops, Clocked S-C, J-K, and D-FFs, D-latches, asynchronous inputs, timing considerations, one shot.

Ripple counters, Counters with MOD numbers $< 2^N$, Changing the MOD number, IC asynchronous counters, Asynchronous down counter, Propagation delay in ripple counters, Synchronous counters, Presettable counters, 74193 counter, Synchronous counter design, Shift register counter. IEEE/ANSI Symbols.

UNIT – III : IC Logic families

Digital IC terminology, TTL logic family, TTL series characteristics, Improved TTL series, TTL loading and fan-out, other TTL characteristics, Connecting TTL outputs together, tristate TTL, ECL family, MOS digital ICs & Characteristics, CMOS logic & characteristics, Bilateral switch, TTL driving CMOS and vice-versa, Low voltage technology.

UNIT – IV : Semiconductor Memories

RAM architecture, Static RAM, Dynamic RAM (DRAM), DRAM structure, and operation, DRAM Read/Write cycles, DRAM refreshing, Expansion of word size and capacity.

Programmable Logic Devices- Basic idea, PLD architecture (PROM), PAL, PLAs, Applications of a programmable Logic Device – GAL 16V 8A, Programming PLDs, Development software.

Book for study:

1. Ronald J.Tocci, “Digital Systems-Principles and Applications”, 6/e, PHI, New Delhi, 1999.

Reference Books:

1. Herbert Taub and Donald Schilling, “Digital Integrated Electronics”, McGraw Hill, 1985.
2. S.K. Bose, “Digital Systems”, 2/e, New Age International (P) Limited, 1992.
3. D.K. Anvekar and B.S. Sonde, “Electronic Data Converters: Fundamentals & Applications”, TMH, 1994.
4. A.P. Malvino and D.P. Leach, “Digital Principles and Applications”, TMH, 1991.

ELEP-103: Analog and Digital IC’s (Lab)

ELEP-104: Programming in ‘C’ (Lab)

ELE-105: PROGRAMMING IN C WITH DATA STRUCTURES

UNIT – I: Fundamentals of C language

C character set – Identifiers and keywords – Constants – Variables – Data types – Declarations of variables Declaration of storage class – Defining symbolic constants Assignment statement

Operators: Arithmetic operators – Relational operators – Logic operators – Assignment operators – Increment and decrement operators – Conditional operators.

Expressions and I/O Statements: Arithmetic expressions – Precedence of arithmetic operators Type converters in expressions – Mathematical (library) functions – Data input and output – The getchar and putchar functions – Scanf-Printif –Simple programs

Control Statements: If-Else statement – Switch statement – The ? Operator – GOTO –While, Do-while, FOR statements – BREAK and CONTINUE statements.

UNIT –II : Arrays

One dimensional and two dimensional arrays – Initialization Type declaration –Inputting and outputting of data for arrays – Programs of matrices addition, subtraction and multiplication

User Define Functions: The form of C functions- Return values and their types –Calling a function –Category of functions, Nesting of functions, Recursion, ANSI C functions – Function declaration, Scope and life time of variables in functions.

Pointers : Accessing the address of variable Declaration and Initialization of pointer variables, Accessing the value of the variable through its pointer-Pointer Expressions – Pointers and Arrays – Pointers and structures.

UNIT – III: Structures, Unions and Bit Fields

Declaration of structure, Initializing a structure, Functions and structures, Arrays of structures, Arrays within a structure, Structures within a structure, Pointers and structures, Unions, Bit Fields, Typedef, Enumerations.

The Stack- Representing stacks in C, Example: Infix, Postfix, and Prefix.

Recursion- Recursive definition and Processes, Recursion in C, The Towers of Hanoi Problem.

UNIT – IV: Queues and Lists

Linked Lists, Lists in C - Trees- Binary Trees, Binary Tree Representations, Example: The Huffman Algorithm, Representing Lists as Binary Trees, Trees and their Applications.

Books for study:

1. D. Ravichandran, “Programming in C”, New Age International (P) Limited, 1996.)
2. Y. Langsam, M.J. Augenstein and A.M. Tenenbaum, “Data Structures using C and C++” 2/e, Pearson Education, Inc., 1996.
3. Programming in ‘C’ – Balaguruswamy & Numerical Methods, E.Balaguruswamy, TataMcGraw

Reference Books:

1. R. Kruse, C.L. Tondo, and B. Leung, “Data Structures & Program Design in C” 2/e, Pearson Education, Inc., 1997.
2. T. Sudha and B. Poornima, “C programming with Data structures”, Anmol Publications Pvt. Ltd., 2005.
3. Programming with ‘C’ Byron Gottfried, Tata McGraw Hill
4. Computer oriented numerical methods –Rajaraman & Let Us C BY Yeswanth Kanetkar

ELE-106: Human Values and Professional Ethics – I

Chapter I: Definition and Nature of Ethics – Its relation to Religion, Politics, Business, Law, Medicine and Environment. Need and Importance of Professional Ethics – Goals – Ethical Values in Various Professions.

Chapter II: Nature of Values – Good and Bad, Ends and Means, Actual and Potential Values, Objective and Subjective Values, Analysis of Basic Moral Concepts – Right, Ought, Duty, Obligation, Justice, Responsibility and Freedom, Good Behavior and Respect for Elders, Character and Conduct.

Chapter III: Individual and Society: Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non Possession) and Aparigraha (Non-stealing). Purusharthas (Cardinal virtues) - Dharma (Righteousness), Artha (Wealth), Kama (Fulfillment Bodily Desires), Moksha (Liberation).

Chapter IV: Bhagavd Gita – (a) Niskama Karma, (b) Buddhism – The Four Noble Truths – Arya astanga marga, (c) Jainism - Mahavratas and Anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Chapter V: Crime and Theories of Punishment – (a) Reformative, Retributive and Deterrent, (b) Views on Manu and Yajnavalkya.

Books for study:

1. Johns S Mackenjie: A Manual of ethics
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. “Ethics in Management” by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.

13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodya Prasad, Cosmo Publications.
15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education – Telugu Academy, Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin& Co Julundhar.

SEMESTER-II

ELE-201: MICROCONTROLLERS AND APPLICATIONS

UNIT - I : Introduction to Microcontrollers

Microcontrollers and Microprocessors, Embedded versus External Memory Devices, 8-bit and 16-bit Microcontrollers, CISC & RISC processors.

8051 Microcontrollers– MCS-51 architecture, Registers in MCS-51, 8051 pin description, pin connections, Parallel I/O ports and Memory organization.

UNIT – II: 8051 addressing modes, instructions and programming

8051 addressing modes, Instruction Set, Assembly language Programming tools, Development Systems and Tools.

MCS—51 Interrupts, Timer/Counters, and Serial communications- Interrupts in MCS-51, Timers and Counters, Serial Communication.

UNIT - III : Design with Atmel Microcontrollers

Atmel Microcontrollers, Architectural overview of Atmel 89C51 and Atmel 89C2051, Pin description of 89C51, and 89C2051, Using Flash Memory devices ATMEL 89CXX and 89C20XX, Power saving options.

Applications- Waveform generation- Sine, Square, Pulse, Ramp, Staircase, Pulse Width Measurement, Frequency Counter.

UNIT – IV: PIC 16F8XX Flash Microcontrollers

Pin diagram of 16F8XX, STATUS Register, OPTION_REG Register, Power Control Register, PIC 16F8XX program memory, data memory, Data EEPROM and Flash Program EEPROM, Interrupts in 16F877, I/O ports and Timers.

Interfacing and Industrial Applications of Microcontrollers- Interfacing of Keyboard, 7-segment LED, LCD, ADC, and DAC, Optical Rotary shaft encoder, LVDT, Angular speed measurement, Digital thermometer, load cell.

Books for Study:

1. Ajay V. Deshmukh, “Microcontrollers: Theory and Applications”, Tata Mc Graw-Hill, New Delhi, 2005.
2. M.A. Mazidi and J.G. Mazidi, “The 8051 Microcontrollers and Embedded Systems”, Pearson Education, Inc., 2002.

Reference Books:

1. K.J. Ayala, “The 8051 Microcontroller Architecture, Programming & Applications”, 2/e, Penram International Publishing (India) Pvt. Ltd.,1996.
2. John B. Peatman, “Designing with PIC Microcontrollers”, Pearson Education, Inc., 1998.
3. Myke Predko, “Programming and Customizing the 8051 Microcontroller”, TMH, 1999.

ELE-202: DIGITAL COMMUNICATIONS

UNIT – I: Spectral Analysis

The Sampling function, Response of a linear system, Normalized power, Normalized power in a Fourier expansion, Power spectral density, Power and Energy transfer through a network, Bandlimiting waveforms, Correlation between waveforms, Power and cross correlation, Autocorrelation, Autocorrelation of a periodic and nonperiodic waveforms, Expansions in orthogonal functions, Correspondence between signals and vectors.

Random Variables and Processes- Probability, Random variables, Cdf, Pdf, Relation between probability and probability density, Average value and variance of a random variable, The Gaussian Probability density, The error function, Mean and Variance of the sum of the random

variables, Correlation between random variables, Central Limit theorem, Error probability, Random processes, Autocorrelation, The complementary Error Function.

UNIT-II: Pulse-Modulation Systems

Quantization of signals, Quantization error, PCM, PCM system, Companding, Multiplexing PCM signals, Differential PCM, Delta Modulation, Adaptive Delta modulation, CVSD.

Digital Modulation Techniques- BPSK, DPSK, QPSK, M-ary PSK, QASK, BFSK, M-ary FSK, MSK, Baseband signal receiver, Matched filter and probability of error, Coherent reception, Correlation, PSK, FSK, Non-coherent detection of FSK, Differential PSK, QPSK.

UNIT – III: Information Theory and Coding

Discrete messages, The concept of amount of information, Average information, Entropy, Information rate, Coding to increase average information per bit, Shannon's theorem, Capacity of a Gaussian channel, Efficiency of Orthogonal Signal transmission, Coding, Parity check bit coding for error detection, Coding for error detection and correction, Block codes, Block codes- coding and decoding, Convolutional Coding, Decode a Convolutional code, Probability of error of Convolutional codes.

UNIT – IV: Spread-spectrum modulation

Spread-spectrum overview, Pseudo-Noise sequences, Direct-sequence spread-spectrum systems, Frequency Hopping Systems, Synchronization.

Encryption and Decryption- Models, Goals, and Early Cipher Systems, The Secrecy of a Cipher System, Practical Security, Stream Encryption, Public Key Cryptosystems.

Books for study:

1. Taub and Schilling, "Principles of Communication Systems", 2/e, TMH, 1991. (UNIT- I to UNIT - IV).
2. Bernard Sklar, "Digital Communications: Fundamentals and Applications", 2/e, Pearson Education, Inc., 2001 (UNIT - V).

Reference Books:

1. Simon Haykin, "Communication Systems", 3/e, John Wiley & Sons (Asia) Pte. Ltd., 1994.
2. Harold Kolimbris, "Digital Communications Systems", Pearson Education, Inc., 2000.
3. K. Sam Shanmugam, "Digital and Analog Communications Systems", John Wiley & Sons (Asia) Pte. Ltd., 2000.
4. Gary M. Miller and Jeffrey S. Beasley, "Modern Electronic Communication", 7/e, PHI, 2003.

ELEP:203 Microcontrollers (Practical)

ELEP:204 Digital Communications (Practical)

ELE-205: MATHEMATICAL METHODS OF SIGNAL & SYSTEM ANALYSIS

UNIT – I: Signals and Systems

Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, The unit Impulse and Unit Step functions, Continuous-Time and Discrete-Time Systems, Basic System Properties.

Linear Time-Invariant Systems- Discrete-Time LTI systems, Continuous-Time LTI systems, Properties of Linear Time-Invariant Systems, Casual LTI Systems described by differential and difference equations.

UNIT – II: Fourier Series Representation of Periodic Signals

A Historical perspective, The response of LTI systems to complex exponentials, Fourier Series representation of Continuous-time periodic signals, Convergence of the Fourier series, Properties of Continuous-Time Fourier Series, Fourier Series representation of Discrete-Time periodic signals, Properties of Discrete-Time Fourier series.

Continuous-Time Fourier Transform- Representation of aperiodic signals: The Continuous-Time Fourier Transform, The Fourier Transform for Periodic signals, Properties of the Continuous-Time Fourier Transform, The Convolution property, The multiplication property.

UNIT – III: Laplace Transforms

Laplace Transform, the region of Convergence for Laplace Transforms, The inverse Laplace transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Laplace Transform, Analysis and Characterization of LTI systems using the Laplace transform.

UNIT – IV: Z-transform

The Z-transform, The region of convergence for the Z-transform, The inverse Z-transform, Geometric evaluation of the Fourier Transform from the Pole-Zero plot, Properties of the Z-Transform, Analysis and Characterization of LTI systems using the z-transforms, System function algebra and block diagram representations, The Unilateral z-Transform.

Book for study:

1.A.V. Oppenheim, A.S. Willsky, “Signals & Systems”, 2/e, Pearson Education, Inc., 1997.

Reference Books:

1. R.E. Ziemer, W.H. Tranter and D.R. Fannin, “Signals and Systems – Continuous and Discrete”, 4/e, Pearson Education, Inc., 2001.
2. Douglas K. Lindner, “Introduction to Signals and Systems”, McGraw-Hill, 1999.
3. Simon Haykin and Barry VanVeen, “Signals and Systems” John Wiley & Sons (Asia) Pte. Ltd., 2001.
4. B.P. Lathi, “Signal Processing & Linear Systems”, Oxford University Press, 1998.

ELE 206: HUMAN VALUES & PROFESSIONAL ETHICS – II

Chapter I: Value Education – Definition – Relevance to present day – Concept of human values - Self introspection – Self esteem. Family values-Components, Structure and responsibilities of family Neutralization of anger – Adjustability – Threats of family life – Status of women in family and society – Caring for needy and elderly – Time allotment for sharing ideas and concerns.

Chapter II: Medical ethics – Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problem of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Chapter III: Business ethics – Ethical standards of business – Immoral and illegal practices and their solutions. Characteristics of ethical problems in management, ethical theories, causes of unethical behavior, Ethical abuses and work ethics.

Chapter IV: Environmental ethics – Ethical theory, man and nature - Ecological crisis, Pest control, Pollution and waste, Climate change, Energy and pollution, Justice and environmental health.

Chapter V: Social ethics – Organ trade, Human trafficking, Human rights violation and social disparities, Feminist ethics, Surrogacy/pregnancy. Ethics of media – Impact of Newspapers, Television, Movies and Internet.

Books for study:

1. Johns S Mackenzie: A Manual of ethics
2. “The Ethics of Management” by Larue Tone Hosmer, Richard D. Irwin Inc.
3. Management Ethics – Integrity at work by Joseph A. Petrick and John F. Quinn, Response Books, New Delhi.
4. “Ethics in Management” by S.A. Shelekar, Himalaya Publishing House.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics

8. Sinha: A Manual of Ethics
9. Manu: Manava Dharma Sastra or the Institute of Manu: Comprising the Indian System of Duties: Religious and Civil (ed) G.C. Haughton.
10. Sasruta Samhita: Tr. KavirajKunjanlal, KunjanlalBrishagratha, Chowkamba Sanskrit Series, Vol I,II and III, Varanasi, Vol I PP, 16-20, 21-32 and 74-77 only.
11. Charaka Samhita: Tr. Dr. Ram Karan Sarma and Vaidya Bhagavan Dash, Chowkambha Sanskrit Series Office. Varanasi I, II, III Vol I PP 183-191.
12. Ethics, Theory and Contemporary Issues. Barbara Mackinnon, Wadsworth/Thomson Learning, 2001.
13. Analyzing Moral Issues, Judith A. Boss, Mayfield Publishing Company, 1999.
14. An Introduction to Applied Ethics (Ed.) John H. Piet and Ayodya Prasad, Cosmo Publications.
15. Text Book for Intermediate First Year Ethics and Human Values, Board of Intermediate Education – Telugu Academy, Hyderabad.
16. I.C. Sharma Ethical Philosophy of India. Nagin & Co Julundhar.

SEMESTER-III

ELE-301: DIGITAL SIGNAL PROCESSING

UNIT – I: Sampling of Continuous-Time signals

Periodic sampling, Frequency-domain representation of sampling, Reconstruction of a band limited signal from its samples, Discrete-Time processing of continuous-time signals, Continuous-Time processing of discrete-time signals, Changing the sampling rate using discrete-time processing, Multirate signal processing, Digital processing of analog signals.

UNIT – II: Structures for Discrete-time systems

Block diagram representation of linear constant-coefficient difference equations, Signal flow graph representation of linear constant-coefficient difference equations, Basic structures for IIR systems, Basic network structures for FIR systems, Overview of finite-precision numerical effects, The effects of coefficient quantization.

Filter design techniques- Design of discrete-time IIR filters from Continuous-time filters, Design of FIR filters by windowing, Examples of FIR filter design by the Kaiser Window method, Optimum approximations of FIR filters.

UNIT – III: The Discrete Fourier Transform

Representation of periodic sequences: the discrete Fourier series, The Fourier transform of periodic signals, Sampling the Fourier transform, Fourier representation of Finite-domain sequences: The discrete Fourier transform, Linear convolution using the discrete Fourier transform.

Computation of the Discrete Fourier Transform- Efficient computation of the discrete Fourier transform, The Goertzel Algorithm, Decimation-in-time FFT algorithms, Decimation-in-frequency FFT algorithms, Practical considerations, The Chirp Transform algorithm.

UNIT – IV: Architecture of TMS320C5X

Bus structure, Central Arithmetic Logic Unit(CALU), Auxiliary Register ALU, Index Register, Auxiliary Register Compare Register, Block Move Address Register, Block Repeat Registers, Parallel Logic Unit, Memory-Mapped Registers, Program Controllers.

TMS320C5X Assembly Language Instructions- Assembly Language Syntax, Addressing modes, Load/Store instructions, Addition/Subtraction instructions, Move instructions, Multiplication instructions, The NORM instruction, Program control instructions, Peripheral control.

Books for study:

1. Alan V. Oppenheim, Ronald W. Shafer and John R. Buck, “Discrete-Time Signal Processing”, 2/e, Pearson Education, Inc., 2000. (UNIT- I to UNIT-III)
2. B. Venkataramani and M. Bhaskar, “Digital Signal Processors: Architecture, Programming and Applications”, TMH, 2002. (UNIT-IV and UNIT-V)

Reference Books:

1. Sanjit K. Mitra, "Digital Signal Processing: A Computer Based Approach", TMH, 1998.
2. Johnny R. Johnson, "Introduction to Digital Signal Processing", PHI, 2000.
3. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithms and Applications" 3/e, PHI, 2000.
4. Boaz Porat, "A Course in Digital Signal Processing", John Wiley & Sons (Asia) Pte. Ltd., 1997.
5. D.J. Defatta, J.G. Luca and W.S. Hodgkiss, "Digital Signal Processing: A System Design Approach", John Wiley & Sons (Asia) Pte. Ltd., 1995.
6. Texas Instruments TMS 320C5X User's Guide, 1997.

ELE-302: DIGITAL SYSTEM DESIGN – VHDL

UNIT – I

Basic terminology, Entity declaration, Architecture body, Configuration declaration, Package declaration, Package body, Model analysis, Simulation.

Basic Language Elements- Identifiers, Data objects, Data types, Operators.

UNIT –II: Behavioural Modeling

Entity declaration, Architecture body, Process statement, Variable assignment statement, Signal assignment statement, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion statement, Report statement, other sequential statements, Multiple processes, Postponed processes.

Data Flow Modelling- Concurrent signal assignment statement, Concurrent versus sequential signal assignment, Delta delay revisited, Multiple drivers, Conditional signal assignment statement, selected signal assignment statement, The unaffected value block statement, concurrent assertion statement, Value of a signal.

Structural Modeling- Component declaration, Component instantiation, Resolving signal values.

UNIT – III

Generics, Configuration specification, Configuration declaration, Default binding rules, Conversion functions, Direct instantiation, Incremental binding.

Subprograms and Overloading- Subprograms - Subprogram overloading, Operator overloading, Signatures, Default values for parameters.

Packages and Libraries- Package declaration, Package body, Design file, Order of analysis, Implicit visibility, Explicit visibility.

UNIT – IV: Advanced Features

Entity statements, Generate statements, Aliases, Qualified expressions, Type conversions, Guarded signals, Attributes, Aggregate targets, More on block statements, Shared variables, Groups, More on ports.

Model Simulation- Simulation – Writing a Test Bench, Dumping results into a text file – Reading vectors from a text file – A test bench example – Initializing a memory.

Hardware Modeling Example- Modeling entity interfaces, Modeling simple elements, Different styles of modeling, Modeling regular structures, Modeling delays, Modeling conditional operations. A clock divider, A generic binary multiplier, A pulse counter.

Book for study:

1. J. Bhasker, "VHDL primer", 3/e, Addison Wesley Longman (Singapore) Pte.Ltd., 2000.

Reference Books:

1. Zainalabedin Navabi, "VHDL– Analysis and Modeling of Digital Systems", McGraw-Hill International Editions, 1998
2. Joseph Pick, "VHDL – Techniques, Experiments, and Caveats", McGraw-Hill International, 96
3. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons (Asia) Pte. Ltd., 2003.

ELEP:303 Digital Signal Processing (Lab)

ELEP:304 VHDL (Lab)

ELE-305A: ADVANCED MICROPROCESSORS AND MICROCOMPUTERS

UNIT – I: Microprocessors and its Architecture

Internal microprocessor architecture, Real mode and protected modes of memory addressing, Memory paging.

Addressing modes- Data addressing modes, program memory-addressing modes, Stack-memory addressing modes.

Instruction Set- Data movement instructions, Arithmetic and logic instructions, Program control instructions, Assembler details.

UNIT – II: Programming the Microprocessor

Modular programming, using the keyboard and video display, Data conversions.

Hardware Specifications- Pin-outs and the pin functions, clock-generator (8284A), Bus buffering and latching, Bus timing, Ready and Wait state, Minimum mode versus maximum mode.

UNIT – III: Memory Interface

Memory devices, Address decoding, 8088 and 80188 (8-bit) memory interface, 8086, 80186, 80286 and 80386 (16-bit) memory interface.

Basic I/O Interface- Introduction to I/O interface, I/O port address decoding, 8255, 8279, 8254, ADC and DAC (excluding multiplexed display & keyboard display using 8255).\

UNIT – IV: Interrupts

Basic interrupt processing, Hardware interrupts, expanding the interrupt structure, 8259A PIC.

Direct Memory Access- Basic DMA operation, 8237 DMA controller.

Bus Interface- PCI bus, Advanced Microprocessors- 80186, 80188 and 80286 Microprocessors;

Book for study:

1. B.B. Brey, “The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium pro processor architecture, programming, and interfacing”, 4/e, PHI, 1999.

Reference Books:

1. Douglas V.Hall, “Microprocessors and Interfacing, Programming and Hardware”, 2/e, McGraw Hill International Edition, 1992.
2. Muhammad Ali Mazidi and Janice Gillispie Mazidi, “The 80x86 IBMPC and Compatible Computers (Volumes I & II)”, 2/e, Prentice-Hall, Inc., 1998.
3. Walter A. Triebel and Avatar Singh, “Software, Hardware and Applications”, PHI, 1995.
4. Yu Cheng Lin and Glenn A. Gibson, “Microcomputer systems: The 8086/8088 Family Architecture, Programming and Design”, PHI, 1992.
5. K.J. Ayala, “The 8086 Microprocessor: Programming & Interfacing the PC”, Penram International Publishing (India) Pvt. Ltd., 1995.

ELE-305B: CONTROL SYSTEMS

UNIT – I: Introduction to Control Systems

Examples of Control Systems, Closed-loop control versus Open-loop control.

Mathematical modeling of dynamic systems- Transfer function and impulse-response function, automatic control systems, modeling in state space, State-space representation of dynamic systems, Electrical and Electronic systems, Signal flow graphs.

UNIT – II: Transient and steady-state response analyses

First-order and second-order systems, Routh’s stability criterion, Effects of Integral and derivative control actions on system performance, Steady-state errors in unity-feedback control systems.

UNIT – III: Root-Locus analysis

Root-Locus plots, General rules for constructing Root Loci, Positive-feedback Systems. Control systems design by the Root-Locus method- Preliminary design considerations, Lead and Lag compensations, Lag-Lead compensation.

Frequency–Response analysis- Bode diagrams, Polar plots, Log-Magnitude-versus-Phase plots, Nyquist stability criterion, Stability analysis, Relative stability.

UNIT –I V: Control System Design by Frequency Response

Lead compensation, Lag Compensation, Lead-Lag Compensation.

PID Controls- Tuning rules for PID controllers, Modifications of PID control schemes, Two degrees of freedom control, Zero placement approach to improve Response characteristics.

Book for study:

1. K. Ogata, “Modern Control Engineering”, 4/e, PHI, 2003.

Reference Books:

1. D. Roy Choudhury, “Modern Control Engineering”, PHI, 2005.
2. B.C. Kuo, “Automatic Control Systems”, 7/e, PHI, 1995.

ELE-306A: COMPUTER ORGANIZATION

UNIT-I

BASIC STRUCTURE OF COMPUTERS : Computer Types, Functional unit, Basic OPERATIONAL concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

UNIT-II:

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS : Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Microoperations, logic micro operations, shift micro operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions–Instruction cycle Memory – Reference Instructions. Input – Output and Interrupt. STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

UNIT -III

MICRO PROGRAMMED CONTROL : Control memory, Address sequencing, microprogram example, design of control unit Hard wired control. Microprogrammed control

COMPUTER ARITHMETIC : Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit Decimal Arithmetic operations.

THE MEMORY SYSTEM : Basic concepts semiconductor RAM memories. Read-only memories Cache memories performance considerations, Virtual memories secondary storage. Introduction to RAID.

UNIT-VI

INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt Direct memory Access, Input –Output Processor (IOP) Serial communication; Introduction to peripheral component, Interconnect (PCI) bus.

Introduction to

standard serial communication protocols like RS232, USB, IEEE1394.

PIPELINE AND VECTOR PROCESSING : Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

TEXTBOOKS:

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals of Computer Organization and Design, – Sivarama Dandamudi Springer Int. Edition.
4. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier
5. Computer Architecture: Fundamentals and principles of Computer Design, Joseph D. Dumas II, BS Publication.

ELE-306B: Optical Communication

Unit: I

Introduction: Measurement of Information, Channel Capacity, Communication System Architecture, Basic Optical Communication System, Advantage of Optical Communication System.

Propagation in Dielectric Waveguides: Introduction, Step-index Fibers, Graded Index Fibers, Modes & Rays, Slab Wave Guide.

Unit: II

Attenuation in Optical Fibers: Introduction, Absorption, Scattering, Very Low Loss Materials, All Plastic & Polymer-Clad-Silica Fibers

Wave Propagation: Wave Propagation in Step-Index & Graded Index Fiber, Overall Fiber Dispersion-Single Mode Fibers, Multimode Fibers, Dispersion-Shifted Fiber, Dispersion, Flattened Fiber, Polarization.

Unit : III

Source & Detectors: Design of LED's for Optical Communication, Semiconductor Lasers for Optical Fiber Communication System, Semiconductor Photodiode Detectors, Avalanche Photodiode Detectors & Photo multiplier Tubes.

Optical Fiber Communication System: Telecommunication, Local Distribution Series, Computer Networks Local Data Transmission & Telemetry, Digital Optical Fiber Communication System-First Generation, System, Second Generation System, Future System.

Unit : IV

Data Communication Networks- Network Topologies, Mac Protocols, Analog System.

Advanced Multiplexing Strategies- Optical TDM, Sub carrier Multiplexing, WDM Network Architectures; SONET/SDH, Optical Transport Network, Optical Access Network, Optical Premise Network.

Text Books:

1. "Optical Fibre Communication - Senior", PHI – 2nd Edition.
2. J. Gowar, "Optical Communication System" EEE – 2nd Edition.

Reference Books:

Keiser, "Optical Fibre Communication" Mc. Graw Hill – 2nd Edition.

SEMESTER-IV

ELE-401: ADVANCED COMMUNICATION SYSTEMS

UNIT – I : Cellular Concept

History of cellular systems, Characteristic and fundamentals of cellular systems, cellular system infrastructure, cell area, signal strength and cell parameters, capacity of a cell, frequency reuse, Co-channel interference, Cell splitting and sectoring.

UNIT – II: Mobile Radio propagation and channel coding

Types of radio waves, propagation mechanisms, Free-space propagation, Pathloss, Slow and Fast Fading, Doppler effect, Delay spread, Inter symbol interference, co-channel Interference, Coherence Bandwidth, Linear Block codes, Cyclic and Convolutional codes, Interleaves, Turbo codes, ARQ Techniques.

UNIT –III: Multiple Radio Access, Multiple Division Techniques, Channel Allocation

Multiple Radio Access Protocols, Contention-based protocols, Concepts and models of FDMA, TDMA, and CDMA, Modulation Techniques, Static versus Dynamic allocation, Fixed channel allocation schemes, Dynamic and other channel allocation schemes, Allocation in specialized system structure, Channel modeling, Modeling for handoff calls.

UNIT - IV : Optical fiber communications

History of optical fibers, Optical fibers versus Metallic cable Facilities, Electromagnetic spectrum, Optical fiber communications system block diagram, Fiber types, Light propagation, Propagation of light through an optical fiber, Optical fiber configurations, Acceptance angle and Acceptance cone, Losses in optical fiber cables, Optical fiber system link budget.

Satellite systems, Indian satellites and applications- Types of satellite systems, Characteristics of satellite systems, Satellite system infrastructures, Call setup, INSAT satellites, IRS satellite program, Satellite applications.

Books for Study:

1. Dharma Prakash Agrawal and Quing-An Zeng, “Introduction to wireless and Mobile Systems” Vikas Publishing House Pvt. Ltd., 2003.(UNIT–I to UNIT–III)
2. Wayne Tomasi, “Electronic Communication Systems: Fundamentals through Advanced”, 4/e, Pearson Education, Inc., 2001. (UNIT –IV)
3. Dr. D.C. Agrawal “Satellite communications”, 5/e, Khanna Publishers, 2002. (UNIT-V)

Reference books:

1. William Stallings, “Wireless Communications and Networking”, PHI, 2003,
2. M.Richharia, “Satellite Communications Systems”, 2/e, Macmillan Press Ltd., 1999.
3. Partt, Bostian and Allnutt, “Satellite Communications”, 2/e, John Wiley & Sons, 2003.

ELE-402: INTRODUCTION TO VLSI CIRCUITS

UNIT - I : An Overview of VLSI and Logic Design with MOSFETs

Complexity and Design, Basic concepts, Ideal switches and Boolean operations, MOSFETs as switches, Basic logics gates in CMOS, Complex logic gates in CMOS, Transmission Gate circuits, Clocking and data flow control.

UNIT – II: Physical Structure and Fabrication of CMOS ICs

Integrated Circuit layers, MOSFETs, CMOS layers, Designing FET arrays, Overview of silicon processing, Material growth and deposition, Lithography, The CMOS process flow, Design rules.

UNIT - III : Elements of Physical Design and Electrical Characteristics of MOSFETs

Basic concepts, Layout of basic structures, Cell concepts, FET sizing and the unit transistor, Physical design of logic gates, Design hierarchies, MOS physics, nFET current-voltage equations, FET RC model, pFET characteristics, Modeling of small MOSFETs.

UNIT – IV: Electronic analysis of CMOS logic gates

DC characteristics of the CMOS inverter, Inverter switching characteristics, Power dissipation, DC characteristics: NAND and NOR gates, NAND and NOR transient response, Analysis of complex logic gates, Gate design for transient performance, Transmission gates and pass transistors.

Designing High-speed CMOS Logic Networks- Gate delays, Driving Large capacitive loads, Logical effort, BiCMOS drivers.

Book for Study:

1. John P. Uyemura, "Introduction to VLSI circuits and Systems", John Wiley & Sons (Asia) Pte. Ltd., 2003.

Reference Books:

1. S.K. Ghandhi, "VLSI Fabrication principles", 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2003.
2. S.M. Sze, "VLSI Technology", 2/e, McGraw-Hill, 1988.
3. N.H.E. Weste and K. Eshraghian, "Principles of CMOS VLSI design", Pearson Education, Inc., 1999.
4. Yuan Taur and T.H. Ning, "Fundamentals of Modern VLSI devices", Cambridge University Press, 1998.
5. R.L. Geiger, P.E. Allen and N.R. Strader, "VLSI design Techniques for Analog and Digital Circuits", McGraw-Hill, 1990.

ELEP 403: Communication (Lab)**ELEP 404: Project****ELE-405A: MICROWAVES****UNIT – I Electromagnetic Theory**

Maxwell's equations, Fields in media and boundary conditions, the wave equation and the basic plane wave solutions, General plane wave solutions, Energy and power, Plane wave reflection from media interface, Oblique incidence at a dielectric interface, The reciprocity theorem, Image theory, Uniqueness theorem.

UNIT – II: Transmission Line theory

The lumped element circuit model for a transmission line, Field analysis of transmission lines, Terminated lossless line, Smith chart, Quarter wave transformer, Generator and load mismatches, Lossy transmission lines.

UNIT –III: Transmission lines and waveguides

General solutions for TEM, TE and TM waves, Parallel plate waveguide, Rectangular waveguide, circular waveguide, Co-axial line, Surface waves on a grounded dielectric slab, Strip line, Microstrip.

UNIT – IV: Impedance matching

Matching with lumped elements, Single stub tuning, Double stub tuning, The quarter wave transformer, Theory of small reflections, Binomial multisection matching transformers.

Antennas-Types of antennas, Hertz and Marconi antennas, Yagi-Uda antenna, Rhombus antenna, Reflector antenna, Lens antenna, Horn antenna, Helical antenna, Log periodic antenna, Phased array antenna, Microstrip antenna.

Microwave Tubes- Klystrons, Two Cavity Klystrons, Multi cavity Klystrons, Reflex Klystrons, Traveling Wave Tubes (TWT), Backward Wave Oscillator (BWO), Magnetrons.

Books for Study:

1. David M. Pozar, "Microwave Engineering", 2/e, John Wiley & Sons (Asia) Pte. Ltd, 1999.
2. A.K. Maini, "Microwaves and Radar: Principles and Applications", 2/e, Khanna Publishers, 2001. (UNIT-IV)
3. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 3/e, 2003.(UNIT-V)

Reference books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", 3/e, PHI, 1998.
2. Wayne Tomasi, "Electronic Communication Systems: Fundamentals through Advanced", 4/e, Pearson Education, Inc., 2001.
3. Gary M. Miller and Jeffrey S. Beasley, "Modern Electronic Communication", 7/e, PHI, 2003.

ELE-405B: DATA COMMUNICATIONS AND NETWORKING

UNIT – I: Basic concepts

Line configuration, Topology, Transmission mode, Categories of networks.

OSI Model: Functions of the layers, TCP/IP protocol suite

Transmission of digital data: Interfaces and modems, digital data transmission, DTE-DCE interface, other interface standards, modems, 56K modem, cable modem.

UNIT –II: Multiplexin

FDM, WDM, TDM, Multiplexing applications: Telephone system, DSL, FTTC.

Data link control: Line discipline, Flow control, Error control.

Data link protocols: Asynchronous and synchronous protocols, Character-oriented and bit-oriented protocols, Link access procedures.

UNIT – III: LAN

Project 802, Ethernet, Token bus, Token ring, FDDI.

Switching: Circuit switching, Packet switching, Message switching.

PPP: PPP layers, LCP, Authentication, NCP.

UNIT – IV: ISDN

Services, Subscriber access to the ISDN, ISDN layers, Broad band ISDN.

X.25: X.25 layers, Other protocols related to X.25.

Frame Relay: Operation, Layers, Congestion control, Leaky Bucket algorithm, Traffic control, other features.

ATM: Design goals, ATM architecture, Switching, Switching fabrics, ATM layers, Service classes, ATM applications.

SONET/SDH: Physical configuration, SONET layers, SONET frame.

Books for study:

1. Behrousz A. Forouzan, “Data Communications and Networking”, 2/e, TMH, 2000.

Reference Books:

1. William Stallings, “Data and Computer Communications”, 5/e, PHI, 2000.
2. Andrew S. Tanenbaum, “Computer Networks”, PHI, 3/e, 1999.
3. Leon-Garcia & Indra Widjaja, “Communication Networks”, TMH, 2000.
4. Douglas E. Comer, “Computer Networks and Internets”, Addison Wesley Longman (Singapore) Pte.Ltd., 2/e,2000
5. Uyles Black, “Computer Networks”, PHI, 2/e, 1999.

ELE-406A: NANOMATERIALS AND DEVICES

UNIT – I : Introduction to Nanomaterials

Introduction to Nanomaterials – Zero, One and Two dimensional Nanomaterials Quantum confinement, Density of states, Dependence of dimensionality - Physical and chemical properties.

Unit - II : Synthesis of Nanomaterials

Introduction to Bottom-up and Top-down approaches

Ball milling – Inert Gas condensation - Physical vapour deposition -, Molecular Beam Epitaxy – Sputtering – Pulsed laser Deposition - Chemical vapour deposition – Sol-Gel – Hydrothermal Synthesis

UNIT - III : Nano-Carbon

Carbon molecules: Nature of the carbon bond – New Carbon structure – carbon clusters – Small carbon clusters – Discovery of C₆₀ – Structure of C₆₀ and its properties –Synthesis of buckyballs and Applications.

Carbon Nanotubes: Fabrication – Structure – Electrical Properties – Mechanical properties – Applications of carbon Nanotubes

Graphene : Fabrication – Structure – Electrical Properties – Mechanical properties – Applications.

UNIT - IV : Nano Devices

Introduction – Nanofabrication – Photo-Lithography – Pattern transfer –Introduction to MEMS - Single Electron Transistor – Solar Cells – Light Emitting diodes – Gas Sensors – Microbatteries- Field emission display devices – Fuel Cells.

References:

1. Nanomaterials: Synthesis, Properties and Applications – Edited by A.S.Edelstein and R.C.Cammarata, Institute of Physics Publishing, 2002.
2. Introduction to Nanotechnology – Charles P.Poole Jr and Frant J.Owens, Wiley Interscience,2003.
3. Nanopracticles from Theory to Applications edited by Gunter Schmid, Wiley VCH, 2004.
4. Nanoelectronics and Nanosystems by K.Goser, P.Glosekotter and J.Dienstuhl.(Springer).

ELE-406B: SEMICONDUCTOR MATERIALS AND DEVICES

UNIT-I: Optoelectronic Devices

Solar Cells – Photovoltaic effect, GaAs solar cells, Thin film solar cells, Photo detectors, Photo diode, Avalanche photo diode, LEDs, LED materials and their structures, Semiconductor Lasers – p-n junction laser, Hetero junction laser, Laser diode materials, fabrication and structures.

UNIT-II: Solid State Microwave Devices

Varactor diodes, PIN diodes, Tunnel diodes, Transferred Electron Devices (TEDs) – GUNN diode, Avalanche Transit Time Devices – IMPATT diode, TRAPATT diode, BARITT diodes.

UNIT-III: Power Semiconductor Devices

Schockley diode, Thyristor, Light Activated Silicon Controlled Rectifier (LACSR), Silicon Controlled Switch, GTO, IGBT, MCT, ETO, RCT, DIAC, TRIAC.

UNIT-IV: Bipolar Junction Transistors

Principle of operation, Fabrication methods and doping profiles, Analysis of the ideal diffusion transistor, Real transistors, Static I-V characteristics, Charge control equations, The diffusion transistor at high frequencies, the drift transistor, high frequency performance.

Junction and MOS Field Effect Transistors- Principle of operation, Static I-V characteristics of the idealized model, JFET structures, Semiconductor surfaces, C-V characteristics of the MOS capacitor, the Si-SiO₂ system, Basic structures and the operating principle of MOSFET, Current-Voltage characteristics.

Books for study:

1. M.S. Tyagi, “Introduction to Semiconductor Materials and Devices”, John Wiley & Sons (Asia) Pte. Ltd., 2000. (UNIT-I, UNIT-IV & UNIT-V)
2. M. Kulkarni, “Microwave and Radar Engineering”, Umesh Publications, 3/e, 2003. (UNIT – II)
3. Alok Jain, “Power Electronics and Its Applications”, Penram International Publishing (India) Pvt. Ltd., 2002. (UNIT-III)

Reference books:

1. Samuel Y. Liao, “Microwave Devices and Circuits”, 3/e, PHI, 1998.
2. Ben G. Streetman and Sanjay Banerjee, “Solid State Electronic Devices”, Pearson Education, Inc., 2000.
3. S.M. Sze, “Physics of Semiconductor Devices”, 2/e, John Wiley & Sons (Asia) Pte. Ltd., 2004.
4. Jasprit Singh, “Semiconductor Devices: Basic Principles” John Wiley & Sons (Asia) Pte. Ltd., 2004.

M.Sc. ELECTRONICS :: Model Question paper

Semester I/II/III/IV

Title of the Paper

Time 3 Hrs

Max marks 80

Attempt any five from part A (5 x 4=20 marks) and all from part B (4 x 15=60 marks)

PART A (5 x 4=20 marks)

1. Unit 1
2. Unit 1
3. Unit 2
4. Unit 2
5. Unit 3
6. Unit 3
7. Unit 4
8. Unit 4

PART A (4 x 15=60 marks)

9. Unit 1 a or b
10. Unit 2 a or b
11. Unit 3 a or b
12. Unit 4 a or b