PROPOSED SYLLABUS FOR THE

MASTER OF SCIENCE

in

ELECTRONICS
according to NEP

(Two-Year Full Time Programme)

Rules, Regulations and Course Content
(Choice Based Credit System)

Department of Electronics
Faculty of Science

C.S.J.M. University, Kanpur

(2022 - 2023)

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY, KANPUR

STRUCTURE OF SYLLABUS FOR THE

PROGRAM: M.Sc., SUBJECT: ELECTRONICS

Syllabus Developed by			
Name of BoS Convenors / BoS Members	**Designation**	**Department**	**College/University**
Prof. K.B. Kushwaha	Convenor	Physics	D.A.V. College, Civil Lines, Kanpur
Prof. Rajiv Manohar	External expert	Physics	Lucknow University, Lucknow
Prof. O.P. Singh	External expert	Physics	IET, Lucknow
Dr. Vishal Awasthi	Member	Electronics	C.S.J.M. University, Kanpur
Dr. Ajay Tiwari	Member	Electronics	C.S.J.M. University, Kanpur
Prof. Manoj Jauhari	Member	Physics	D.A.V. College, Civil Lines, Kanpur
Dr. Om Prakash Gupta,	Member	Physics	DBS College, Kanpur

IST YEAR / IST SEM						
COURSE CODE	**TYPE**	**COURSE TITLE**	**MIN CREDITS**	**CIA**	**ESE**	**MAX. MARKS**
B140701T	CORE	PHYSICS OF ELECTRONIC MATERIALS	4	25	75	100
B140702T	CORE	SIGNAL ANALYSIS AND MATHEMATICAL METHODS IN ELECTRONICS	4	25	75	100
B140703T	CORE	C^{++} PROGRAMMING AND DATA STRUCTURE	4	25	75	100
B140704T	CORE	SEMICONDUCTOR DEVICES	4	25	75	100
B140705P	PRACTICAL	Lab Course I: C^{++} PROGRAMMING AND DATA STRUCTURE Lab	4	25	75	100
		Lab Course II: Semiconductor Lab				
	PROJECT	DISSERTATION/PROJECT WORK	-	-	-	-
	TOTAL		20			500
IST YEAR / IIND SEM						
B140801T	CORE	NETWORK ANALYSIS AND SYNTHESIS	4	25	75	100
B140802T	CORE	ELECTROMAGNETIC, ANTENNAAND MICROWAVE THEORY	4	25	75	100
B140803T	CORE	ELECTRONIC CIRCUIT	4	25	75	100
B140804T	CORE	DIGITAL SYSTEM AND DESIGN	4	25	75	100
B140805P	PRACTICAL	Lab Course III: Digital Electronics Lab	4	25	75	100
		Lab Course IV: ELECTRONIC CIRCUIT Lab				
B140806R	PROJECT	DISSERTATION/PROJECT WORK	8	25	75	100
	MINOR ELECTIVE FROM OTHER FACULTY (IN 1ST YR- Ist/IInd SEM)*		4	25	75	100
	TOTAL		32			700
IIND YEAR / IIIRD SEM						
B140901T	CORE	CONTROL SYSTEM	4	25	75	100
B140902T	CORE	IC TECHNOLOGY AND VLSI DESIGN	4	25	75	100
B140903T	CORE	ANALOG AND DIGITAL COMMUNICATION SYSTEM	4	25	75	100
B140904T	ELECTIVE	ELECTONICINSTRUMENTATIONAND MEASUREMENTS	4	25	75	100
B140905T		FOUNDATION OF NANO ELECTRONICS				
B140906P	PRACTICAL	Lab Course V: COMMUNICATION LAB	4	25	75	100
		SEMINAR				
	PROJECT	DISSERTATION/PROJECT WORK	-	-	-	-
	TOTAL		20			500
IIND YEAR / IVTH SEM						
B141001T	CORE	WIRELESS AND MOBILE COMMUNICATION	4	25	75	100
B141002T	CORE	MICROPROCESSOR AND MICROCONTROLLER	4	25	75	100
B141003T	CORE	OPTTOELECTRONICS ANDOPTICALCOMMUNICATION	4	25	75	100

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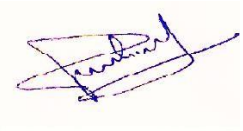
B141004T	ELECTIVE	POWER ELECTRONICS	4	25	75	100
B141005T		BIO – MEDICAL ELECTRONICS				
B141006T		PROCESSES IN DEVICE FABRICATION				
B141007P	PRACTICAL	Lab Course VI: MICROPROCESSOR LAB	4	25	75	100
		MAJOR PROJECT/DESERTATION				
B141008R	PROJECT	DISSERTATION/PROJECT WORK	8	25	75	100
	TOTAL		28			600
GRAND TOTAL			100			**2300**

NOTE:

1. *A MINOR ELECTIVE FROM OTHER FACULTY SHALL BE CHOSEN IN 1ST YEAR (EITHER Ist / IInd SEMESTER) AS PER AVAILABILITY.
2. In both years of PG program, there will be a Research Project or equivalently a research-oriented Dissertation as per guidelines issued earlier and will be of 4 credit (4 hr/week), in each semester. The student shall submit a report/dissertation for evaluation at the end of the year, which will be therefore of 8 credits and 100 marks
3. Research project can be done in form of Internship/Survey/Field work/Research project/ Industrial training, and a report/dissertation shall be submitted that shall be evaluated via seminar/presentation and viva voce.
4. The student straight away will be awarded 25 marks if he publishes a research paper on the topic of Research Project or Dissertation.



PHYSICS OF ELECTRONIC MATERIALS (B140701T)

UNIT-1

Fundamentals of Materials Science:

Relative stability of Phase, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Elementary idea of point, line and planar defects. Concept of thin films, preparation of thin films, Deposit ion of thin film using sputtering methods (RT and glow discharge).Smart Materials.

UNIT-2:

Semiconductors:

Metal-semiconductor and, Direct and Indirect semiconductors, Variation of energy bands with alloy composition, charge carriers in semiconductors, effective mass, Intrinsic and Extrinsic materials, Diffusion and drift, diffusion length, diffusion and recombination. The Fermi level & Fermi dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration Qualitative and Quantitative analysis, Temperature dependency of carrier concentration, conductivity and mobility, effects of temperature and doping on mobility, high field effects, the hall effects.

UNIT-3:

Dielectric and Magnetic Materials:

Dielectric properties, Electronic polarisability, Clausius Mossotti relation, dielectric constant static and frequency dependence, Kramer-Kronig relation, damped oscillation, Piezoelectric properties, polymers and their properties. Magnetic and Electro-optical properties, Magnetism & various contributions to para and dia magnetism, Fero and Ferri magnetism and ferrites, Magnons and dispersion relation, antiferromagnetism, domains and domain walls, coercive force, hysterisis, methods for parameters measurements.

UNIT-:4

Superconductivity and Liquid Crystals:

Different Properties of Superconductor, Meissner effect, London equation, BCS theory, Josephson effect, High temperature Superconductors, Types of liquid crystals and their mesomorphous phases, Elementary theory of order, Transition Metal Alloys.

RECOMMENDED BOOKS

1. “A First Course In Material Science” by Raghvan, McGraw Hill Pub.
2. “Solid State Physics” by S.O.Pillai,New Age Publication.
3. “Electrical Engineering Materials”,by A.J. Dekker, PHI Pub.
4. “Electronic Components and Materials” Grover and Jamwal, DhanpatRai and Co.
5. ‘The Science and Engineering of materials’ by Donald R.Askeland,Chapman & Hall Pub.
6. “Introduction to Liquid Crystal” by Peter J. Collings and Michael Hird,CRC Press.

SIGNAL ANALYSIS AND MATHEMATICAL METHODS IN ELECTRONICS (B140702T)

UNIT-1

Signal Analysis:

Classification of signals and systems, some ideal signals, energy signal, power signals, energy and power spectral densities. Periodic & non periodic, analog & digital, deterministic & random, unit impulse, unit step. LTI networks, the concept of frequency in continuous & discrete time domain, linear time invariant system definition. Impulse response of LTI system.

UNIT-2

Fourier Series & Transforms:

Fourier Series, Dirchilit conditions, determination of Fourier Co-efficients, Statement of Fourier Integral Theorems, Fourier series–sine and cosine series, Fourier Transforms & properties, Fourier Transform of various functions, Fourier Sine & Cosine transforms. Inverse transforms. Convolution Theorem, Parsevals Identity, applications.

Laplace Transforms:

Laplace transforms, Region of Convergence (ROC), Basic properties of Laplace Transforms. Laplace transform of derivatives and integrals, shifting theorem, differentiation and integration of transforms, inverse transforms, convolution property. Laplace transform of unit step function, impulse function and periodic function, Solutions of linear differential equations with constant coefficients using Laplace transform applications

UNIT-3

Z – Transforms:

Definition of Z- transform, Region of Convergence (ROC), properties, initial and final value theorem. Z transform of unit step sequence, unit ramp sequence, polynomial functions, trigonometric functions. Shifting property, convolution property, Inverse transform. Pole-Zero plots from z-transform. Solutions of 1st & 2nd order difference equations with constant coefficients using Z transforms.

UNIT-4

Computational Methods Numerical Differentiation and Integration:

Finite Differences, Derivatives using Forward, Backward and Central Difference Formulae, Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's rules, Weddle's rule.

Numerical methods for Solution of Ordinary Differential Equation-

Picards Method ,Taylor Series Method , Eulers and Modified Eulers methods, Runge and Runge Kutta Methods , Predictor and Corrector Method.

RECOMMENDED BOOKS:

1. "Advance Engineering Mathematics" by H.K.Dass,PHI Pub.
2. "Advanced Engg. Mathematics" by Erwin Kreyszig,Wiley India Pvt. Ltd..
3. 'Signals and System' by Samarjit Ghosh,Pearson Education.
4. "Digital Signal Processing" by S. Salivahanan, A. Vallavara and C. Gnanpriya,TMH Pub..
5. "Laplace and Fourier Transforms" by Goyal and Gupta,Pragati Prakashan.
6. "Higher Engineering Mathematics" by Dr. B. S. Grewal, Khanna Pub.
7. " Signal and System" by Nagrath, Sharan and Ranjan ,McGraw Hill Pub.

C++ PROGRAMMING AND DATA STRUCTURE (B140703T)

UNIT-1

Introduction:

Object oriented programming, characteristics of an object-oriented language.

C++ programming language: Tokens, keywords, identifier and constants, basic data types, user defined data types, derived data types, arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, special operators, expressions and evaluation of expressions, scope resolution operator, member dereferencing operators, manipulators, type cast operator, implicit conversions, precedence of operators, new and delete operators. Arrays, pointers and structures.

UNIT-2

Decision making, Branching and Looping:

if, if-else, else-if, switch statement, break, continue and go to statement, for loop, while loop and do loop. **Functions:** Function definition, function arguments and passing, returning values from functions, referencing arguments, function overloading, virtual functions, library functions, local, static and global variables.

UNIT-3

Classes and Objects:

Classes and objects, member functions, class constructors and destructors, array of objects, operator overloading. **Class inheritance:** Derived class and base class, multiple inheritance, polymorphism. Streams in C++ - Stream Classes – Formatted and Unformatted data – Manipulators – User Defined Manipulators – File Streams – Opening and Closing a File – File Pointers Manipulation – Template Classes and Functions– Exception Handling: Try, Catch, Throw. Exception Handling – Multithreading – Applets – Graphics Programming..

UNIT-4

Data Structures:

Multidimensional arrays definition implementation multidimensional arrays in control loops, pointers to multidimensional arrays. Stacks and queues array implementation: Definition of stacks and queues, Terminology, implementation using arrays, Link Lists, stacks and queues, Implementation of stacks and queues.

RECOMMENDED BOOKS:

1. "Object- Oriented Programming with C++" by Balagurusamy E,TMH Pub.
2. "PROGRAMMING IN C++" by P.B.MAHAPATRA,S Chand Pub.
3. "Programming with C++" by Ravichandran,TMH Pub.
4. "Data structures using C and C++" by Yedidyah,Moshe, and Aaron, PHI Pub.
5. "Data structure, Algorithms & application in C++" by Sartaj Sahni ,McGraw HillPub.

SEMICONDUCTOR DEVICES (B140404T)

UNIT-1

Junction Theory:

Fabrication of p-n junctions, Different types of junction –grown junction, alloyed junction, diffused junction, Ion implanted junction, Epitaxial junctions. equilibrium conditions, contact potential, current flow at a junction, junction breakdown, capacitance of p-n junctions, charge storage and transient behavior, rectifiers, switching diodes, zener diode, LEDs, Schottky diodes, Varactor diodes.

UNIT-2

Bipolar Transistors:

BJT fabrication, transistor action, minority carrier distributions, and terminal currents, Ebers – moll Model, Switching, Drift in base region, Base narrowing, Avalanche breakdown, injection level - thermal effects, Base resistance and Emitter crowding, h-parameters and analysis of transistor amplifier using h-parameter.

UNIT-3

Field Effect Transistors:

Junction FET - metal semiconductor FET, GaAs MESFET, metal insulator semiconductor FET, High electron mobility transistor, threshold voltage. MOSFET- basic operations, constructions, and characteristics, ideal MOS capacitor, Control of threshold voltage.

UNIT-4

Microwave Solid State Devices:

Principle, structure, construction and working of Gunn diodes, LSA diode, READ diode, IMPATT, TRAPATT and BARRIT diode, Tunnel diodes, Parametric devices.

RECOMMENDED BOOKS

1. “Solid State Electronic Devices” by Ben G Streetman, PHI Pub.
2. “Semiconductor Devices - Physics and Technology” by S M Sze, John Wiley Pub.
3. “Semiconductor Devices” by Kanaan Kano, Pearson Education.
4. “Microwave Devices and circuits” by Samuel Y.Liao,PHI Pub.
5. “Semiconductor Physics and Devices – Basic Principles” by Donald A Neamen, TMH Pub.
6. “Power Semiconductor drives” by S.B.Dewan, G.R.Sleman and A.Strauphan,John Wiley Sons.
7. “Power Electronics” by P.C. Sen,TMH Education.

LAB 1

C++ PROGRAMMING AND DATA STRUCTURE LAB (B140705P)

1. Write a program to calculate the roots of quadratic equation $Ax^2+Bx+C=0$.
2. Write a program to calculate the average of a set of n numbers including zero and negative numbers.
3. Write a program to sort an array element in ascending order and descending order using bubble sort technique.
4. Write a program to plot a sin (X).
5. Write a program to find a row sum and column sum of a given matrix and built a new matrix with the help of row sum and column sum and previous matrix.
6. Write a program to read and print two-dimensional matrix of order nxm. Find the sum of diagonals.
7. Write a program that calculate and prints out the maximum and minimum of array.
10. Write a program for sorting names in alphabetical order.
11. Write a program to plot and exponential series.
12. Write a program to print the terms in the exponential series, till the term is equal to 0.00001 also compute the exponential series of x, $e^x=1+x+x^2/2!+x^3/3!+$ ..... +0.00001.
13. Write a program for matrix addition and matrix multiplication.
14. Write a program for the operation of (a) addition (b) subtraction (c) multiplication (d) division. Using switch command.
15. Write a program to find the factorial of a given number and Fibonacci series using switch command.
16. Write a program to find the sum of natural numbers using function
17. Write a C++ program to create a class to handle telephone directory, include name, phone number (landline, mobile), STD/ISD code, City and Country as data members and write member function to create new directory, display directory, sort according to name, edit, add, delete and search as per name/telephone number.
18. Program to demonstrate exception handling mechanism while divide by zero.
19. Program to demonstrate generic programming for sorting using
    a. **c**lass templates
    b. function templates
20. To write the sum and difference of 2 clock times (hr: min: sec)
    (a) using member functions (b) using operator overloading
    (c) using friend function (d) using operator overloading friend function

Note: - 20**% experiments other than this list of equal standard relevant to syllabus can also be set.**

B140705P LAB-PART 2

SEMICONDUCTOR LAB

1. To obtain a static characteristics of a PN junction diode and then obtain the forward resistance of the diode at a given operating point.
2. To obtain V-I characteristics of a zener diode and note down its breakdown potential.
3. To study the I-V characteristics of infrared,blue and red LEDs.
4. To determine the emission intensity of the LED as a funtion of the diode current using photodetector.
5. To study and plot the BJT characteristics and evaluate—
   a. Input resistance b. Output resistance c. Current gain.
6. To bias a given transistor in active region in CE configuration.
7. To study the transistor as a switch.
8. Bias a MOS transistor in saturation region in CS configuration
9. To study and plot the MOSFET characteristics.
10. Bias a JFET in saturation region and operates it as an RC coupled amplifier in CS configuration and measure the voltage gain.
11. Study of I-V characteristics of Gunn Diode.
12. To study the characteristics of JFET in common source configuration & evaluate—
    a. AC drain resistance, 2. Amplification factor and 3.Drain Resistance.
13. Study of DIAC and TRIAC characteristics.
14. Study of R-Triggering and RC triggering of an SCR.
15. Study of RC full wave triggering circuit.

Note: - 20**% experiments other than this list of equal standard relevant to syllabus can also be set.**

NETWORK ANALYSIS AND SYNTHESIS (B140801T)

UNIT-1

Network Fundamentals and Graph Theory

Active and passive elements,The dot conventionfon for coupled circuits, Kirchhoff's laws , source transformation, mesh and node analysis of electric circuits, Review of theorems. Concept of a network graph, twigs and links, trees, co-trees, formation of incidence matrix ,cut-set matrix, tie-set matrix and loop currents, analysis of networks ,network equilibrium equation ,duality, network transformation.

UNIT-2

Network Function

Network function for one port and two port, the calculation of network functions - ladder networks and general networks, pole and zero of network functions, restrictions on pole and zero locations for driving point functions ,restrictions on pole zero locations.

UNIT-3

Two Port Network Analysis

Relationship of two port variable, Z-parameters, Y- parameters, Hybrid parameters, ABCD parameters; T-network, π-netwok, L-network, lattice network, Symmetrical network. Conditions for reciprocity and symmetry; inter-relationship between parameter of two port network, different types of interconnections of two port networks.

UNIT-4

Network Synthesis

Concept, Procedure of Synthesis, Positive real function, Hurwitz polynomial, Reactive Networks, Properties of Expressions of Driving point admittances of L-C Networks, Pole-Zero Interpretations in L-C Networks. L-C Networks Synthesis-Foster's Canonic Form (First and Second Foster form), Significance of Elements in the Foster form. Cauer Canonic form of Reactive Networks-First and Second form of Cauer Networks, Applicability of Foster and Cauer forms, R-L & R-C Network Synthesis by Foster form, Identification of foster form of R-L/R-C network, Identification of Admittance, R-L & R-C Network Synthesis by Cauer form, Identification of Immittance Function in Cauer form, Determination of end elements in Foster and Cauer R-L & R-C Networks.

RECOMMENDED BOOKS

1. "Networks and systems" by D Roy Choudhury , Wiley Eastern Ltd.
2. "Network Analysis" by M.E. Van Valkenburg, PHI Pub.
3. "Circuit theory- analysis and synthesis" by A. Chakrabarti, Dhanpat Rai and Co.
4. "Network analysis and synthesis" by Franklin F Kuo, John Wiley and Sons.
5. "Engineering Circuit analysis"by W.H. Hayt & Jack E-Kemmerly, TMH Pub.
6. "Circuit and Network analysis and Synthesis" by A. Sudhakar and S. P. Shammohan,TMH Pub.,
7. "Network Analysis Theory and Compute Methods" by donson and Watkins, PHI Pub.
8. "Circuit, Theory Fundamentals and Applications" by Aram Budak, PHI Pub.

ELECTROMAGNETIC, ANTENNA AND MICROWAVE THEORY (B140802T)

UNIT-1

Electromagnetic Plane Wave

Electron motion in electromagnetic field, electric and magnetic wave equations, Maxwell's equation, Poynting theorem, uniform plane wave and reflection, uniform plane wave propagation in free space and perfect dielectric,, plane wave propagation in lossy media, duality theorem, uniqueness theorem ,image theory ;equivalence principle; introduction and reciprocity theorem.

UNIT-2

Transmission Lines and Antennas

Basic equation , reflection and transmission coefficient , standing wave and standing wave ratio , line impedance and admittance, Determination of characteristics impedance, Fundamental of Smith Chart, Impedance Matching: Single and Double Stub Matching, microwave Coaxial Connectors.The Radiation mechanism, Current and Voltage distribution, Antennas gain, Antenna resistance, Bandwidth, Beamwidth and Polarisation, effects of Antenna height, Dipole arrays, Folded dipole. Microwave Antennas - Parabolic reflector, Horn and Lens antenna. Special purpose antennas - Yagi, Log periodic and Loop antennas.

UNIT-3

Linear Wire Antennas and Arrays

Infinitesimal Dipole, Small Dipole, Region Separation, Finite Length Dipole, Half-Wavelength Dipole Linear Elements Near or on Infinite Perfect Conductors, Ground Effects ,Two element array, N-element linear array : uniform linear amplitude and spacing, N-element linear array: Directivity, Circular array.

UNIT-4

Theory of Microwave Propagation,Waveguides and Components, RADAR

Fundamentals of microwave propagation,Rectangular Wave guide – TE and TM modes , power transmission, excitation in rectangular wave guide, circular wave guides – TE,TM and TEM mode, Cavity resonator, Q-factor.Waveguide Tee - E-plane tee, H-plane tee, Hybrid tee, scattering parameters (s-matrix), circulators, isolators , directional couplers. RADAR and its applications.

RECOMMENDED BOOKS

1. "Electromagnetic Wave & Radiating System" by Jordan & Balmain, PHI Pub.
2. "Introduction to Electrodynamics" by David J. Griffiths , PHI Pub.
3. "Antennas" by J.D.CKraus,McGraw Hill.
4. "Elements of Electromagnetics" by Matthew N. O. Sadiku,Oxford Series.
5. "Antenna Theory and Design" by W. L.Stutzman, and G.Thiele,John Wiley & Sons.
6. "Microwave Devices and circuits" by Samuel Y.Liao,PHI Pub.
7. "Microwave and Radar Engineering" by M. Kulkarni, Umesh Publication.

ELECTRONIC CIRCUIT (B140803T)

UNIT-1

Power Supplies

Building blocks of regulated power supplies,Zener as a series and shunt regulators, Transistor as a series and shunt regulators, Regulator design with dicrete components,IC 723.

UNIT-2

Transistor Biasing and Stability

Q-point, self bias-compensation techniques, h-model of transistors, Expression for voltage gain, current gain, input and output impedance, trans-resistance & trans-conductance, emitter follower circuits, high frequency model of transistor amplifiers,frequency response characteristics, lower and upper half frequencies, bandwidth, and concept of wide band amplifier.

UNIT-3

Feedback Amplifiers & Oscillators

Feedback concept, negative & positive feedback, voltage current, series/shunt feedback, Berkhausen criterion, Colpitts, Hartley's and phase shift oscillators, Wein bridge and Crystal oscillators, amplifier distortion, amplifier classification and characteristics, power and efficiency of amplifiers, direct and transformer coupled amplifiers , Power amplifiers

UNIT-4

Op-amp and its Applications

Operational Amplifier: Ideal Op-amp, Differential Amplifier, Constant current source (current mirror etc.), level shifter, CMRR, Open & Closed loop circuits, importance of feedback loop (positive & negative), inverting & non-inverting amplifiers, voltage follower/ circuit IC 741,. Applications of Operational Amplifiers: adder, subtractors integrator & differentiator, comparator, Schmitt Trigger. Instrumentation Amplifier, Log & Anti-log amplifiers, Trans-conductance multiplier, Precision Rectifier, voltage to current and current to voltage converter..

RECOMMENDED BOOKS

1. "Introduction to System Design Using ICs" by B.S. Sonde, New Age International Pub.
2. "Electronic Devices and Circuit Theory" by Boylestad & Nashelsky, Pearson Pub.
3. "Microelectronic Circuits" by Sedra & Smith,Oxford Pub.
4. "Integrated Electronics" by Millman & Halkias ,McGraw Hill Pub..
5. "Microelectronic Circuits-Analysis and Design" by H.Rashid, Thomson Pub
6. "Electronic Circuit:Discrete & Integrated" by D.L.Schilling & C. Belove, TMH Pub.
7. "Operational Amplifiers and Linear ICs" by David A.Bell, Oxford Pub.
8. "Op-Amps and Linear IC's" by R.A Gayakwad, PHI Pub.

DIGITAL SYSTEM AND DESIGN (B140804T)

UNIT-1

Basic Logic Circuit

Number systems and Codes , Introduction of basic gates, universal gates, Boolean algebra, Switching characteristics of semiconductor devices, Logic gate characteristics - speed of operation, power dissipation , figure of merit, fan in, fan out, noise margin. Logic families - RTL, DTL, TTL, ECL, Interfacing between logic families, MOS logic, comparison of logic families.

UNIT-2

Combinational Logic Design

Minterm and maxterm, Simplification of boolean algebra using K-map, design of binary adder, substractor , digital comparator, parity generator/checkers, priority encoder, BCD to 7-segments decoder, multiplexer , multiplexer tree, demultiplexer and demultiplexer tree.

UNIT-3

Sequential Circuit Design

Excitation table of flip flops – S-R, J-K , Master-Slave – JK, D and T flip-flops, clocked flip flop design – conversion of one form of flip flop to another type.State equation, state table, state diagram, state input equations, analysis with D flip flops, JK flip flops and T flip flops.State reduction and assignment, design procedure – synthesis using D flip flops, JK flip flops and T flip flops.

UNIT-4

Registers, Counters and A/D , D/A converters

Shift registers, application of shift registers, serial to parallel converter,parallel to serial converter.Counters, modulo-n-counter, synchronous counter –ripple counter (binary, BCD) and up-down counter, asynchronous counters - ripple counter (binary , BCD) and up-down counter. Other counters – counter with unused states, ring counter, Johnson counter.D/A converters-weighted register type, R/2R ladder type, D/A converter specification. A/D converters - Successive approximation type, parallel comparator, dual slop. ADC using voltage to frequency conversion and frequency to time conversion.

RECOMMENDED BOOKS

1. “Digital Design” by M Morris Mano and M D Ciletti, PHI Pub.
2. “Digital Electronics Circuits and Systems” by V.K. Puri; TMH Pub.
3. “Introduction to Digital Electronics” by NIIT, PHI Pub.
4. “Digital Electronics: Principles And Integrated Circuits” by Anil K. Maini,Wiley India.
5. “Electronic Principle” by A. Malvino and D. J. Bates, TMH Pub.
6. “Digital Principles and Applications” by Leach & Malvino,McGraw Hill.
7. “Modern Digital Electronics” by R P Jain,TMH Pub.
8. “Fundamental of Digital Circuits” by A. Anand Kumar,PHI Pub.

LAB-1

DIGITAL ELECTRONICS LAB (B140805P)

1. Design and Study of AND, OR, NOT Logic Gates Using IC.
2. Design and Study of NAND, NOR gates using IC.
3. Design and Study of Ex-OR & Ex-NOR using IC.
4. Design and Study of Half Adder and Full Adders using IC.
5. Design and Study of Half Adder and Full Adder using NAND or NOR gates.
6. Design and Study of 4:1 Multiplexers using common gates.
7. Design and Study of 8:1 Multiplexers 1:4 Demultiplexer using IC.
8. To design a 2^n to n line encoder using basic universal logic gates.
9. To study R-S/D/T flip-flops using NAND ICs and verify truth table.
10. To study the master slave J-K flip-flop and verify truth table.
11. To study the operation of modulo-n-counter as MOD 3 & MOD 4 and verify the truth table.
12. To design Jhonson & Ring counter.
13. To design an up-down synchronous counter with direction control that can count a particular sequence.
14. To design a modulo-n Asynchronous and synchronous counter using JK/T-Flip Flop IC's.
15. To study the operation of a Presetable Divide by N Counter and verify its truth table.
16. To design a universal shift register and demonstrate SISO, SIPO, PISO and PIPO functions.
17. To study the operation of shift register as serial in parallel and parallel in serial mode.
18. To study the operation of shift register as parallel in parallel and serial in serial mode.
19. To study write/read operation of digital data into semiconductor memory using IC 7489. Store and retrieve some set of data. (RAM).
20. Design of A/D and D/A converter using IC.

Note: - 20% experiments other than this list of equal standard relevant to syllabus can also be set.

B140805P LAB - PART 2
ELECTRONIC CIRCUITS LAB

1. To design Rectifier using capacitor filter
   (a) Half wave Rectifier (b) Full wave Rectifier
2. To study the Clipping circuits as positive and negative logic.
3. To study the Clamping circuits as positive and negativelogic.
4. To study and design an RC coupled amplifier using BJT and FET.
5. To study the Colpit Oscillator, determine its frequency of oscillation and compare the calculated and observed frequency.
6. To study the Negative Feedback Amplifier by measuring closed loop gain and gain bandwidth product.
7. To study the RC Phase Shift Oscillator by determining its frequency of oscillation and compare calculated and observed frequency.
8. Construct a Wein Bridge Oscillator and determine its frequency of oscillation and compare calculated and observed frequency.
9. To study the operation of Class B Amplifier.
10. To measure the following parameters of 741 op-amp IC.
    (a) Open-loop gain, (b) Output Offset voltage, (c) CMRR, (d) Slew rate.
11. Using op-amps design the following:
    (a) Differentiator (b) Integrator (c) Zero Crossing Detector (d) Comparator
12. Using op-amps design the following:
    (a) Buffer (b) Scale changer (c) Adder (d) Subtractor.
13. To Verify that in a current mirror, the output current is equal to input current.
14. To design and realize Op-Amp based pulse generator.
15. To design and realize a square wave generator using Op-Amp.
16. To design and realize Log and exponential amplifiers using Op-Amps
17. To study the Active Low pass filter and to evaluate: -
    (a) Cutoff frequency (b) Band pass gain (c) Plot the frequency response
18. To study the Active Band pass filter and calculate its
    (a) Bandwidth: - Lower cutoff & upper cutoff frequency (b) Quality factor.
19. To design and realize current to voltage converter and also find its conversion factor.
20. Determine the frequency using IC 555 timer of
    (a) Astable Multivibrator (b) Monostable Multivibrator

Note: -20% experiments other than this list of equal standard relevant to syllabus can also be set.

CONTROL SYSTEM (B140901T)

UNIT-1:

Introduction

Introduction, terminology and Feedback characteristics of control system definitions, closed and open loop systems, Transfer functions, Block diagrams, Reduction Algebra, signal flow graphs.

UNIT-2:

Time domain analysis and Root Locus Techniques:

Standard test signals, Time domain performance of control systems, Transient response of the first order system, the second order system, stability, steady state errors, effect of adding zero to the system, Routh stability criterion. Root locus techniques: The root locus concept, construction of root locus and analysis of control system.

UNIT-3:

Frequency domain analysis and Basic control actions:

Correlation between time and frequency response, Polar plots, Bode plots, experimental determination of transfer function, log magnitude versus phase plots, Nyquist stability criterion.

UNIT -4

State Variable Analysis

Concept of state variables, state model, state model for linear continuous time system, diagonalization, solution of state equations, concept of controllability and observability.

RECOMMENDED BOOKS

1. "Control system Engineering" by I..J. Nagrath and M. Gopal, Wiley Eastern Ltd.
2. "Modern Control Engineering " by K. Ogata, Pearson Pub.
3. "Automatic control systems" by B.C. Kuo, PHI Pub.
4. "Linear control system" by B S Manke,khanna Pub.
5. "Control system" by Smarajit Ghosh,Pearson Education.

IC TECHNOLOGY AND VLSI DESIGN (B140902T)

UNIT-1

Crystal Growth & Wafer Characterization

Electronic Grade Silicon, CZ Crystal Growing, Silicon Shaping, Processing Consideration. Vapor Phase Epitaxy, Molecular Beam Epitaxy, Silicon on Insulators. Growth Mechanism, Oxide Properties, Oxidation Induced Defects.Optical Lithography, Electron Lithography, X-Ray Lithography, Ion Lithography.Feature Size Control and Anisotropic, Etch Mechanisms, Reactive Plasma Etching Techniques and Equipment

UNIT-2

Diffusion and Metallization

Models of Diffusion in Solids, Fick's One Dimensional Diffusion Equations, Atomic Diffusion Mechanisms.Range Theory, Implantation Equipment, Annealing. Metallization Applications, Metallization Choice, Physical Vapour Deposition, Patterning, Bipolar IC Technology

UNIT-3

Introduction to MOS

MOS, CMOS IC Technology, Metal Gate, Poly Silicon Gate, P-Channel, N- Channel Devices, Enhancement Mode and Depletion Mode Devices and their Characteristics

UNIT-4

VLSI design Introduction

Issues in Digital Integrated Circuit Design, Quality Metrics of a Digital Design. Manufacturing CMOS Integrated Circuits, Design Rules, IC Layout, Scaling factors, advantages of scaling, limitations to scaling, scaling of wires and interconnections.

RECOMMENDED BOOKS:

1. "VLSI Technology" by S. M. Sze,Mcgraw Hill Pub.
2. "Solid State Electronic Devices" by Ben G. Streetman, PHI Pub.
3. "VLSI Design" by K.Lal Kishore and V. Prabhakarl, I.K.International Pub.
4. "Physics and Technology of Semiconductor Devices" by A. S. Grove, John Wiley and Sons Pub.
5. "Basic VLSI design" by Douglas A Pucknell and Kamran Eshraghian, PHI Pub.
6. "CMOS VLSI design" by Neil H E Weste and David Harris, Pearson Pub.

ANALOG AND DIGITAL COMMUNICATION SYSTEM (B140903T)

UNIT-1

Concept of Communication

Communication system, Study of basic block diagram of communication system, Bandwidth and its requirement, Modulation and its types, Need of modulation, Noise, External and internal source of noise, Calculation of thermal noise and shot noise, Noise figure, Noise temperature, Equivalent noise bandwidth, Random process, Stationary process, Ergodic process, Gaussian process, Poisson process, Power spectral density.

UNIT-2

Amplitude Modulation

Baseband and carrier modulation, Amplitude modulation with full carrier, Mathematical analysis. Power relation in AM wave, Double sideband suppressed (DSB-SC) system, Singal sideband suppressed(SSB-SC) system, Vestigial sideband (VSB) modulation system, Quadrature amplitude modulation (QAM), AM transmitter and receiver, Time division multiplexing (TDM).

UNIT-3

Angle Modulation

Frequency modulation, Analysis of FM waveform and frequency spectrum,Bessel function, Wide-band FM and Narrow band FM, Mathmatical analysis of WBFM and NBFM, Phase modulation, Generation and detection of FM, Generation and detection of PM, frequency division multiplexing (FDM).

UNIT-4

Digital Communication System& Modulation Techniques

Element of digital communication system, Sampling process, Sampling theorem, Natural and flat top sampling, Analog pulse modulation : Types of analog pulse modulation, Method of generation and detection of PAM, PWM, PPM, Pulse code modulation, Quantization error, Delta modulation, Adaptive delta modulation, Compandig. Digital modulation techniques: ASK, FSK, PSK, BFSK, BPSK, QPSK, Inter symbolinterfferance, Matched filter, Probability of error, Correlation receiver.

RECOMMENDED BOOKS

1. "Communication System" by S. Haykin, John Willy & Sons Pub.
2. "Modern analog & Digital Communication Systems" by B.P. Lathi,Oxford Univ.Press.
3. "Electronic Communication Systems" by George Kennedy, TMH Pub.
4. "Analog Communication System" by P.Chakrabarti, Dhanpat Rai Pub.
5. "Digital and Analog Communication Systems" by Leon W. Couch,Pearsons Education.
6. "Digital communications" by J. G. Proakis,Mc-GrawHill Pub.

ELECTONIC INSTRUMENTATION AND MEASUREMENTS (B140904T)

UNIT– 1

Introduction of Measurement

Precision & accuracy, Characteristics of Instruments, Measurement of frequency, phase, time – interval, impedance, power measurement, energy measurement and measurement of distortion, Errors in Measurement.

UNIT-2

Measuring Instruments-

Basic galvanometer ,conversion to voltmeter ,ammeter and ohmmeter ,Multimeter Measurement of R,L,C Using Bridge, Voltage, Current, Energy, Frequency/Time power , power factor, working principle and procedure of operation of Digital Voltmeter, Digital Multimeters, Digital Frequency Meter, Q-Meter, Digital Storage Oscilloscope. Spectrum Analyzer, Logic Analyzer, recorders-Galvanometer recorders, Strip recorder, X-Y recorder.

UNIT– 3

Measurement of Non – Electrical Quantities & Electrical Transducers

Measurement of Displacement, Velocity, Acceleration, Force, Torque, Strain, Speed & Sound, Temperature, Pressure, Flow, Humidity, Thickness. Fundamental Concept & Transducers Classification Resistance, Capacitance, Inductance, Piezoelectric, Thermoelectric, Techogenerator, Optical & Digital Transducers.

UNIT-4

Virtual Instrumentation

Historical Perspective, advatages, block – diagram and architecture of a virtual instrument data – flow techniques, graphical programming in data flow comparison with conventional programming, Develpment of virtual instrument using GUI.

RECOMMENDED BOOKS

1. "Measurement, Instrumentation and Sensors Handbook" by J. G. Webster, CRC Press.
2. "Digital Measurement Techniques" by T. S. Rathore, Narosa Publishing House, New Delhi.
3. "Modern Electronic Instrumentation and Measurement Techniques" by Cooper and Helfrick, PHI.
4. "Electronic Instrumentations and Measurements" by Larry Jones and A. Foster Chin, John Wiley .

FOUNDATION OF NANO ELECTRONICS (B140905T)

UNIT 1

Region of nanostructures, scaling of devices in silicon technology, estimation of technology limits, Uncertainty principle, Experiments on duality, Schrodinger's equation and its applications to square well potential, square potential barrier (1D).

UNIT 2

Infinite array of potential wells, Barrier penetration, applications to tunnel diode, Josephson effect, Perturbation theory and its applications, Scattering. Binomial and related distributions, Phase space,

UNIT 3

Statistical ensembles, applications of classical statistical mechanics, Quantum statistics, Brownian motion, Random walk problem. Concept of Chemical potential, partition function and its applications in computing thermodynamic quantities.

UNIT 4

Quantum electronic devices, electrons in mesoscopic structures, short channel MOSFET, split-gate transistor, electron wave transistor, electron spin transistor, quantum cellular automata, Bioelectronics, molecular processor, DNA analyzer as biochip, Molecular electronics, Fullerenes, nanotubes, switches based on Fullerenes and nanotubes ,

RECOMMENDED BOOKS:

1. "Nanotechnology: Science, Innovation and Opportunity"by Lynn E. Foster, Prentice Hall.
2. "Handbook of Nanotechnology: Volume 1&2" by B.Bhushan , Springer -Verlag. Second ed.
3. "Nanoelectronics and Nanosystems" by K.Goser, P. Glosekotter and J. Dienstuhl, Springer
4. "Introduction to Nanotechnology" by Charles P Poole Jr., and Frank J. Ownes,, John Wiley Sons.
5. "Nanotechnology-A gentle introduction to the Next Big Idea" by Mark Ratner and Danial Ratner,Perason
6. "Encyclopedia of Nanoscience & Nanotechnology" by H. S. Nalwa , American Scientific Pub.

COMMUNICATION LAB (B140906P)

1. To study the amplitude modulation and demodulation.
2. Envelop detector for AM signals.
3. Generation and Demodulation of DSB-SC signal.
4. SSB generation.
5. To study andrealize VCO as a FM generator.
6. To study and realize Phase locked loop FM generator.
7. To study and realize frequency discrimination method for FM demodulation.
8. To study and realize PLL as FM detector.
9. Study of Frequency Division Multiplexing and Demultiplexing
10. Study of Frequency Modulation (FM) and Frequency Shift Keying (FSK)
11. Study of signal sampling and reconstruction techniques and to verify Nyquist criteria and tracing.
12. Study of PAM, PWM and PPM modulation and demodulation techniques.
13. Study of TDM pulse amplitude modulation and demodulation.
14. Study of Pulse code modulation and demodulation techniques.
15. Study of Delta / Adaptive Delta Modulation and Demodulation.
16. Study of Phase Shift Keying Modulation and Demodulation Technique.
17. Study of Binary Phase Shift Keying (BPSK)
18. Study of ASK and FSK modulation and demodulation
19. Study of PSK, DPSK and QPSK Modulation and Demodulation
20. Study of Time Division Multiplexing and De-multiplexing

Note: - 20% experiments other than this list of equal standard relevant to syllabus can also be set.

WIRELESS AND MOBILE COMMUNICATION (B141001T)

UNIT - 1

Introduction

History of wireless communication, Evolution of Mobile Communication, Mobile and Wireless devices. A market for mobile communications. A simplified reference model for mobile communications, Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model.

UNIT- 2

Wireless-transmission

A brief introduction of frequencies for radio transmission, signals propagation, Multiplexing, Modulation, spread spectrum, cellular system, Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, improving coverage and capacity in cellular systems, Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels, types of fading, theory of multi-path shape factor for fading wireless channels.

UNIT-3

Satellite System

Review of the System, Broadcast System-Review. **Wireless LAN**: IEEE 802-11 Protocol, System Architecture, Protocol Architecture, Physical Layer & MAC Layer, Newer developments, Hiper LAN, Bluetooth Technology, Introduction to wireless networks, 2G, 3G and 4G wireless systems, wireless standards.

UNIT-4

Mobile Network Layer

Mobile IP, Mobile host configuration Network, Mobile ad-hoc networks **Mobile transport Layer:** Traditional TCP, classical TCP improvement TCP over wireless network, performance Enhancing, proxies.**Support for Mobility:** File systems, World Wide Web, wireless application protocol, i-mode, Sync ML, WAP2-0 etc. Architecture of future Network & Applications.

RECOMMENDED BOOKS

1. "Wireless Communications: Principles and Practice" by T. S. Rappaport, Pearson Pub.
2. "Mobile Cellular Telecommunications" by William C. Y. Lee, Mc-Graw Hill Pub.
3. "Mobile and Personal Communication systems and services" by Raj Pandya, PHI Pub.
4. "MIMO Wireless Communications" by Ezio Biglieri, Cambridge University Press.
5. "Mobile Communication Engineering" by William C.Y. Lee,Mc-Graw-Hill
6. "Wireless and Digital Communications" by Dr.Kamilo Feher, Prentice-Hall.

MICROPROCESSOR AND MICROCONTROLLER (B141002T)

UNIT 1

Introduction to Microprocessor:

Evolution of Microprocessors, Register structure, ALU, Bus Organization, Timing and Control. Introduction to 8085: Architecture, pin diagram, memory interfacing, memory mapping and organization, timing diagram of different cycles

UNIT-2

Assembly Language Programming

Instruction format and addressing modes, Data transfer instructions, Arithmetical and logical instructions, Program control Instructions (jumps, conditional jumps), stacks and subroutines, interrupts.

UNIT- 3

Basic of Interfacing:

Programmed I/O, Interrupt driven I/O, Parallel I/O (8255-PPI), 8259 Programmable Interrupt Controller, 8237-DMA Controller, 8253/8254 Programmable Timer/Counter, (8279) Keyboard and display interface.

UNIT-4

Fundamentals of 8086 Microprocessor

Internal organization of 8086, Bus interface unit, Execution unit, Register organization, Sequential memory organization, Bus cycle. Signal Description of pins of 8086 and 8088, Clock generation, Address and data bus, demultiplexing, Buffering memory organization, Read and Write cycle Timings, Interrupt structures, Addressing modes and their features.

RECOMMENDED BOOKS:

1. "Microprocessor Architecture, Programming and Applications" by R. S. Gaonkar,Penram International Pub.
2. "Microprocessors and Interfacing" by Douglas V.Hall, TMH Pub.
3. "Microprocessor & Microcontroller" A.P. Godse and D.A. Godse,Technical Publication.
4. "Introduction to 8086, 80186,80286, 80386, 80486, Pentium and Pentium Pro Processors" by B. Bray, Tata Mc-Graw Hill Pub.
5. "The 8051 Microcontroller architecture, programming and application" by K. J. Ayala, Cengage Learning.
6. "The 8051 Microcontroller and Embedded Systems" by M. Ali Mazidi, J. G. Mazidi & Rolin, Pearson Prentice Hall.

OPTTOELECTRONICS AND OPTICAL COMMUNICATION (B141003T)

UNIT 1:

Introduction:

Historical developments, Optical fiber communication system, Principle of optical communication, Advantages of optical fiber communication, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Cylindrical fiber.

Structure and types of optical cable: Structure of optical fibers, Single and multimode fibers, Step index and graded index optical fiber.

UNIT 2:

Transmission Characteristics of Optical Fibers:

Mid-infrared and Far-infrared transmission, Inter-modal and Intra-modal dispersion, Overall fiber dispersion, Polarization.

Losses in optical fibers: Attenuation, Material absorption losses, Linear scattering losses, Non-linear scattering losses and Fiber bends loss and Joint loss.

Preparation methods of optical fibers: Liquid phase (melting) and Vapour phase deposition techniques.

UNIT 3:

Optical Fiber Connection & **Optical Detectors**

Joints, Fiber alignment, Splices, Connectors, Couplers.

Optical sources: Absorption and emission of radiation, Einstein's relation, Population inversion, Optical emission from semiconductors, Semiconductor LASER, LED power and efficiency characteristics. Optical transmitter and receiver. Optical detection principles, Absorption and emission, Quantum efficiency, Responsivity, Long wavelength cutoff, p-n photodiode, p-i-n photo diode, photo transistors.

Optical fiber measurements: Fiber attenuation measurements, Dispersion measurements, Refractive index profile measurements, Cut-off wavelength measurements, Numerical aperture measurements.

UNIT –4

Digital Transmission Systems

Point to point links, system considerations, link power budget, rise time budget, modulation formats for analog communication system, introduction to WDM concepts, Introduction to advanced multiplexing strategies.

RECOMMENDED BOOKS:

1. "Optical Electronics" by A. Yariv, HRW Pub.
2. "Optoelectronics: An introduction" by J.Wilson and J.F.B.Hawkes, PHI Pub.
3. "Optical Fiber Communication" by Gerd Keiser, TMH Pub.
4. "Optical Fiber Communication" by A. Selvarajan S. Kar and T Srinivas, TMH.
5. "Optical fiber communications, Principles and Practice" by John M. Senior, PHI Pub.
6. "Optical fiber systems, Technology design and applications" by Charles K Kao, Mc- Graw Hill Pub.

POWER ELECTRONICS (B141004T)

UNIT 1

Power semiconductor Devices:

Power semiconductor devices their symbols and static characteristics. Characteristics and specifications of switches, types of power electronic circuits. Operation and steady state characteristics of MOSFET and IGBT. Thyristor – Operation & V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC, Protection of devices. Series and parallel operation of thyristors, Commutation techniques of thyristor

UNIT 2

DC-DC Converters:

Principles of step-down chopper, step down chopper with R-L load, Principle of step-up chopper, and operation with RL load, classification of choppers.

UNIT 3

Phase Controlled Converters

Single phase half wave controlled, rectifier with resistive and inductive loads, effect of freewheeling diode. Single phase fully controlled and half controlled bridge converters. Performance Parameters, Three phase half wave converters, Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters.

UNIT 4

AC Voltage Controllers

types of AC voltage controllers, integral cycle control, single phase voltage controllers, with R and RL loads, single-phase transformer tap changers, single-phase sinusoidal voltage controllers, working of three-phase controllers with star & delta loads.

Cycloconverters: Principle of cycloconverter operation, single-phase to single-phase circuit, step-up and step-down cycloconverter, three-phase half wave cycloconverter, output voltage equation of a cycloconverter, load commutated cycloconverter.

RECOMMENDED BOOKS:

1. "Power Electronics" by Mohan, Undeland and Robbins, John Wiley Pub..
2. "Power Electronics Circuit Devices and Applications" by Rashid M. H., PHI Pub.
3. "Modern Power Electronics and AC Drives" by Bimal K Bose, Pearson Pub.
4. "Power Electronics" by Bimbhra P S, Khanna Publishers.
5. "Power Electronics" by Vedam Subrahmanyam, New Age International.
6. "Power Electronics: Circuits, Devices and Applications" by H. Rashid, Pearson Pub.

BIO – MEDICAL ELECTRONICS (B141005T)

UNIT – 1

Introduction:

The age of Biomedical Engineering, Development of Biomedical Instrumentation, Man-Instrumentation System, Components, Physiological system of the body, Problems encountered in measuring a living system.

Transducers & Electrodes: The transducers & transduction principles, Active transducers, Passive transducers, Transducers for Biomedical Applications.

Source of Bioelectric potentials: Resting and Action potentials, propagation of active potential. The Bioelectric potential – ECG, EEG, EMG and Envoked responses.

Electrodes: Electrode theory, Biopotential Electrodes – Microelectrodes, Body Surface Electrodes, Needle Electrodes, Biochemical Transducers, Reference Electrodes, pH Electrodes, Blood Gas Electrodes.

UNIT – 2

Cardiovascular Measurements:

Electrocardiography – ECG amplifiers, Electrodes and leads, ECG – Recorders – Three channel, Vector Cardiographs, ECG system for stress testing, Continuous ECG recording (Holter recording), Blood pressure measurement, Blood flow measurement, Heart sound measurements. **Patient Care and Monitoring:** Elements of intensive care monitoring, Patient Monitoring displays, Diagnosis, Calibration & Reparability of patient monitoring equipment, Pacemakers & Defibrillators.

UNIT – 3

Measurements of Respiratory System:

Physiology of respiratory system measurement of breathing mechanics – Spiro meter, Respiratory therapy equipments: Inhalators ventilators & Respirators, Humidifiers, Nebulizers & Aspirators.

UNIT – 4

Diagnostic Techniques:

Ultrasonic Diagnosis Eco - Cardiography, Eco– Encephalography, Opthalmic scans, X-Ray & Radio-isotope instrumentation, CAT scan, Emission Computer Tomography, MRI.

RECOMMENDED BOOKS:-

1. "Biomedical Instrumentation" by R.S. Khandpur, TMH Publications.
2. "Introduction to Biomedical Engineering Technology" by Laurence J. Street, CRC Press.
3. "Biomedical Instrumentation Systems" by Shakti Chatterjee and Aubert miller, Cengage Learning.

PROCESSES IN DEVICE FABRICATION (B141006T)

UNIT-1

Crystal Growth and Wafer Preparation –Electronic Grade silicon, Czocharski Single Crystal growth technique, Zone refining, Silicon Shaping – from ingot to finished wafer, Defects in the crystal. Epitaxial Growth, VPE, LPE and MBE techniques, Mechanism, Equipment, Methods of Evaluation, Epitaxial defects, Buried layers Oxidation.

UNIT-2

Oxidation, Deal Grove model of thermal oxidation, dry, wet, rapid thermal, and pyrogenic oxidation, chlorine enhanced oxidation, anodic and plasma oxidation, dependence on process and substrate parameters, oxide properties – masking, oxide charges, oxide stress, quality of oxide, oxidation induced stacking faults, oxidation of Polysilicon.

UNIT-3

Lithography, Types, Optical lithography – resists, contact, proximity and projection printing, mask making, Equipment, limitations, Electron Beam Lithography – Equipment, resists, pattern writing, mask generation, limitations, X-ray lithography - Equipment, X-ray sources resists, masks generation, limitations.

UNIT-4

Characterization and analytical techniques: Thickness measurement, I-V measurement, C-V measurements, Resistance measurement – two probe and four probe, spreading resistance, Dielectric property measurements, XRD, XPS, FTIR, SEM, Ellipsometer, UV-VIS spectrometer, Raman spectroscopy.

RECOMMENDED BOOKS

1. "VLSI Fabrication Principles" by S.K. Gandhi, John Willey & Sons Pub.
2. "VLSI Technology" by S.M.Sze, McGrawHill Pub.
3. "Semiconductor & Integrated Fabrication Techniques" by P.E. Gise and R. Blanchard, Restonn Pub.
4. "Large Scale Integration" by M.J. Hower and D.V.Morgan, JohnWiley Pub.

MICROPROCESSOR LAB (B141007P)

1. Write programme for Addition/Subtraction of 8 and 16t numbers using 8085.
2. Write programme for Multiplication/Division of 8 and 16 numbers using 8085.
3. Write programme to compute the factorial of an integer using 8085.
4. Write programme for Addition and Subtraction of two packed BCD's numbers using 8085.
5. Write programme to find the largest signed number in a given series of data using 8085.
6. Write programme to find sum of a given series of numbers using 8085.
7. Write programme to find the largest and smallest number from a given unordered array of 8- bit numbers using 8085.
8. Write programme to perform BCD addition using 8085.
9. Write programme for BCD to Binary and Binary to BCD conversion using 8085.
10. Write programme to convert BCD into its equivalent binary number using 8085.
11. Write programme convert Binary number into its equivalent unpacked BCD number using 8085.
12. Write programme to arrange the data array in ascending and descending order using 8085.
13. Write a programme to control the operation of a steeper motor using 8085 and 8251 PPI.
14. Program 8253 in mode 3 to generate square wave.
15. Program 8255 in mode 0 i.e. simple I/O mode. Program Port A in I/P mode, Port B in input mode. Read data from Port A & B, add it & display the result in Port C.
16. Interface 8251 with 8085 M.P.U. and program it in asynchronous transmitter mode, use 8251 Group A.
17. Interface 8251 with 8085 M.P.U. and program it in asynchronous receiver mode, use 8251 Group A.
18. Study of master 8259 in stand-alone mode. Generate and interrupt request-using 8259 and display the respective interrupt in address field.
19. Write programme to add first ten natural numbers using 8051.
20. Write programme for Multiplication of two numbers using 8051.
21. Write programme to toggle the bits of an I/O port using 8051.
22. Write programme to convert Hexadecimal to Decimal number using 8051.
23. Write an 8051 ALP to generate 10 KHz square wave on any pin of port 0.
24. Write programme to obtained 1 sec delay using 8051.
25. Write an 8051 ALP to generate 10 KHz square wave on any pin of port 0 using interrupts.

Note: - 20% experiments other than this list of equal standard relevant to syllabus can also be set.