RATHNAVEL SUBRAMANIAM COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
SULUR, COIMBATORE-641402

DEPARTMENT OF ELECTRONICS & COMMUNICATION SYSTEMS
B.Sc ELECTRONICS & COMMUNICATION SYSTEMS

Syllabus effective for the students admitted during the academic Year 2016-2019 Batch

(2016-2019)

HOD **PRINCIPAL** **COE**

SCHEME OF EXAMINATIONS
B.Sc., ELECTRONICS & COMMUNICATION SYSTEMS
2016-19 BATCH AND ONWARDS- BASED ON CHOICE BASED CREDITSYSTEM

Semester	Part	Type	Title of the paper	Hours of instructions \ week		Credits	Duration of examination in hours	Marks		
				Lecture Hours	Tutorial Hours			CIA	EOS	TOTAL
I	I	L- I	Tamil / Arabic/ French /Hindi / Malayalam - I	6		4	3	25	75	100
	II	E – I	English –I Grammar and Usage	5	1	4	3	25	75	100
	III	M – I	Principles of Electronics	5	1	4	3	25	75	100
	III	A – I	Mathematics- I	6		4	3	25	75	100
	III	MP - I	Semiconductor Devices Lab	3	-	-	-	-	-	-
	III	MP-II	Electronics Circuits lab	3	-	-	-	-	-	-
	IV	FC-A	Foundation Course – A (value education) Environmental Studies [self study]	-	-	2	3	50	-	50
	V	EC	NCC/NSS/SPORTS/GAMES	-		-	-	-	-	-
			TOTAL	**30**		**18**	**12**	**150**	**300**	**450**
II	I	L – II	Tamil / Arabic/ French /Hindi / Malayalam -II	6		4	3	25	75	100
	II	E – II	English –II Communicative English	5	1	4	3	25	75	100
	III	M – II	Electronics Circuits	5	1	4	3	25	75	100
	III	A – II	Mathematics – II	6		4	3	25	75	100
	III	MP - I	Semiconductor Devices Lab	3	-	4	3	40	60	100
	III	MP-II	Electronics Circuits lab	3	-	4	3	40	60	100
	IV	FC-B	Foundation Course – B General awareness [self study]	-		2	3	50	-	50
	V	EC	NCC/NSS/SPORTS/GAMES	-		-	-	-	-	-
			TOTAL	**30**		**26**	**24**	**255**	**495**	**650**

Semester	Part	Type	Title of the paper	Hours of instruction /week		Credits	Duration of examination in hours	MARKS		
				Lecture Hours	Tutorial Hours			CIA	EOS	TOTAL
III	III	M-III	Principles of Communication Systems	4	1	4	3	25	75	100
	III	M-IV	Digital Principles and Application	4	1	4	3	25	75	100
	III	M-V	IC 's and their Applications	4	1	4	3	25	75	100
	III	M-VI	Electronic Instrumentation	4	-	4	3	25	75	100
	III	AL-III	C Programming	5		4	3	25	75	100
	III	MP-III	IC'S and Digital Electronics Lab	3	-	-	-	-	-	-
	III	MP-IV	Electronics & Communication Lab	3	-	-	-	-	-	-
	V	EC	NCC/NSS/SPORTS/GAMES	-		-	-	-	-	-
	TOTAL			**30**		**20**	**18**	**165**	**435**	**500**
IV	III	M-VII	Microwave Communication Systems	5	1	4	3	25	75	100
	III	M-VIII	8085 Microprocessor and its Applications	5	1	4	3	25	75	100
	III	MP-III	IC'S and Digital Electronics Lab	3		4	3	40	60	100
	III	MP-IV	Electronics & Communication Lab	3		4	3	40	60	100
	III	AL-IV	C- Programming Lab	4	-	4	3	25	75	100
	III	EL-I	Elective-I	5		4	3	25	75	100
	IV	SBC-I	Aptitude skills	3		3	3	100	-	100
	V	EC	NCC/NSS/SPORTS/GAMES	-		1	-	100	-	100
	TOTAL			**30**		**28**	**18**	**355**	**345**	**800**
V	III	M-IX	Optical fiber communication systems	4	1	4	3	25	75	100
	III	M-X	Satellite communication systems	4	-	4	3	25	75	100
	III	M-XI	8051 Microcontroller and its Applications	4	1	4	3	25	75	100
	III	M-XII	Medical Electronics	4	-	4	3	25	75	100
	III	MP-V	Micro controller Lab	3		-	-	-	-	-
	III	MP-VI	Industrial & Medical Electronics Lab	3		-	-	-	-	-
	III	EL-II	EDC-Fundamentals of Digital Computer	3	-	3	3	25	75	100
	III	SBC-II	PCB Design & PC Hardware Trouble Shotting Lab	3		3	3	40	60	100
	TOTAL			**30**		**22**	**15**	**125**	**375**	**600**

Semester	Part	Type	Title of the paper	Hours of instruction /week		Credits	Duration of examination in hours	MARKS		
				Lecture Hours	Tutorial Hours			CIA	EOS	TOTAL
VI	III	M-XIII	Digital and Cellular Communication	5	1	4	3	25	75	100
		M-XIV	PIC Microcontroller	5	1	4	3	25	75	100
	III	M-XV	Industrial and Power Electronics	5	1	4	3	25	75	100
	III	MP-V	Micro controller Lab	3	-	4	3	40	60	100
	III	MP-VI	Industrial and Medical Electronics Lab	3	-	4	3	40	60	100
	III	EL-III	Elective-III	6		6	3	40	60	100
			TOTAL	**30**		**26**	**18**	**195**	**405**	**600**
			TOTAL			**140**				**3600**
III-VI	CS		**Extra Credits** (i)CAREER SKILLS –(Mandatory)	-	-	3	-	-	-	-
V	ALCTA		(ii) OPEN CHOICE INTER DEPARTMENT PAPERS- Extra credits	-	-	4	-	-	-	Grade
I-IV	DM		FIRE FIGHTING TECHNIQUES- Extra credits	-	-	1	-	-	-	-
	FA		FIRST AID TRAINING- Extra credits	-	-	1	-	-	-	-

L – LANGUAGE **E – ENGLISH** **M – MAJOR PAPER**
MP – MAJOR PRACTICAL PAPER **AL – ALLIED PAPER** **EL – ELE CTIVE PAPER**
SBC – SKILL BAESD COURSE **EDC – EXTRA DISPLIANARY COURSE**
EC-EXTRA CURRICULAR ACTIVITIES **CS- CARRIER SKILLS**
DM – DISASTERS MANAGEMENT **FA-FIRST AID**
ALCTA- ADVANCED LEARNERS COURSE IN THRUST AREA

ELECTIVE-I: 1.Analog and VLSI 2.Automotive Electronics

ELECTIVE-II: EDC Fundamentals of Digital Computer

ELECTIVE-III: Project Viva-Voce (or) Implant training

*** PROJECT WORK:**

REPORT-VIVA VOCE MARKS 80:20 RESPECTIVELY WILL BE JOINTLY ASSESSED BASED ON 40:60 RATIO APPLICATION

*** GUDLINES FOR IMPLANT TRANNING:**

THE STUDENTS SHOULD UNDER GO TRANNING FOR 15 DAYS DURING V SEMESTER HOLIDAYS AND SUBMITT THEIR CERTIFICATE WITH REPORT ON VI SEMESTER AND REPORT MARKS 80:20 RESPECTIVELY WILL BE JOINTLY ASSESSED BASED ON 40:60 RATIO APPLICATION

SEM - I PART– III **PRINCIPLES OF ELECTRONICS** **M- I**

OBJECTIVES: To develop basic knowledge in Electrical and Electronic Components & impart knowledge on solving circuits.

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: PASSIVE CIRCUIT COMPONENTS **13 HOURS**

RESISTORS: Fixed resistor – Variable resistor – Color coding – Tolerance - Series and parallel connection.

CAPACITORS: Basic structure and symbol – Fixed capacitor – Variable capacitors – Dissipation factor – Series and parallel connection

INDUCTORS: Inductance of the coil – Fixed inductors – Variable inductors – Inductive reactance – Energy stored in an inductor – Q factor – Mutual inductance – Series and parallel connection

UNIT II: AC AND DC CIRCUITS FUNDAMENTALS **15 HOURS**

Ohm's law – Kirchoff's law - Alternating current – peak value – average value – rms value – frequency – time period – wave length – phase angle– Three phase AC Power-Star delta conversion - AC circuits with resistance – AC circuits with XL – AC circuits with XC – Series reactance and resistance – Parallel reactance and resistance – Series parallel reactance and resistance - Real power – Apparent power – Series resonance circuit – Parallel resonance circuit.– Analysis of series circuit, parallel circuits and series parallel circuits – Voltage divider – Current divider – Simple problems in DC circuits.

UNIT III: NETWORK THEOREM **10 HOURS**

Superposition theorem – Thevenin's theorem – Thevenzing a circuit with two Voltage Source – Thevenzing a bridge circuits – Norton theorem – Thevenin's Norton conversion – Conversion of voltage and current source – Millman's theorem – Maximum power transfer theorem – Simple problems in DC circuits

UNIT IV: SEMICONDUCTOR DEVICES **12 HOURS**

Conductor – Semiconductor – Intrinsic semiconductor – Extrinsic semiconductor – P type and N type semiconductor– PN junction diode –V-I characteristics - Zener diode - V-I characteristics- LDR and its characteristics–Construction of NPN and PNP transistors – Operation of NPN, PNP transistors – Characteristics of CE, CB and CC Transistor configurations

Hybrid parameters: Determination of h parameters-h parameter equivalent circuit-performance of a linear circuit in h parameters-The h parameters of a transistor – Nomenclature for transistor h parameters.

UNIT V: FET & OPTOELECTRONIC DEVICES **10 HOURS**

JFETS: Drain and transfer characteristics-current equation-pinch off voltage and its significance-MOSFET-Characteristics-threshold voltage-channel length modulation, FINFET, DUAL GATE MOSFET.

Display Devices: LED, LCD, phototransistors opto coupler, solar cell, CCD.

TEXT&REFERENCE BOOKS **TOTAL HOURS= 60 HOURS**

1.R.S.Sedha "A Text Book Of Applied Electronics" S.Chand and Company Ltd., 2005

2. Bernard Grob "Basic Electronics" Tata McGraw – Hill, 9th edition 2003.

3 .V.K.MEHTA "Principles of Electronics"

SEM - I PART– III **MATHEMATICS-I** **A - I**

OBJECTIVES: To develop basic knowledge in Applied Mathematics useful for Electrical and Electronic Circuit Analysis

PEDAGOGY :All the units will be covered with blackboard teaching, LCD, OHP methods.

UNIT I: MATRICES 12HOURS

Definition – Addition of matrices – Multiplication of matrices –Matrix Inversion - Rank of a matrix - Solving a System of linear equations (Matrix of order up to 3 x 3) using matrix inversion – characteristic equation of a matrix – Eigen Values and Eigen Vectors – cayley's Hamiltanian theorem – Orthogonal Matrix – Unitary Matrix.

UNIT II: DIFFERENTIAL CALCULUS 12 HOURS

Differentiation of algebraic exponential logarithmic and trigonometric functions – Physical interpretation of derivatives with reference to velocity and acceleration. Application of differentiation to maxima and minima (simple problems) - Partial differentiation (Simple Problems).

UNIT III: INTEGRAL CALCULUS 12HOURS

Integration of simple algebraic, exponential and trigonometric functions – substitution method – Integration by parts

UNIT IV: LAPLACE TRANSFORMS 12HOURS

Definition of Laplace transform – Properties & Laplace Transform – Inverse Laplace Transform – Convolution Theorem.

UNIT V: COMPLEX NUMBERS & VECTOR CALCULUS 12 HOURS

Expansion of Sinn0, Cosn0, Tann0, and expansion of $\sin^n 0$ and $\cos^n 0$ - Concepts of vector and scalar fields – the Del operator – Divergence of a vector – curl of a vector – laplacian operator (Simple Problems)

TOTAL HOURS= 60 HOURS

TEXT & REFERENCE BOOKS:

1. M.K. Venkataraman – Engineering mathematics part B, vol II, part A The National publication.
2. P. Kandasamy – Engineering Mathematics, Volume I, II, III, 2004 S.Chand Company, New Delhi.
3. A.Singravelu – Mathematics – III, Meenachi Agencies, Chennai
4. T.K. Manickavasam Pillai. "Algebra and Calculus".

SEM – II PART–III **ELECTRONICS CIRCUITS** **M–II**

OBJECTIVES: : To develop basic knowledge in Electronic circuit analysis and design.

To learn about biasing of BJTS and MOSFETS.

To design and construct amplifiers.

To understand the analysis and design of LC and RC oscillators, amplifiers, multivibrators, and wave shaping circuits.

PEDAGOGY: All the units will be covered with blackboard teaching, LCD & OHP methods.

UNIT I: SMALL SIGNAL AMPLIFIERS 10 HOURS

Methods of transistor biasing: Base bias – Voltage divider bias – Emitter bias – CE amplifiers – RC coupled amplifiers – Gain – Frequency response – Multistage amplifiers – Transformer coupled amplifiers.

UNIT II: POWER AMPLIFIERS JFET MOSFET 9 HOURS

Classification of amplifiers – Class A operation – Class B operation – Push pull configuration – Class AB operation– Class C operation – Power relation – Load power – Power dissipation – Current drain – stage efficiency – Complementary pair operation – Distortions. small signal analysis of JFET amplifier and MOSFET amplifier.

UNIT III: FEEDBACK AMPLIFIERS 9 HOURS

Basic concept – Effect of negative feedback on gain – Gain stability – Band width – Distortion and noise – Types of Feedback connection: Voltage series – voltage shunt – current series – current shunt.

UNIT IV: OSCILLATORS 10 HOURS

Classification – Barkhausen criterion – Hartley oscillator – Colpitts oscillator – clap oscillator – Phase shift oscillator – Wein bridge oscillator. Multivibrators:operation of Astable ,Monostable and Bistable.

UNIT V: WAVESHAPING 10 HOURS

Clipping, Clamping circuits – Half wave, full wave and bridge rectifiers – Average value – RMS value – Ripple factor – Rectification efficiency.

Filters: Capacitors, Inductors, LC and PI filter – low pass filter – High pass filter – Band pass filter – Regulated power supplies using Zener diode – Fixed voltage regulators using IC's.

TOTAL HOURS= 48 HOURS

TEXT & REFERENCE BOOKS:

1. Grob, "Basic Electronics", Tata McGraw Hill, 8th edition.
2. V.K.Mehta, "Principles of Electronics", S.Chand&Co, New Delhi, 2nd edition
3. R.S.Sedha "A Text Book of Applied Electronics" S.Chand & Company Ltd, Secondly revised edition

SEM – II PART–III **MATHEMATICS II** **A - II**

OBJECTIVES: To develop basic knowledge in Applied Mathematics useful for Electrical and Electronic circuit analysis.

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods.

UNIT I: NUMERICAL METHODS **12 HOURS**

Solving simultaneous linear equation using Gauss elimination process - Gauss – Jordan Method – Gauss Jacobi Method – Gauss Seidal Method – Numerical Integration – Trapezoidal rule – Simpson's rule – Romberg's Integration.

UNIT II: FOURIER SERIES **12 HOURS**

Dirichlet's conditions – General Fourier series – Change of length of interval – Fourier cosine and Sine series – Half – range series.

UNIT III*:* DIFFERENTIAL EQUATIONS **12 HOURS**

Second order linear differential equations with constant Co-Efficient– Laplace equation – Application of electrical Circuits RL, RC, and RLC.

UNIT IV: PROBABILITY DISTRIBUTION, CORRELATION, REGRESSIONS **12 HOURS**

Probability distribution - binomial distribution - Poisson distribution (no derivation) and simple problems. Karl Pearson's coefficient of correlation, Bow ley's Rank Correlation, Regression equations, Principles of least squares - curve fitting (straight line fitting).

UNIT V:SPECIAL FUNCTIONS **12 HOURS**

Definition of gamma function – recurrence relation of gamma function – relation between gamma and pi function – definition of beta function – relation between beta and gamma function – value of gamma(1/2) - simple problems for beta and gamma functions.

TOTAL HOURS= 60 HOURS

TEXT & REFERENCE BOOKS

1. M.K. Venkatraman, "Numerical methods in Science and Engineering, National Publication, Chennai
2. Engineering Mathematics – Volume – II, M.K. Venkatraman, National Publication, Chennai
3. Higher Mathematics for Engineering and Science, M.K. Venkatraman, National Publication, Chennai
4. Engineering Mathematics – P.K. Kandasamy, S. Chand, Publications, New Delhi
5. Engineering Mathematics – A. Singaravelu, Meenakshi Agencies, Chennai

SEM –I & II PART– III **SEMICONDUCTOR DEVICES LAB** **MP- I**

LIST OF EXPERIMENTS (Any 18)

OBJECTIVES : To impart practical knowledge in Basic Semiconductor devices theorems and their applications.

1. Use of CRO (for Amplitude, Frequency & Phase measurement)
2. Resistances in Series, Parallel & Series parallel.
3. Capacitors in Series & Parallel.
4. Verification of Ohm's law
5. Verification of Kirchoff's law
6. Characteristics of LDR
7. Characteristics of Solar cell
8. Verification of Thevinin's theorem
9. Verification of Norton's theorem
10. Verification of Millman's theorem
11. Verification of Superposition theorem
12. Verification of Maximum Power transfer theorem.
13. Verification of Series resonance circuit
14. Verification of Parallel resonance circuit
15. Band gap Energy of Silicon Diode
16. V-I Characteristics of PN Junction diode
17. V- I Characteristics of Zener diode
18. Transistor Characteristics of CB Configuration
19. Transistor Characteristics of CE Configuration
20. V-I Characteristics of JFET
21. Study of LED and Seven Segment Display
22. Study of IR (TX & Rx)
23. On/OFF Control of relay using Opto-couplers.
24. UJT as Relaxation Oscillator

TOTAL HOURS= 90 HOURS

OUTCOMES: At the end of the year, the student should be able to Learn the characteristics of basic electronic devices, Design and verify Network Theorems.

SEM –I & II PART–III **ELECTRONICS CIRCUITS LAB** **MP–II**

LIST OF EXPERIMENTS (Any 18)

OBJECTIVES: To gain hands on experience in designing rectifiers, Amplifiers and oscillators.

TOTAL HOURS= 72 HOURS

1. Half wave rectifier
2. Full wave rectifier
3. Bridge rectifiers
4. Pi Filters
5. L Section
6. Construction of DC regulated power supply using IC 723
7. Emitter Follower
8. Single stage RC coupled Amplifier
9. Feedback Amplifier
10. Transformer coupled power amplifier
11. Class B push pull amplifier
12. Hartley oscillator
13. Colpitts oscillator
14. Wein bridge oscillator
15. Phase shift oscillator
16. Class A amplifier
17. Astable multivibrator using Transistor
18. Schmitt trigger using transistor
19. Monostable multivibrator
20. High pass filters
21. Low pass filters
22. Band pass filters
23. Clipping
24. Clamping

TOTAL HOURS= 72 HOURS

OUTCOMES: At the end of the semester, the student should be able to analyze and design rectifiers, Amplifiers and oscillators circuits.

SEM - III PART– III **PRINCIPLES OF COMMUNICATION SYSTEMS** **M- III**

OBJECTIVE: To impart the concepts and techniques used in modulation & detection, propagation of waves.

UNIT-I BASICS OF COMMUNICATION SYSTEMS 12 HOURS

Introduction to communication systems – components of communication systems: information – transmitter- channel – noise- receiver- modulation- need for modulation-types of modulation- introduction to electromagnetic waves –electromagnetic spectrum- generation of EM waves –properties of EM waves –energy contained in EM waves

UNIT-II WAVE PROPAGATION & ANTENNAS 11 HOURS

Wave propagation: surface wave propagation – sky wave propagation: layers of ionosphere – virtual height –critical frequency-critical angle-MUF, LUF and OWF– skip distance - fading. - space wave propagation- antenna: definition and function of an antenna-current and voltage distributions in antenna-radiation pattern -radiation resistance- antenna gain-bandwidth and beam width-polarization – Folded dipole – yagi-uda antenna-parabolic reflector antenna.

UNIT-III GENERATION & CHARACTERISTICS OF AMPLITUDE MODULATION & DETECTION 13 HOURS

Amplitude modulation: introduction –definition- frequency spectrum of AM wave-representation of AM -power and current relations in AM- modulation factor –generation of AM: suppression of carrier: balanced modulator- methods of suppressing unwanted sideband - block Diagram and explanation of basic AM transmitter. Receivers: block diagram & working ofsuper heterodyne receiver- block diagram& working of SSB receiver

UNIT-IV GENERATION & CHARACTERISTICS OF ANGLE MODULATION 12 HOURS

Angle modulation: Introduction –definition of frequency modulation and phase modulation-mathematical representation of FM- frequency spectrum of FM wave-frequency modulation vs amplitude modulation-pre emphasis and de emphasis- generation of FM: reactance modulator- varactor modulator – AFC - Armstrong method - block diagram and explanation of basic FM transmitter.

UNIT-V PULSE COMMUNICATION 12 HOURS

Pulse communication: Introduction to pulse modulation – PAM- PTM- sampling theorem –generation and detection of PWM – generation and detection of PPM – PCM principles- quantizing noise- companding - advantages and applications of PCM.

TEXT BOOKS TOTAL HOURS= 60 HOURS

1. George Kennedy, **" Electronic Communication Systems",** Tata McGraw Hill Publishers, 4th Edition
2. K.D.Prasath**," Antenna & Wave Propagation"**, Sathya Prakashan Publishers, 3rd Edition

REFERENCE BOOKS

1. Dennis Roddy, John Coolen, **"Electronic Communication",** Prentice Hall of India Publishers, Fourth Edition
2. Anok Singh,A.K.Chhabra, **" Principles Of Electronic Communication**

E**ngineering"**, S.Chand & Publishers, First Edition.

SEM - III PART– III **DIGITAL PRINCIPLES AND APPLICATION** **M- IV**

OBJECTIVES: To impart basic knowledge in Digital Electronics and its applications.

PEDAGOGY : All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: NUMBER SYSTEMS AND BOOLEAN ALGEBRA **14 HOURS**

Decimal, Binary, Octal and Hexa Decimal numbers – Conversion – Floating point representation – Binary addition, Subtraction and Multiplication – 1's and 2's compliments. Binary Coded Decimal (BCD) – Weighted codes and Non-weighted codes – Excess three – Grey code – Error detection codes – Hamming codes – ASCII codes – EBCDIC codes – Hollerith code – Parity advantages.

UNIT II: BOOLEAN ALGEBRA AND LOGIC GATES **10 HOURS**

Boolean logic operations – Boolean functions – Truth Tables – Basic laws – DeMorgans theorem – Sum of Products and Products of Sums – Karnaugh map – Logic gates – OR, AND, NOT, NAND, NOR, EX-OR AND EX- NOR GATES – Code conversion .

UNIT III: COMBINATIONAL LOGIC CIRCUITS **12 HOURS**

Half adder – Full adder – Half subtractor – Full subtractor – Parallel binary adder – 4 bit binary adder / subtractor – BCD adder – Multiplexer – Demultiplexer – Decoders – Encoders – Parity generators / checkers – Magnitude comparators.

UNIT-IV : SEQUENTIAL LOGIC CIRCUITS **12HOURS**

Flip Flops – RS, Clocked RS, JK, JK Master Slave, D and T Flip Flops – Shift Registers and its types – Ring counters – Ripple counters – Synchronous counter – Up down counter – Mod-3, Mod-5 counters – Decade counter – Applications.

UNIT-V : D/A AND A/D CONVERTERS **12HOURS**

Digital to Analog converters: Resistive divider type and Ladder type – Accuracy and Resolution – Analog to Digital converters: Counter – Ramp type – simultaneous conversion – Dual slope type – Successive approximation type – Accuracy and resolution.

TOTAL HOURS= 60 HOURS

TEXT BOOKS:

1. Malvino & Leach – "DIGITAL PRINCIPLES AND APPLICATIONS" TMH publications
2. ASHOK KAMTHEN –"C-PROGRAMMING " TMH publications

REFERENCE BOOKS:

1. Millman & Halkias – "INTEGRATED ELECTRONICS" TATA McGraw Hill ,1972.

SEM - III PART– III **ICS AND THEIR APPLICATIONS** **M- V**

OBJECTIVES: To develop adequate knowledge in various IC details and their applications.

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: IC FABRICATION TECHNOLOGY **12 HOURS**

Fundamentals of monolithic technology – Basic planer process- Wafer preparation- Epitaxial growth – Oxidation – Photolithography – Diffusion of impurities – isolation techniques – Metallization –Monolithic transistors – Monolithic diode – Integrated resistors – Thin and thick film technology – Limitations of IC technology.

UNIT II: LOGIC FAMILIES **11 HOURS**

Digital IC Characteristics – Digital IC families – DTL-DCTL-RTL – HTL – TTL – Characteristics of TTL gate – Current sourcing and current sinking – fan in and fan out of standard TTL gate – IIL – CMOS circuits – Comparison.

UNIT III: VOLTAGE REGULATORS **11 HOURS**

Introduction – Parameters for voltage Regulators :Line regulation- Load Regulation – functional blocks of IC LM 723 – Low voltage Regulator – High Voltage regulator – Fold block Current limiting – Current Boosting – Fixed Voltage regulators – 78XX and 79XX series.

UNIT IV: TIMER AND PLL **10 HOURS**

Functional block diagram of IC 555 timer – Monostable operation – Applications: Missing pulse detector – Linear Ramp generator – Frequency divider – Pulse width modulator- Astable operation – Schmitt trigger-pulse position Modulator. Phase Locked Loop: Functional block diagram- Applications – Frequency multiplier – Frequency translator – AM Detection – FM detection.

UNIT V: OPERATIONAL AMPLIFIER **12 HOURS**

Op-amp characteristics – Inverting and non-inverting amplifier – Applications – Summing amplifier – Integrator – Differentiator - Instrumentation amplifier – Voltage to current converter – Current to voltage converter – Comparator – Regenerative comparator-Wein bridge oscillator- Triangular wave generator.

TOTAL HOURS= 60 HOURS

TEXT & REFERENCE BOOKS:

1. Jacob Millman, Christos C.Halkias ," INTEGRATED ELECTRONICS" TMH New Delhi 1991 (UNIT I)
2. B.S.Sonde, ' INTRODUCTION TO SYSTEM DESIGN USING INTEGRATED CIRCUITS", Willsey eastern Ltd., 1995 (UNIT II)
3. D.Roy Choudry , Sahil Jain " LINEAR INTEGRATED CIRCUITS' New Age International (p) Ltd., Publishers 2001. (UNIT III, IV & V)
4. Ramakant A Gayakwad ."OPAMPS AND LINEAR INTEGRATED CIRCUITS " IIIrd Ed PHI 1999 U-3
5. K.R.Botkar , " INTEGRATED CIRCUITS ", Khanna publishers.1986.

SEM - III PART– III **ELECTRONIC INSTRUMENTATION** **M- VI**

OBJECTIVES : To Develop Basic Knowledge in Hardware And Troubleshooting.

PEDAGOGY: All the units will be covered with blackboard teaching , LCD,OHP methods

UNIT I : DC& AC INDICATION INSTRUMENTS

PMMC Galvanometer (D'Arsonal Movement) - Conversion of Galvanometer into Ammeter- DC Voltmeters- Ohmmeter – Multimeter – Electrodynamometer- Rectifier Type Instruments- Thermocouple Instruments Electrostatic Voltmeters- Watt-hour Meter**.**

UNIT II: DC &AC BRIDGES

Wheatstone Bridge- Determination of Resistance - Kelvin Double Bridge - Determination of Resistance - Maxwell's Bridge - Determination of Self-Induction- Schering Bridge - Determination of Capacitance - Wein Bridge **.**

UNIT III : OSCILLOSCOPE

Oscilloscope - Block Diagram - CRT - Deflection sensitivity, Electrostatic Deflection, Electrostatic Focusing –

Measurement of waveform - Phase, Frequency & Time interval- Sampling Oscilloscope - Storage Oscilloscope

UNIT IV : INSTRUMENTATION AMPLIFIERS & SIGNAL ANALYZER

Instrumentation amplifier - Electronic Voltmeter - Electronic Multimeter-Digital Voltmeter- Ohm Meter - Function

Generation - Wave Analyzer - Fundamentals of Spectrum Analyzer**.**

UNIT V : TRANSDUCERS AND DISPLAY DEVICES
Strain Gauge – LVDT - Resistance Thermometer - Photoelectric Transducer- LED Screen - LCD Screen - Seven Segment Display

TEXT BOOKS:

1. Electronic Instrumentation and Measurement Techniques Third Edition Prentice Hall of India. By W.D.Cooper & A.D.Halftrack (All the five units)
2. A course in Electrical and Electronic Measurement and Instrumentation Third Edition Dhanpat Rai & Sons A.K.Sawhney
3.Electronic Instrumenrts and Measurement |Edition : 1 | McGraw Hill International | 1.P.B.Zbar

SEM – III PART–III **C PROGRAMMING** **AL–III**

OBJECTIVES: To get an idea about special features of C(Pointers & Functions)

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I 12 HOURS

Overview of C : Brief History – C is a middle level, structured and programmers language- Compilers verses Interpreters- the form of a C program – Compiling C program

Expression: The basic data types- identifiers and variables- the C scopes – type qualifiers- storage class specifiers – variable initialization – constants – operators and expressions.

UNIT II 12 HOURS

Selection statements: If , Nested If , If-else-If ladder, switch and nested switch statements, the ?:alternative.

Iterations statements: While, do while loop & The for loop – variations – infinite loop – for loops with no bodies – declaring variables within for loop-

Jump statements :Goto, break, continue statements – the exit() function. Expression and block statements, the return.

UNIT III 12 HOURS

Arrays & Strings: Single Dimension arrays, Two dimensional & Multi dimensional arrays, variable length arrays - array initialization, Arrays of strings.

Pointers: what are pointers, pointer variables, pointer operator, pointer expression, pointers & arrays, multiple indirection, initializing pointers, and pointers to functions, dynamic allocation function and arrays.

UNIT IV 12 HOURS

Structures & Unions : Accessing structure members, structure assignments, arrays of structure, arrays within structures, structures within structures, passing structure to function, structure pointers, unions, bit fields, enumeration.

Functions: General form of function, function prototype, function arguments & the return statement, recursion, understanding the scope of function, the inline keyword.

UNIT V 12 HOURS

Console input& output : reading and writing character- reading and writing strings – formatted console input and output- printf() and scanf().

File input/output: Streams and files- file system basics – fread() and fwrite() – fseek() and random access i/o - fprintf() and fscanf() – standard streams.

Pre-processors: The pre-processor, Macro Expansion, Macros with Arguments & File Inclusion (#define, #error and #include) Directives – conditional compilation & Miscellaneous(#line and # pragma directives – the # and ## pre-processor operators) **TOTAL HOURS= 60 HOURS**

TEXT BOOK:

C: The Complete Reference, 4th Edition, Herbert Schildt, Tata Mcgraw Hill Publishing Company Ltd.,New Delhi. (Unit – I-V)

REFERENCE BOOKS :

1) Schaum's outline of theory and problems of programming with C, Second Edition, Byron S.Gottfried,Ph.D., Tata Mcgraw Hill Publishing company Ltd., New Delhi.

2) Let us C , Sixth Edition by Yashavant P. Kanetkar, BPB publications, B-14, connaught place, NewDelhi.

3) Programming in ANSI C – E.Balagurusamy, Third Edition, Tata McGraw Hill Publishing Company Limited 1998

SEM – IV PART III **MICROWAVE COMMUNICATION SYSTEMS** **M VII**

OBJECTIVES: To develop adequate knowledge in various technologies involved in microwave communications and their applications.
PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I INTRODUCTION TO MICROWAVE **12 HOURS**

Introduction – Maxwell's equation – Ampere's law – Faraday's law- Gauss Law – Wave equation – Types of Wave guides – TE and TM modes- Propagation of TM waves in rectangular wave guides – TM modes rectangular wave guide.

UNIT II MICROWAVE AMPLIFIERS AND OSCILLATORS **10 HOURS**

Microwave tubes: Two cavity klystrons - Multicavity klystrons-Reflex klystrons-Traveling wave tube (TWT)-Backward wave oscillator (BWO)-Magnetron- applications

UNIT-III MICROWAVE DEVICES **12 HOURS**

Microwave transistors – Gallium Arsenide (Ga As) metal semiconductor FET- Varactor Diode – PIN Diode – Schottky diode – Tunnel Diode – Gunn diode – IMPATT diode – TRAPATT diode – BARITT diode – Maser principle – Applications.

UNIT IV PRINCIPLES OF RADAR **13 HOURS**

Introduction – Block diagram of RADAR – Application of RADAR- Range equation- Minimum detectable signal – receiver Noise- S/N ratio-Transmitter power – Maximum ambigious range- System losses. Receiver :Duplexer – Local oscillator –Mixer-Line pulse modulator – Displays- PPI.

UNIT V FM RADAR AND MTI **13 HOURS**

Doppler effect- CW radar – FM CW radar- Mutliple frequency CW radar – Moving Target Indicator(MTI)-Non coherent MTI- Pulsed Doppler Radar FM altimeter- Tracking –Sequential lobbing-Conical scan-Mono pulse tracking radar.

TOTAL HOURS= 60 HOURS

TEXT BOOKS:

1. N.Kulkarni, "MICROWAVE AND RADAR ENGINEERING", Umesh Publications,2nd

SEM –IV PART III 8085 MICROPROCESSOR AND ITS APPLICATIONS M - VIII

OBJECTIVES:

To develop adequate knowledge in the designing of microprocessor and microcomputer And also develop their applications.

PEDAGOGY :

- **All the units will be covered with blackboard teaching, LCD, OHP methods.**

UNIT I MICROPROCESSOR ARCHITECTURE 10HOURS

Introduction- INTEL 8085- ALU – Timing & Control unit – Registers- Data and address bus – Pin configuration – Intel 8085 Instruction Opcode and Operands – Instruction word size – Instruction cycle – Fetch operation – Execute operation – Machine cycle and state – Instruction and Data flow – Timing diagram - Timing diagram for opcode fetch – Memory read – I/O read - Memory write – I/O write.

UNIT II INSTRUCTION SET OF INTEL 8085 10 HOURS

Introduction – Instruction and data formats – Addressing modes – Status flags – Intel 8085 Instructions- Data transfer group – Arithmetic group – Logical group – Branch group – Stack , I/O and machine control group.

UNIT III PERIPHERAL DEVICES & THEIR INTERFACING 09 HOURS

Address space partitioning – memory and I/O Interfacing - Data transfer schemes – Interrupts of Intel 8085 – I/O ports – Programmable peripheral Interface – Programmable counter / Interval Timer.

Elements and Circuits for Interface:

Zero cross detector – Phase shifter – Current to Voltage converter – Summing amplifier – Differential amplifier – over voltage protection.

UNIT IV MICROPROCESSOR APPLICATIONS 10 HOURS

Deley subroutine – 7 segment LED display – Analog to Digital conversion – sample and hold circuit – Interfacing A/D converter – ADC 0800- ADC 0808 / 809- Bipolar and Unipolar conversion – Digital to Analog converter (DAC) – DAC 800

UNIT V MEASUREMENT OF ELECTRICAL QUANTITIES 09 HOURS

Frequency measurement – Phase angle and power factor measurement – measurement of voltage and current.

MEASUREMENT OF PHYSICAL QUANTITIES:

Temperature measurement & control – strain measurement – Deflection measurement- stepper motor – Microprocessor based Traffic Light Control.

TOTAL HOURS= 48 HOURS

TEXT & REFERENCE BOOKS:

- ”FUNDAMENTALS OF MICROPROCESSORS AND MICROCOMPUTERS” B.RAM , Dhanpat rai Publication , VI Edition ,2006

SEM – III&IV PART– III **ICS AND DIGITAL ELECTRONICS LAB** **MP- III**

OBJECTIVES: To impart practical knowledge in Basic Digital electronics and their applications.

LIST OF EXPERIMENTS (ANY 18 EXPERIMENTS)

TOTAL HOURS= 72 HOURS

1. Verification of basic gates
2. Universal Building Blocks
3. Two bit comparator and parity checker
4. Half adder and full adder
5. Half subtractor and full subtractor
6. A/D Converters
7. D/A Converters
8. Verification of Demorgan's theorem
9. IC verification of Mux & Demux, Encoders & Decoders
10. BCD to seven segment display
11. Up/Down and Decading counter
12. Multiplexers & demultiplexers .
13. Inverting, Non-inverting amplifier and Buffer amplifier using Op-Amp
14. Adder and subtractor circuits using Op-amp
15. Integrator and Differentiator using Op-amp
16. Voltage to current and Current to voltage converter using Op-amp
17. Comparator and Schmitt trigger using op-amp
18. Op-amp :square wave and Triangular wave generator
19. Op-Amp sine wave generator
20. Op-amp : Half wave and full wave precision rectifiers
21. Regulated power supply using IC 723
22. Monostable and Bistable multivibrator using IC 555
23. Astable multivibrator using IC 555
24. Voltage controlled oscillator using IC 555

OUTCOMES: At the end of the semester, the student should be able to analyze and design op-amp circuits and digital circuits.

SEM – III &VI PART–III **ELECTRONIC COMMUNICATION LAB** **MP-IV**

LIST OF EXPERIMENTS (ANY 12 EXPERIMENTS) **TOTAL HOURS= 72 HOURS**

1. AM Generation and Detection.
2. FM Generation and Detection.
3. PAM Generation and Detection
4. PWM & PPM Generation.
5. Generation of delta modulation.
6. Band pass filter.
7. Alignment of satellite DTH receiver.
8. Audio amplifier using IC LM 380.
9. Study of antennas.
10. Missing pulse detector.
11. FSK generation.
12. FSK detection.
13. Second order low pass filter.
14. Digital coding techniques.
15. Characteristics of optical source and reflectors.

SEM – IV PART–III **C- PROGRAMMING LAB** **AP–IV P-I**

OBJECTIVES: To impart practical knowledge in Computer Programming language "C".

LIST OF EXPERIMENTS (ANY 18 EXPERIMENTS) **TOTAL HOURS= 60 HOURS**

1. ASCII code to symbol conversation.
2. Area and perimeter of triangle calculation.
3. Exponential series computation (using math library).
4. Quadratic equation evaluation (using math library).
5. Prime number between 1 to n (using break).
6. Fibonacci series (using if-else).
7. Largest and smallest value from a set of numbers (using if-else).
8. Reverse of the integer (using while).
9. Sum and average of a 'n' numbers (using while).
10. Sum of even numbers between 1 to n.
11. Factors of a number (using for loop).
12. Conversion of temperature (using switch-case).
13. Factorial of a number (using recursion method).
14. Multiplication table (using # define).
15. Cube of a number (using function – define and declare).
16. Arithmetic calculation (using function with multiple arguments).
17. Swap two numbers (using pointer as function arguments).
18. Concatenation of strings (using string function).
19. Palindrome check (using string function).
20. Transpose of a matrix.

SEM – IV PART– III **ANALOG AND VLSI** **EL- I-I**

OBJECTIVES: To develop adequate knowledge in Analog VLSI Design

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: INTRODUCTION 10 HOURS

MOSFET Structure and working – Device equations – Characteristics (input and output) – Second order effects – CMOS technology- Comparison BJT and MOSFET.

UNIT II: SINGLE STAGE AMPLIFIER 15 HOURS

Small signal model – Biasing – Common Source, Common Gate and Common Drain configuration analysis – derivation of small signal gain and impedance(CS).

UNIT III: CASCODE AND CURRENT MIRRORS 10 HOURS

Current source –Importance of cascading – types (telescopic and folded) – MOS current mirrors

UNIT IV: DIFFERENTIAL AMPLIFIERS 15 HOURS

Differential signal – Importance of differential stage – MOS Differential pair – quantitative – large signal – small signal analysis – Differential output and single ended output – Introduction to 2 stage Op-Amp design.

UNIT V: FREQUENCY RESPONSE 10 HOURS

Importance of frequency response – Transfer function and frequency response – Poles and zeros–Importance of Compensation – Stability – Gain and phase – Phase margin and gain margin- Miller compensation.

TOTAL HOURS= 60 HOURS

TEXT & REFERENCE BOOKS:

1. Fundamentals of Microelectronics – BehzadRazavi- II Edition 2006
2. Design of Analog CMOS integrated Circuits – BehzadRazavi- MC GRAW-HILL-International Edition 2001

SEM – IV PART– III **AUTOMOTIVE ELECTRONICS** **EL- I-II**

OBJECTIVES: To Develop Adequate Knowledge in Designing the Automotive Electronic Circuits

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: INTRODUCTION: 10 HOURS

Automotive component operation Electrical wiring terminals and switching Multiplexed wiring systems Circuit diagrams and symbols. Charging Systems and Starting Systems : Charging systems principles alternations and charging circuits New developments requirements of the starting system Basic starting circuit.

UNIT II: IGNITION SYSTEMS: 15 HOURS

Ignition fundamental, Electronic ignition systems. Programmed ignition distribution less ignition direct ignition spark plugs. Electronic Fuel Control : Basics of combusion Engine fuelling and exhaust emissions Electronic control of carburation Petrol fuel injection Diesel fuel injection.

UNIT III: INSTRUMENTATION SYSTEMS: 10 HOURS

Introduction to instrumentation systems Various sensors used for different parameters sensing Driver instrumentation systems vehicle condition monitoring trip computer different types of visual display

UNIT IV: ELECTRONIC CONTROL OF BRAKING AND TRACTION: 15 HOURS

Introduction and description control elements and control methodology Electronic control of Automatic Transmission: Introduction and description Control of gear shift and torque converter lockup Electric power steering Electronic clutch.

UNIT V: ENGINE MANAGEMENT SYSTEMS: 10 HOURS

Combined ignition and fuel management systems Exhaust emission control Digital control techniques Complete vehicle control systems Artificial intelligence and engine management Automotive Microprocessor uses. Lighting and Security Systems: Vehicles lighting Circuits Signaling Circuit Central locking and electric windows security systems Airbags and seat belt tensioners Miscellaneous safety and comfort systems

TEXT BOOK

1. TOM DENTON, Automobile Electrical and Electronic Systems, Edward Arnold pb., 1995

REFERENCES

1.DON KNOWLES, Automotive Electronic and Computer controlled Ignition Systems, Don Knowles, Prentice Hall, Englewood Cliffs, New Jersey 1988.
2. WILLIAM, T.M., Automotive Mechanics, McGraw Hill Book Co.,
3. WILLIAM, T.M., Automotive Electronic Systems, Heiemann Ltd., London ,1978.
4. Ronald K Jurgen, Automotive Electronics Handbook, McGraw Hill, Inc, 1999.

SEM – V PART–III **OPTICAL FIBER COMMUNICATION SYSTEMS** **M–IX**

OBJECTIVES: To develop the basic knowledge in fiber optic communication systems.

PEDAGOGY: All the units will be covered with blackboard teaching , LCD, OHP methods.

UNIT I: OPTICAL FIBER STRUCTURE , WAVE – GUIDING & FABRICATION 9 HOURS

Basic optical Laws and Definitions – Optical fiber Modes & Configurations – Mode theory for circular waveguides – Single mode fibers – Graded index fiber structure – Fiber materials – Mechanical Properties of Fibers – Fiber optic Cables**.**

UNIT II : SIGNAL DEGRADATION IN OPTICAL FIBERS,OPTICAL SOURCES, PHOTODETECTORS 12 HOURS

Attenuation – Signal Distortion in fibers – Characteristics of single mode fibers – Speciality fibers – LED – Laser Diodes – Physical principles of photodiodes – Photodetectors noise – Detector Response time.

UNIT III : POWER LAUNCHING AND COUPLING , OPTICAL RECEIVER OPERATION 10 HOURS

Source – To – Fiber Power Launching – Lensing Schemes For Coupling Improvements – Fiber – To- Fiber Joints – Fiber Splicing – Optical Fiber Connectors – Fundamental Receiver Operation .

UNIT IV : WDM CONCEPTS AND COMPONENTS , OPTICAL AMPLIFIERS 9 HOURS

Overview of WDM – Passive optical couplers – Isolators and circulators – Active optical components – Tunable light Sources – Basic Applications and types of optical amplifiers – Semiconductor optical Amplifier – Erbium Doped fiber amplifier.

UNIT V : OPTICAL NETWORK 8 HOURS

Network Concepts – Network Topologies – SONET /SDH – Optical Add/Drop Multiplexing- Optical Switching – WDM Network Examples.

TEXT BOOKS:

1.G.Keiser , “Optical Fiber Communication 4th Edition)’, Mc Graw Hill International. (All five units)

SEM – V PART–III SATELLITE COMMUNICATION SYSTEMS M–X

OBJECTIVES : To develop the basic knowledge in satellite communication systems

PEDAGOGY: All the units will be covered with blackboard teaching , LCD, OHP methods.

UNIT I: OVERVIEW OF SATELLITE SYSTEMS, ORBITS & LAUNCHING METHOD 9 HOURS

Introduction - Frequency Allocation for Satellite Services – Intelsat- Kepler's Laws – Definition of terms for Earth-orbiting Satellites - Orbital Elements-Apogee and Perigee Heights- Orbit Perturbations- Inclined Orbits- The Geostationary Orbit -Introduction - Antenna Look Angles- The polar Mount - Limits of visibility - Near Geostationary Orbits - Earth Eclipse of Satellite – Sun Transit Outage - Launching Orbits

UNIT II: RADIOWAVE PROPAGATION, POLARIZATION & ANTENNAS 12 HOURS

Reciprocity Theorem for Antennas - Coordinate System - The Radiated Fields - Rain Attenuation & Other propagation Impairments - Ionospheric Depolarization - Rain Depolarization - Ice Depolarization - Polarization of Satellite Signals & Cross-polarization Discrimination - Atmospheric Losses -Ionospheric Effects- The Power Density - The isotropic Radiator and Antenna gain - Radiation pattern - Beam Solid Angle & Directivity - Effective Aperture & The Half-wave Dipole- Aperture Antennas -Horn Antennas- The Parabolic Reflector - The Offset Feed
- Double Reflector Antennas - Shaped Reflector Systems- Antenna Polarization

UNIT III : THE SPACE SEGMENT, EARTH SEGMENT, ANALOG & DIGITAL SIGNALS

13 HOURS

Introduction, The Power Supply - Attitude Control- Station Keeping - Thermal Control - TT&C Subsystem
- Transponders- Receive-Only Home TV System - MATV - CATV & Tx-Rx Earth Station - The Telephone Channel - Single - Sideband Telephony - FDM Telephony- Frequency Modulation- Digital Baseband Signals- Pulse -Code Modulation - Time-Division Multiplexing & Bandwidth Requirements - Digital Carrier Systems

UNIT IV : THE SPACE LINK & SATELLITE ACCESS 7 HOURS

Introduction - Equivalent Isotropic Radiated Power - Transmission Losses - System Noise - C/N Ratio - Uplink – Downlink - Combined Uplink & Downlink C/N Ration - Single Access - Preassigned FDMA & Demand-Assigned FDMA – TDMA – CDMA

UNIT V : SATELLITE SERVICE & THE INTERNET 7 HOURS

Network Layers - The TCP link - Satellite Links & TCP - Split TCP Connections- Asymmetric Channels- VSATs
- Radarsat – GPS

TEXT BOOKS:

1. " Satellite Communication ", Dennis Roddy , 3rd Edition , McGraw – Hill International Edition (All five units)

SEM – V PART–III 8051 MICROCONTROLLER AND ITS APPLICATIONS M–XI

OBJECTIVES: To develop programming skills in 8051 ALP & Embedded C for embedded systems

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: 8051 ARCHITECTURE AND MEMORY ORGANIZATION DEFINITION OF BASIC TERMINOLOGIES 9 HOURS

Digital Computer- CPU- ALU- Control Unit- Memory- RAM- ROM- Peripherals-Input- Output-Microprocessor-Microcontroller- Bus- Address Bus- Data Bus-Control Signals **Computer Languages**: Bit- Byte-Nibble- Word-Instruction- Mnemonics- Program- Machine language- Assembly language- Low level Language- High Level Language- Assembler- Compiler- Interpreter- Simulator- Integrated Development Environment (IDE) **Microcontrollers for Embedded Systems**: Criteria forchoosing microcontroller Overview of 8051family Architecture of 8051- 8051Memory organization: RAM allocation- SFR and Program memory

UNIT II: INSTRUCTION SET AND ADDRESSING MODES 9 HOURS

Flag bits and PSW register - Program counter- instruction fetching- decoding and execution concepts- 8051 instruction set: Data transfer instructions-Arithmetic instructions -Logical instructions- Boolean and Branching instructions- Addressing modes

UNIT III: ALP & EMBEDDED C PROGRAMMING 10HOURS

Introduction to ALP: Data types and assembler directives - simple data transfer programs- Unsigned addition and subtraction - Unsigned multiplication and division- Counting and Looping techniques - Addition of array of data- Introduction to Embedded C: C data types and operators for 8051; Simple data transfer; Arithmetic and logical programs using C I/O port programming: single bit operations in ALP and C Time delay programming and delay calculation in ALP and C

UNIT IV: 8051 PERIPHERALS & INTERRUPTS TIMERS 10 HOURS

Basic registers of timer- Programming 8051timer and counter **UART:** Serial communication registers- 8051 connection to RS232- 8051 serial communication programming **8051 interrupts:** Interrupts registers Programming timer interrupts-Programming external hardware Interrupts- Programming with serial communication interrupts

UNIT V: REAL WORLD APPLICATIONS 10 HOURS

I/O Interfacing: Key- LED's- LCD Interfacing -ADC Interfacing- sensor- Interfacing- DAC Interfacing Relay interfacing - stepper motor and DC motor

Text Book:

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems using Assembly and C", Pearson, Second edition, 2008.

References:

1.D.Karuna Sagar, "Microcontroller 8051", Narosa Publishing House, 2011.

2.A.P. Godse, D.A. Godse, "Microprocessor and Microcontroller", Technical Publications Pune, First Edition, 2007.

3.http://nptel.ac.in/courses/117104072/

SEM – V PART–III **MEDICAL ELECTRONICS** **M–XII**

OBJECTIVES : To develop adequate knowledge in various Medical test instruments and their applications.

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I BIOELECTRIC POTENTIALS & ELECTRODES 12 HOURS

Introduction to human physiology –Man instrument system- Origin of bioelectric potential – Resting and action potential – Bio potential electrodes: Micro electrodes – Skin surface electrodes – Needle electrodes – Reference electrodes – pH electrode- Blood gas electrode.

UNIT II BIO MEDICAL RECORDERS 11 HOURS

Electrocardiography –ECG amplifiers – electrodes and leads – ECG recorder - Principles – Phonocardiography – Electro Encephalography - Electro Myography – Electro Oculography

UNIT III BIOSIGNAL MEASUREMENTS 12 HOURS

Measurements of blood pressure: Sphygmomanometer – Measurement of blood flow: Electromagnetic blood flow meter – Ultrasonic blood flow meter – Measurement of heart rate – Measurement of respiration rate – Digital Thermometer.

UNIT IV BIO-TELE METRY & THERAPEUTIC DEVICES 13 HOURS

Introduction to Bio-telemetry : Elements of Bio-telemetry system – Design of biotelemetry – radio telemetry system – Problems in telemetry – Uses of Bio-telemetry- Pace maker systems : Implantable and external pacemakers - different types of pacemakers –Defibrillators - DC Defibrillator - Synchronized defibrillator - square pulse defibrillator - Double square pulse defibrillators - biphasic defibrillators.

UNIT V MODERN IMAGING SYSTEMS AND DIATHERMY 12 HOURS

X- ray machine - CT scanner – Ultra sound scanner- MRI system – Angiography – Endoscopy – Introduction to Diathermy - Surgical Diathermy- Micro wave Diathermy- Short wave Diathermy- Ultra sonic therapy.

TOTAL HOURS= 60 HOURS

TEXT BOOKS:

1. Dr.M.Arumugam , ‘ BIO-MEDICAL INSTRUMENTAION “, Anuradha agencies, 2nd Edition (All five units)
2. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, ‘ BIOMEDICAL INSTRUMENTATION AND MEASUREMENTS’ PHI Publications, 2nd Edition ISBN-81-203-0653-8 (UNIT I)

REFERENCE BOOKS:

1. R.S.Khandpur, ‘HANDBOOK OF BIOMEDICAL INSTRUMENTATION “ TataMcGraw Hill Publication.

John G.Webster , ‘ MEDICAL INSTRUMENTION, APPLICATION AND DESIGN” John Wiely & Sons , Inc, 3rd

SEM – V PART–III FUNDAMENTALS OF DIGITAL COMPUTER EL-II EDC

OBJECTIVES: To develop adequate knowledge in fundamentals of digital computer

PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I: NUMBER SYSTEMS AND CODES 5 HOURS

Binary Number System – Binary to decimal Conversion – Decimal to binary Conversion– Octal Numbers– Hexadecimal Numbers– ASCII code – Excess three code – Grey code.

UNIT II: LOGIC GATES AND COMBINATIONAL LOGIC CIRCUITS 5 HOURS

Basic Gates – NOT,OR, AND– Universal Logic Gates – NOR, NAND , EX-OR and EX-NOR gates – Boolean Laws – Duality Theorem– Demorgan's Theorem – Sum of products Method – products of Sum Method – Products of Sum Simplification.

UNIT III: ARITHMETIC AND DATA PROCESSING CIRCUITS 5 HOURS

Binary addition and subtraction – Signed and Unsigned binary numbers – Sign-magnitude Numbers–1's and 2's Complement – Half adder – Full adder – Half subtractor – Full subtractor – multiplexers – Demultiplexers – Decoder– BCD to decimal decoder – Seven segment decoder – Encoders.

UNIT IV: FLIP FLOPS, REGISTERS AND COUNTERS 5 HOURS

RS, D,JK, master slave Flip Flops types – Shift register types – serial in serial out – serial in parallel out, parallel in serial out- Counters – synchronous and asynchronous counters, decade counter.

UNIT V: MEMORIES 4 HOURS

Basic terms and ideas – Magnetic memory – Optical memory – Memory addressing – ROMs – PROMs – EPROMs – RAMs

TOTAL HOURS= 24 HOURS

TEXT & REFERENCE BOOK:

1. Donald P. Leech, Albert Paul Malvino and Goutam Saha "**Digital Principles and Applications**", 6th Edition, McGraw Hill Company .

SEM – V PART–III PCB DESIGN &PC HARDWARE TROUBLE SHOTTING LAB SBC-II

PCB DESIGN LAB (ANY 5)

1. Study about single side and double side PCBs.
2. Introduction to Schematic Diagram design using Eagle.
3. PCB Layout preparation cleaning, Etching , milling & drilling.
4. Studying Proto – Etch Etching Machine.
5. Design a astable multi vibrator using eagle.
6. Design a DC regulated power supply using eagle.

PC HARDWARE LAB (ANY 5)

1. Study : Identifying ports on the cards and interfacing.
2. Study and Understanding CMOS.
3. Study : Partitioning and formatting Hard disks.
4. Study: Understanding control panel settings.
5. Troubleshooting symptom failures in motherboard.
6. Identify different beep codes and error codes.
7. Identification of different motherboards & CPU's.

OUTCOMES: At the end of the semester , the student should be able to analyze the system hardware and design PCB circuits.

SEM – VI PART–III **DIGITAL AND CELLULAR COMMUNICATION** **M-XIII**

OBJECTIVES: To develop adequate knowledge in the digital communication and also develop their applications.
PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I DATA TRANSMISSION **14 HOURS**

Introduction – Representation of data signal – Parallel and serial data transmission – 20 milliamps loop and line drivers – Transient noise- Data signal – Signal shaping and signaling speed – Noise and error analysis – Repeaters.

UNIT II COMMUNICATION SYSTEM **14 HOURS**

Model of communication system- Elements of digital communication system: Information source, Source encoder/decoder, Communication channel, Modulator, Demodulator, Channel encoder/decoder, other functional blocks-Analysis of communication system- Design of communication system.

UNIT III DIGITAL CARRIER MODULATION SCHEMES **14 HOURS**

Binary phase shift keying- Differential phase shift keying – Differentially encoded PSK – Quadrature phase shift keying – Base band signal receiver – Phase shift keying – frequency shift keying – Non-coherent detection of FSK –Differential PSK.

UNIT IV QUANTIZATION AND PULSE MODULATION SYSTEMS **15 HOURS**

Quantization of signals – quantization error – pulse code modulation – Electrical representation of Binary digits – PCM system –Companding – Multiplexing PCM signals – Differential PCM – Delta modulation – Adaptive delta modulation – Voice coders –Channel decoder – Linear predictive coder – Synchronization.

UNIT V DIGITAL CELLULAR SYSTEMS **15 HOURS**

GSM Architecture – Layer modeling – transmission – Data Service- Multiple Access Scheme – Channel, Coding Interleaving – Radio resource management – Mobility management – Communication management – Network management- TDMA Architecture- Transmission and modulation – CDMA – Terms of CDMA Systems – Call processing – Hand over Procedures.

TOTAL HOURS= 72 HOURS

TEXT & REFERENCE BOOKS:

1. Sam K.Shanmugam,“DIGITAL AND ANALOG COMMUNICATION SYSTEMS” John Wiley Publications.
2. John G.Proakis ‘DIGITAL COMMUNICATIONS”, TMH, 2001
3. W.C.Y.Lee,” MOBILE CELLULAR TELECOMMUNICATION”, TMH ,1995.

SEM – VI PART–III **PIC MICROCONTROLLER** **M-XIV**

OBJECTIVES:

- **To develop basic knowledge in PIC16F87X CPU and develop the programming skills in PIC16F87X ALP**

PEDAGOGY:

- **All the units will be covered with blackboard teaching, LCD, OHP methods and Industrial visits.**

UNIT I: ARCHITECTURE OF PIC MICROCONTROLLER 12 HOURS

Architecture – the CPU – ALU – status register – hardware configuration – interrupts – program counter and stack –memory organization – system clock – oscillators – hardware and file registers –I/O ports

UNIT II: INSTRUCTION SET 12 HOURS

Addressing modes – instruction set – data moment instructions –data processing instructions – execution change operators – processor control – instructions – bank addressing – register organization

UNIT III: PERIPHARALS IN PIC CONTROLLERS 12 HOURS

Timer 0 module - Timer 1 module - Timer 2 module – watch dog timer – power up timer – SLEEP-Start-up timer – Capture/ Compare/ PWM module

UNIT IV: PERIPHARALS IN PIC CONTROLLERS 12 HOURS

Synchronous serial port modules – USART – SPI – I2C transmission and reception – ICSP **Special features of the CPU** : oscillator selection – Reset – power on reset – brownout reset –ADC

UNIT V: INTERFACING AND APPLICATIONS 12 HOURS

Digital logic – relays and solenoids - LCD interfacing –I2C interfacing - DAC interfacing – stepper motor interfacing – DC motor interfacing -ADC application -PWM applications.

TOTAL HOURS =60 HOURS

TEXT & REFERENCE BOOKS:

1. “Programming and customizing PIC micro controllers” by myke predrco II- nd edition –MCGRAW HILL - ISBN -0-07-136172-3
2. PIC16F87X DATA BOOK ,Microchip technology.

SEM – VI PART–III **INDUSTRIAL AND POWER ELECTRONICS** **M-XV**

OBJECTIVES: To develop adequate knowledge in the industrial and power electronics and also develop their applications
PEDAGOGY: All the units will be covered with blackboard teaching, LCD, OHP methods

UNIT I THYRISTORS AND THEIR APPLICATIONS **17 HOURS**

Principles and operations of SCR – Volt –ampere characteristics – Gate characteristics of SCR – Characteristics of two – transistor model – Thyristor construction – rectifier circuit using SCR – GTO – operation and characteristics of Diac – Triac – Silicon controlled switch – Silicon unilateral switch – light activated SCR.

UNIT II TURN ON/OFF MECHANISM **17 HOURS**

Types of turn on methods: AC gate triggering : R triggering – RC triggering – DC gate triggering – Pulse gate triggering – Types of turn off methods :Natural commutation – Forced commutation: Self commutation – Complimentary commutation – Auxiliary commutation – External pulse commutation – Line commutation – Thyristor rating.

UNIT III APPLICATION OF SCR **17 HOURS**

Multiple connections of SCR – Series operation – Triggering of series connected SCRs – Parallel operation – triggering of parallel connected SCRs – SCR di/dt calculation – snubber circuit – dv/dt calculation across SCR – Types of converters – Half wave rectifiers with resistive load –HWCR with inductive load – HWCR with free wheeling diode – Full wave controlled rectifier with resistive load –FWCR with inductive load- FWCR with free wheeling diode

UNIT IV INVERTERS **17HOURS**

Types of inverters – Single phase bridge inverter – McMurray impulse commutation inverter- Single phase half bridge voltage source inverter – Single phase full bridge voltage inverter – step down choppers – step up choppers – chopper classification.

UNIT V HEATING AND WELDING **16 HOURS**

Induction heating – resistance welding – Over voltage protection –Zero voltage switch SMPS – UPS – DC circuit breaker – Battery charger- AC static switch –DC static switch – Time delay – fan regulator using Traic

TOTAL HOURS= 84 HOURS

TEXT & REFERENCE BOOKS:

1. Harris C.rai ‘ A TEXT BOOK ON POWER ELECTRONICS : DEVICES, CIRCUITS , SYSTEMS AND APPLICATIONS”, Galcottia publications Pvt Ltd , edition 2000. (All five units)
2. M.Ramamoorthy ,’THYRISTOR AND THEIR APPLICATIONS’ East-west pub. IInd Edition.
3. Shamir K.Datta ‘ POWER ELECTRONCIS AND CONTROLLERS’ PHI third Edition.
4. J.S.Chitode ‘POWER ELECTRONICS ‘ Technical publications, Pune I Edition 2004

SEM – V&VI PART– III **MICRO CONTROLLER LAB** **MP- V**

LIST OF EXPERIMENTS (ANY 16 EXPERIMENTS)

8051 EXPERIMENTS:

1. Arithmetic operations
2. Logical operations
3. Timer operations
4. Interrupt operations
5. Serial communication
6. LED & switches interfacing
7. LCD interfacing
8. ADC interfacing
9. PWM interfacing
10. Stepper motor interfacing

PIC16F877 EXPERIMENTS :

11. Arithmetic operations
12. Logical operations
13. Timer operations
14. Serial Communication
15. Capture and compare operations
16. PWM generation
17. LED & switches interfacing
18. LCD interfacing
19. ADC operation
20. I2C operation

OUTCOMES : At the end of the semester , the student should be able to design stand alone microcomputer based systems for customized application.

SEM – V&VI PART–III **INDUSTRIAL AND MEDICAL ELECTRONICS LAB** **MP-VI**

LIST OF EXPERIMENTS (ANY 15 EXPERIMENTS) **TOTAL HOURS= 72 HOURS**

1. Instrumentation amplifier.
2. Notch filter designing.
3. Heart beat Monitor.
4. Clinical Thermometer.
5. Pace maker.
6. Buffer amplifier using op-amp.
7. Speed control of DC Motor.
8. Burglar alarm.
9. Automatic Street light.
10. Fan regulator using SCR.
11. SCR sequencer.
12. Single phase Inverter.
13. Water level control using IC 555.
14. Lamp Dimmer.
15. Study of washing machine.
16. Study of Micro wave oven.
17. Study of Voltage stabilizer
18. Study of Air-Conditioner.
19. Study of house wiring and earthing.
20. Temperature measurement using ad 590.

SEM – VI PART–III **PROJECT VIVA-VOCE** **EL - III**