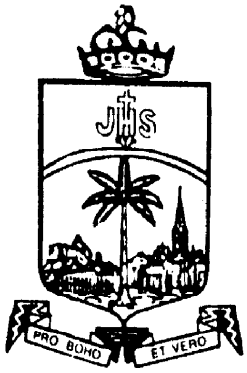
M.Sc. ELECTRONICS

SYLLABUS : 2012

CHOICE BASED CREDIT SYSTEM (CBCS)



St. JOSEPH'S COLLEGE (Autonomous)

Re-accredited with 'A' Grade (3rd Cycle) by NAAC

College with Potential for Excellence by UGC

TIRUCHIRAPPALLI - 620 002, INDIA.

FEATURES OF CHOICE BASED CREDIT SYSTEM

PG COURSES

The Autonomous (1978) St. Joseph's College, accredited with Five Star status in 2001, Re-accredited with **A⁺ Grade** from **NAAC (2006),** Re-accredited with **A Grade** from **NAAC (3rd cycle)**, had introduced the Choice Based Credit System **(CBCS**) for PG courses from the academic year 2001-2002. As per the guidelines of Tamil Nadu State Council of Higher Education (TANSCHE) and the Bharathidasan University, the College has reformulated the CBCS in 2008-2009 by incorporating the uniqueness and integrity of the college.

OBJECTIVES OF THE CREDIT SYSTEM

- ⁕ To provide mobility and flexibility for students within and outside the parent department as well as to migrate between institutions
- ⁕ To provide broad-based education
- ⁕ To help students learn at their own pace
- ⁕ To provide students scope for acquiring extra credits
- ⁕ To impart more job oriented skills to students
- ⁕ To make any course multi-disciplinary in approach

What is credit system?

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The following Table shows the relation between credits and hours.

Sem.	Specification	No. of Papers	Hour	Credit	Total Credits
I – IV	Core Courses (Theory & Practical)	14	6	14 x 5	70
	Project	1	--	1 x 5	05
I – IV	3 – Core Electives 1 – Soft Skill Course (Common) (IDC-1)	3	4	3 x 4	12
	1 – Inter Dept. Courses (IDC-2)	2	4	2 x 4	08
I – IV	SHEPHERD – Extension Activity	~	70	5	05

Total Minimum Credits **100**

Other Additional Credits (Dept. Specific) **….**

However, there could be some flexibility because of practicals, field visits, tutorials and nature of project work.

For PG courses a student must earn a minimum of 100 credits. The total number of courses offered by a department is 20. However within their working hours a few departments can offer extra credit courses.

Course Pattern

The Post Graduate degree course consists of three major components. They are Core Course, Elective Course and Inter Departmental Course (IDC). Also 2 compulsory components namely Project / Project related items and SHEPHERD, the extension components are mandatory.

Core Course

A core course is the course offered by the parent department, totally related to the major subject, components like Practicals, Projects, Group Discussions, Viva, Field Visits, Library Record form part of the core course.

Elective Course

The course is also offered by the parent department. The objective is to provide choice and flexibility within the department. The student can choose his/her elective paper. Elective is related to the major subject. The difference between core course and elective course is that there is choice for the student. The department is at liberty to offer three elective courses any semester. It must be offered at least in two different semesters. The staff too may experiment with diverse courses.

Inter Departmental Course (IDC)

IDC is an inter departmental course offered by a department for the students belonging to other departments. The objective is to provide mobility and flexibility outside the parent department. This is introduced to make every course multi-disciplinary in nature. It is to be chosen from a list of courses offered by various departments. The list is given at the end of the syllabus copies. Two IDC s must be taken by students which are offered in Semester II & III. In

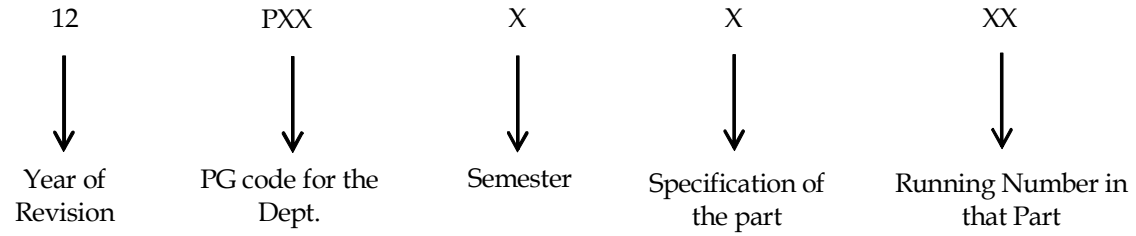
semester II, a common IDC, Soft Skills is to be offered by JASS (Joseph Academy of Soft Skills).

Day College (Shift-I) student may also take an IDC-2 from SFS (Shift-II) course and vice versa

The IDC are of application oriented and inter-disciplinary in nature.

Subject Code Fixation

The following code system (9 characters) is adopted for Post Graduate courses:



01 – Core Courses: Theory & Practical
02 – Core electives
03 – Additional Core Papers (if any)
04 – Inter Departmental Courses
05 – Project
06 – SHEPHERD

CIA Components

The CIA Components would comprise of two parts: (1) Test Components conducted by Controller of Examination (COE) and (2) Teacher specific component. The two centralized tests will be conducted by the COE (Mid-Semester Test & End-Semester Test) for 30% each administered for 2 hours duration. The remaining 40% would comprise of any three components as listed below and will be carried out by the faculty concerned for that paper.

* Assignment, Quiz (Written / Objective), Snap Test, Viva-Voce, Seminar, Listening Comprehension, Reading Comprehension, Problem Solving, Map Reading, Group Discussion, Panel Discussion, Field Visit, Creative Writing, Open Book Test, Library Record, Case Study, etc.

* As a special consideration, students who publish papers in referred journals would be exempted from one of the teacher specific internal components in one of the papers. At the beginning of each semester, the four internal components would be informed to the students and the staff will administer those components on the date specified and the marks acquired for the same will be forwarded to the Office of COE.

Evaluation

For each course there are formative continuous internal assessment (CIA) and semester examinations (SE) in the weightage ratio 50:50.

Once the marks of CIA and SE for each course are available, the Overall Percentage Mark (OPM) for a student in the programme will be calculated as shown below:

$$OPM = \frac{\sum_i C_i M_i}{\sum_i C_i}$$ where C_i is the credit earned for that course in any semester and M_i is the marks obtained in that course.

The Scheme of Over-all Results is as follows:

	PG	
Class	**Arts (OPM)**	**Science (OPM)**
SECOND	50 to 59.99	50 to 59.99
FIRST	60 to 74.99	60 to 79.99
DISTINCTION	75 & Above	80 & Above

Declaration of Result

Mr./Ms. _____ has successfully completed M.Sc./M.A. degree course in _____. The student's overall average percentage of marks is _____ and has completed the minimum 100 credits. The student has also acquired _____ (if any) additional credits from courses offered by the parent department.

M.Sc. Electronics - Course Pattern

SEM	SUB. CODE	SUBJECT TITLE	HRS/WK	CREDITS
I	12PEL1101	Design of Analog and Digital Circuits	6	5
	12PEL1102	Microprocessors And Programming	6	5
	12PEL1103	Signals And Systems	6	5
	12PEL1104	Electronics Practical – I	8	5
	12PEL1201A	Elective - I: Sensors and Transducers (or)	4	4
	12PEL1201B	Elective - I: Communication Systems	(4)	(4)
		TOTAL FOR SEMESTER 1	**30**	**24**
II	12PEL2105	Embedded System I - Microcontrollers and Programming with IDES	6	5
	12PEL2106	Digital Signal Processing	6	5
	12PEL2107	Electronics Practical – II	8	5
	12PEL2202A	Elective - II: Programmable Logic Controllers and Programming (or)	4	4
	12PEL2202B	Elective - II: Mobile Communication	(4)	(4)
	12PSK2401	IDC - I: Soft Skills	4	4
		TOTAL FOR SEMESTER 2	**28**	**23**
III	12PEL3108	Embedded System II – PIC Controller and RTOS	6	5
	12PEL3109	VLSI Design and VHDL Programming	6	5
	12PEL3110	Electronics Practicals – III	8	5
	12PEL3111	IPT and Literature Survey	5	5
	12PEL3203A	Elective - III: Medical Electronics (or)	4	4
	12PEL3203B	Elective - III: MEMS And NANO Electronics	(4)	(4)
	12PEL3402	IDC - II: Computer Hardware	4	4
		TOTAL FOR SEMESTER 3	**33**	**28**
IV	12PEL4112	Embedded System III – ARM and Embedded LINUX	6	5
	12PEL4113	Programmable Digital Signal Processor and MATLAB	6	5
	12PEL4114	Power Electronics	6	5
	12PEL4501	Project Work	11	5
		TOTAL FOR SEMESTER 4	**28**	**20**
I - IV	12PEL1101	SHEPHERD		5
		TOTAL CREDITS FOR ALL THE SEMESTER	**120**	**100**

SEM: I *Hours: 6*

12PEL1101 *Credit: 5*

DESIGN OF ANALOG AND DIGITAL CIRCUITS

Objective

- To learn the design concept of analog circuits
- To discuss about the designing concept of digital circuits
- To deal the digital circuit with LABVIEW environment

UNIT-I: TRANSISTOR, JFET AND MOSFET

Conduction in semiconductors – Drift and diffusion current, suitability of CC – CB and CE configuration in multistage amplifiers – JFET: JFET operation – JFET low frequency ac equivalent circuit - Parameters – MOSFET: background – Depletion type – Enhancement MOSFET – Non ideal current voltage characters – MOSFET biasing – Introduction to MOSFET as VLSI device – N-MOS – P-MOS and CMOS device – Power MOSFET – MESFET.

UNIT-II: OPERATIONAL AMPLIFIER AND ITS APPLICATION

The ideal op-amp – Equivalent circuit – Summing – Scaling and averaging amplifier – Instrumentation amplifier – Integrator – Differentiator – Active filters – First order low pass and high pass butter worth filter – Band pass filter – Band reject filter – All pass filter – Oscillator principle – Square wave – Triangular wave generator – Comparator – Zero crossing detector – Schmitt trigger – Sample and Hold circuit – V to I with floating & grounded load – R and 2R ladder method – Binary weighted resistors.

UNIT – III: SEQUENTIAL CIRCUIT COMPONENTS

Introduction to sequential circuits – Latches and Flip Flop: SR latch – Timing problems and clocked SR latches – JK latch – Master slave latch – Delay Flip Flop – T Flip Flop – Flip Flop excitation requirements – Registers: Serial load shift registers – Parallel load shift register – Parallel to serial conversion – Universal shift registers.

UNIT–IV: SYNCHRONOUS SEQUENTIAL MACHINES AND DESIGN

Basic concept – State assignment – General design procedure – State equivalence and machine minimization – Machine with finite spans – Synchronous counters – Algorithmic state machines – Asynchronous input – PAL.

UNIT-V: LABVIEW FOR DIGITAL CIRCUITS

Lab VIEW basics: The Lab VIEW Environment – Panel and Diagram Windows – Shortcut menus – Palettes – Opening – Loading – and saving VI's – Virtual Instruments: What are Virtual Instruments – Several worked examples – The Block Diagram – Structures: The For Loop – The While loop – Shift Registers – Arrays – Data Acquisition – Components of DAQ System – Types of Signals – Analog I/O Considerations – Using the DAQ Assistant – Instrument Control – Components of an Instrument Control System – Detecting and Configuring Instruments – Using the Instrument I/O Assistant – Instrument Drivers.

BOOK FOR STUDY

1. U.A. Bakshi and A.B. Godse "Semiconductor Devices & Circuit', 6th Revised edition, Technical Publications, Pune
2. Ramakant A. Gayakwad, "Operational Amplifier and Linear Integrated Circuits", 3rd Edition, Prentice-Hall of India Pvt Limited, New Delhi.
3. Norman Balabaniam , Bradly Carlson, "Digital Logic Design Principles", John Wiley & Sons, INC. Newyork, Chichester, Weinhein, Brisbane, Toronto, Singapore.
4. Robert H. Bishop, "Learning with LAB VIEW 7 Express", Low Price Edition, Pearson Education.

BOOK FOR REFERENCE

1. National Instruments, "Lab VIEW manual"
2. Donald P. Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and Applications", Tata McGraw-Hill Publishing Company Limited, New Delhi.

3. Boylstead, "Principles of Electronics".
4. Malvino A.P, "Principles of electronics", TMH.

SECTIONS

Unit	Book	Sections
1	1	1.12.1, 1.12.2, 6.13.5, 7.6.1-7.6.4,9.3, CHAPTER 10 FULL
2	2	1.1, 2.3, 3.3, 3.4, 7.5, 7.6, 7.12, 7.13, 8.3-8.5, 8.8-8.11, 8.15, 8.16, 9.2, 9.3, 9.4, 9.15, 7.8, 7.9, 9.11.1(B), 9.11.1(A)
3	3	CHAPTER 5 FULL
4	3	CHAPTER 6 FULL
5	4	1.1,1.3,1.4,1.6,1.7,2.1,2.2,2.4,5.1,5.2,5.3.1,6.1,8.1,8.2,8.5,8.8, 10.1-10.4

SEM: I *Hours: 6*

12PEL1102 *Credit: 5*

MICROPROCESSORS AND PROGRAMMING

Objective

- To learn the Concepts of 8085 and 8086 microprocessors and to develop assembly language programs.

UNIT-I: INTEL 8085 ARCHITECTURE AND INSTRUCTION SET

Introduction to INTEL8085 – Register structure – Pin details and functions – Instruction cycle – Timing diagram – Instruction set – Addressing modes – Status flags – Data transfer group – Arithmetic group – Logical group – Branch – Stack, I/O and machine control group.

UNIT-II: MEMORY AND I/O INTERFACING TECHNIQUES

Address space partitioning – Memory and I/O interfacing – DMA controller 8257-Data transfer schemes – Interrupts of INTEL 8085 – interfacing and programming 8255 – 8259 programming and interfacing – 8251 programming and interfacing – 8253 programming and interfacing – Programmable interval timer interfacing – 8279 keyboard interfacing.

UNIT-III: INTEL 8086 ARCHITECTURE & DATA TRANSFER INSTRUCTION

Introduction to 8086 microprocessor – Internal architecture – Execution unit – General purpose registers – Instruction pointers – Addressing modes – Instruction set – Constructing the machine codes for 8086 instructions – Segment registers – Memory segmentation.

UNIT-IV: ASSEMBLY LANGUAGE PROGRAMMING MINIMUM AND MAXIMUM MODE

Simple programs – Finding average of two numbers – Conditional and unconditional jump instructions – Conditional flags – Time, delay loops – Timing diagram – Minimum mode – Addressing memory and I/O ports – Addressing and address

decoding – Maximum mode.

UNIT-V: ADVANCED MICROPROCESSORS

Introduction to 80386 – Pentium processors – APIC – MMX – SMM – P6 family of processors – SSE2 – SSE3 – HT technology – Pentium M processors – RISC machine – Parallel processing – Introduction to Multicore – Dual core – Core duo processor technology.

BOOKS FOR STUDY

1. B. Ram, "Fundamentals of Microprocessors and Microcomputers", 4th edition, Dhanpat Rai & Sons.
2. Douglas V. Hall, "Microprocessors and Interfacing Programming and Hardware", 2nd edition, Tata McGraw-Hill.

BOOKS FOR REFERENCE

1. K.R. Venugopal Rajkumar, "Microprocessor X86 Programming", New Delhi, BPB Publications, 2005.
2. M. Rafiquzzaman, "Microprocessors, Theory and Applications", Intel and Motorola (Revised edition), Prentice Hall India.

SECTIONS

UNIT	BOOK	SECTION
I	1	3.1- 3.4, 4.1- 4.6.5
II	1	7.1 – 7.7.4, 7.9- 7.11, 7.12.5
III	2	2.11 – 2.20, 3.6 – 3.29
IV	2	4.1- 4.4, 4.8 – 4.33 7.1 – 7.42, 11.1 -11.10
V	2	15.16 – 15.24, 16.1 – 16.19, Lecture Notes

SEM: I *Hours: 6*

12PEL1103 *Credit: 5*

SIGNALS AND SYSTEMS

Objective

- To acquire the basics of Signals, Systems and Transformations.

UNIT – I: INTRODUCTION TO SIGNAL AND SYSTEM

Signals: Definition – Classification of signals – Basic operations on signals – Types of signals. Systems: Definition – Classification of systems – Properties of systems – Properties of continuous-time linear time-invariant (LTI) system – Properties of discrete – LTI system.

UNIT – II: LAPLACE TRANSFORM

Definition – Representation of signals using Laplace transform – Region of Convergence (ROC) – Properties of Laplace transform – Initial value and final value theorem – Inverse of the Laplace transform – Analysis of passive networks using Laplace transform – Solution of differential equations using Laplace transform – Relationships between Laplace transform (LT) and continuous-time Fourier transform (CTFT).

UNIT – III: FOURIER SERIES

Continuous-time Fourier series (CTFS): Definition – Dirichlet condition – Fourier series representation of continuous-time periodic signal – Trigonometric Fourier series – Problems – Exponential Fourier series – Problems – Properties of CTFS - Discrete-time Fourier series (DTFS): Definition – Fourier series representation of discrete-time periodic signal – Calculation of DTFS coefficient – Properties of DTFS.

UNIT – IV: FOURIER TRANSFORM

Continuous-time Fourier Transform (CTFT): Definition – Dirichlet condition – CTFT representation of aperiodic signal – Properties of CTFT – Problems. Discrete Time Fourier Transform (DTFT): Definition – DTFT representation of aperiodic signal – Properties of DTFT – Problems.

UNIT – V: Z -TRANSFORMS

Z-Transforms (Double and Single sided) – ROC conditions - Properties - Initial and final value theorems – Relationship between the Z-transform and discrete-time Fourier transform – Relationship between the Z-plane and S-plane – Methods of inverse Z-transforms – Power series method (long-division) – Partial-fraction method – Residual method.

BOOK FOR STUDY

Poornachandra S., "Signals and System", Vijay Nicole imprints Pvt. Ltd., 2004.

BOOK FOR REFERENCE

1. Alan V. Opphenehim, Alan S. willsky and Hamid nawab S., "Signals and Systems", 2nd Edition, PHI, 2004.
2. Ramesh Babu P, Ananda Natarajan R., "Signals and System", 3rd Edition, Scitech publication private limited, 2007.

SECTIONS

Unit	Book	Sections
I	1	1.1 - 1.4, 2.1- 2.9, 3.4, 4.3
II	1	10.1, 10.2, 10.4, 10.7 - 10.9, 10.11 - 10.13
III	1	5.1, 5.2, 5.4, 6.1- 6.3
IV	1	7.1 - 7.4, 8.1- 8.3
V	1	11.1 - 11.4, 11.7 – 11.9, 11.12

SEM: I *Hours: 4*

12PEL1201A *Credit: 4*

ELECTIVE - I: SENSORS AND TRANSDUCERS

Objective

- To expose the working principle of sensors and transducers.

UNIT - I: TRANSDUCERS

Introduction to measurement – Direct and indirect measuring methods – Accuracy – Errors – Transducers – Resistive transducers – Potentiometers – Non-linear potentiometers function generators – Strain gauges – Types of strain gauges – Resistance thermometers – Variable inductance transducers – Linear variable differential transformer – Capacitive transducers – Peizo electric transducers – Hall Effect transducers – Magneto resistors

UNIT - II: MEASUREMENT OF NON-ELECTRICAL QUANTITY

Measurement of vibrations – Seismic transducers – Measurement of flow rate – Measurement of thickness – Measurement of humidity – Measurement of sound using microphones – Measurement of pH value – Measurement of thermal conductivity – Measurement of pressure.

UNIT - III: INTEGRATED SENSORS

LM 35 temperature sensor – DS18s20 1-wire digital thermometer – TSOP 17 photo modules for PCM remote control system – MOC3041 zero cross optoisolators – TL173L linear hall effect sensor – KMZ51 magnetic field sensor – MPXV5004G pressure sensor – A1425 analog speed sensor – LM1830 water level sensor – HC610 humidity sensor – ICM105A VGA CMOS sensor

UNIT - IV: BIOSENSORS

Introduction – FET & MOSFET chemical sensor – Bio sensors – Ion exchange membrane electrodes – Oxygen electrodes – CO2 electrodes enzyme electrode – Construction –ISFET for glucose, urea etc. Electrolytic sensors – Optical sensor – Fiber optic sensors.

UNIT -V: SIGNAL CONDITIONERS

Signal conditioning – Op-amp circuit used in instrumentation – Differential amplifier – Voltage follower – Instrumentation amplifier – Filters – Wheatstone bridge – AC bridges.

BOOK FOR STUDY

A.K. Sawhney, "A course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Co. publishers.

BOOK FOR REFERENCE

1. H. S. Kalasi, "Electronic Instrumentation", Tata McGraw-Hill publishers.
2. Albert D. Helbrick and William D.Cooper, "Modern Electronic Instrumentation and Measurement techniques", New Delhi: Prentice Hall of India, 1995.

SECTIONS

Unit	Book	Sections
1	1	25.2-25.9
2	1	25.11-25.13; 25.16, 25.17, 25.19, 25.22-25.24; 25.28-25.31
3		Lecture Notes
4		Lecture Notes
5	1	31.3-31.5; 31.731.10

SEM: I *Hours: 4*

12PEL1201B *Credit: 4*

ELECTIVE - I: COMMUMUNICATION SYSTEMS

Objective

- To impart the concepts of Digital Modulation Techniques and the principles of Fiber optics communication.

UNIT-I: PULSE MODULATION SYSTEMS

The sampling theorem: low pass signals, band pass signals – PAM – Channel bandwidth for a PAM signal – Natural sampling – Flat top sampling – PCM – Electrical representation of binary digits – The PCM system – Companding – Multiplexing PCM signal – Differential PCM – Delta modulation

UNIT-II: DIGITAL MODULATION TECHNIQUES

Phase shift keying-binary PSK – Differential PSK – Differentially encoded PSK (DEPSK) – Quadrature PSK – M-ary PSK – FSK – Binary FSK – Similarity of BFSK and BPSK – M-ary FSK.

UNIT-III: PRINCIPLES OF FIBRE OPTIC COMMUNICATION

Need for optical communication – Introduction – Physical nature of optical fiber – Basic principle involved in optical fiber technology – Fiber classification – Acceptance angle, acceptance cone and numerical aperture of fiber – Optical fiber bundles and cables – Fiber splices, connector and couplers – Fiber attenuation – Dispersion in optical fiber – Manufacturing of fiber – Advantages/ disadvantages of using optical fiber as communication medium – Various application area of optical fiber.

UNIT IV: LIGHT SOURCES FOR OPTICAL FIBRES SYSTEM

LED – Processes – Structures of LED – Modulation Bandwidth of LED – LASER – Types of laser - Application of laser Organic LEDs – Photo Detectors – characteristics – photo emissive photo detector – P-N Junction photo Detector – PIN photo diode- APD-photo Transistor –bit error rate- optical Transmitter-optical receiver – Repeater- MUX-DMUX-Line coding- Fibre optic switches – Bypass switches.

UNIT – V: PAGING & WIRELESS DATA NETWORK

Introduction – Paging and Messaging system – Wireless Local Area Network – LAN – Ethernet Bridges – Radio LANs – IEEE 802.11 – Blue tooth – Wireless Bridges- Wireless Modem- Wireless Packet Data Services.

BOOK FOR STUDY

1. Taub and Schilling, "Principles of communication systems", 2nd edition, New Delhi: Tata McGraw Hill Ltd., 1998.
2. Anuradha De, "Optical fibre & LASER, principles & applications", New age international publishers.
3. Joseph C, Palais, "Fiber optic communications", fourth edition, Prentice Hall international Inc, Agarwal, D.C, "Fiber optic communication", 2nd edition, Wheeler publishing, 1998.
4. Roy Blake, "Wireless Communication Technology", First Reprint, 2001, Thomson Asia P Ltd. Singapore.

BOOK FOR REFERENCE

1. Taub and Schilling, "Electronic communications", Bell & Howell Company, 1992.
2. J. G. Proakis, "Digital Communication", 4th edition, McGraw – Hill.
3. G. Keiser, "Optical Fiber Communications", 3rd edition, McGraw-Hill.

SECTIONS

Unit	Book number	Sections
1	1	5.1-5.5; 5.9-5.15
2	1	6.2 - 6.6; 6.8 - 6.10
3	2	1.7; 2.1 - 2.12
4	3	6.1 – 6.7; 7.1, 7.3 – 7.5
5	4	Chapter 13

SEM: II *Hours: 6*

12PEL2105 *Credit: 5*

EMBEDDED SYSTEM I MICROCONTROLLERS AND PROGRAMMING WITH IDEs

Objective

- To provide basic concepts on two typical microcontrollers and develop skill in programming.

UNIT - I: 8051 MICROCONTROLLER

Introduction to 8051 microcontroller – flag bits and PSW – Register banks and stack – Jump –loop – call instructions – I/O port programming – Addressing modes – Arithmetic and logic instructions

UNIT - II: PERIPHERALS OF 8051 AND KEIL IDE

8051 Timer and counter programming - Serial communication - Interrupts – Introduction to Keil – Working with keil IDE – Development flow for the keil IDE: Interfaces offered by keil IDE – Choosing the best memory model for your C51 program – Data types – Variables – Conditional and looping statements – Arrays and string manipulation – Functions – Passing values to a function – Pointers – Passing array and string to function – Program to interface LED and Switches – C program for timer based delay – Writing ISR in C – UART programming in C.

UNIT - III: INTRODUCTION TO AVR MICROCONTROLLERS

Introduction to AVR microcontrollers – Microcontroller's series in AVR family – Salient features of AVR controllers – AVR CPU core architecture – Features of atmega8 – Architecture of atmega8 – Registers – Program memory - SRAM – Power management and sleep mode – Methods of resetting microcontroller – Principles of watch dog timer & brown out detector – I/O port structure & associated registers – Instruction set summary.

UNIT - IV: ATMEGA 8 PERIPHERALS & AVR STUDIO

Peripherals: EEPROM and associated registers – accessing EEPROM (Read & Write) – ADC block diagram – accessing ADC through free running & single conversion mode – analog comparator and its accessing – TWI – SPI – USART- Register organization: interrupts – timer/counter – AVR Studio: Introduction – Creating projects – Simulating a program – Simulating peripherals – Debugging – Running a program

UNIT - V: MICROCONTROLLER REAL TIME APPLICATIONS:

8051 MICROCONTROLER: Assembly language program: Interfacing a stepper Motor. C language programming: Interfacing an ADC 0809 – key board interfacing – DAC 0808 interfacing – Temperature sensor interfacing

AVR MICROCONTROLLER: Assembly language: LCD Interfacing. C language Programming: Interfacing LED – Driving Relays with AVR – Using internal PWM of AVR microcontroller to control the speed of a DC motor.

BOOKS FOR STUDY

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi., "The 8051 Microcontroller and Embedded systems", Person Education, 2004.
2. ATMEGA 8L Datasheet from ATMEL.

BOOK FOR REFERENCE

Ayala, Kenneth, "The 8051 Microcontroller", Upper Saddle River, New Jersey Prentice Hall, 2000.

SECTIONS

UNIT	BOOK	SECTION
I	1	Chapters 2, 3, 4, 5, 6, 7
II	1	Chapter 9, 10, 11 and Lecturer Notes for KEIL IDE
III	2	Relevant sections from data sheet
IV	2	Relevant sections from data sheet and Lecturer Notes for AVR studio
V	2	Lecturer Notes

SEM: II *Hours: 6*

12PEL2106 *Credit: 5*

DIGITAL SIGNAL PROCESSING

Objective

- To impart the algorithms of Signal Processing.

UNIT–I: DISCRETE FOURIER TRANSFORMS AND FAST FOURIER TRANSFORM

Frequency analysis of discrete-time signal – Properties of DFT– Problems. IDFT: Definition – Problems. FFT: Definition – Radix-2 FFT algorithm – Decimation-in-time – decimation-in-frequency – Problems – Inverse FFT – Problems – Linear convolution: Cross table method – Matrix method – Circular convolution: Circle method – Matrix method – DFT-IDFT method – Section convolution: Overlap-save method – overlap-add method.

UNIT – II: FINITE IMPULSE RESPONSE (FIR) FILTERS

Symmetric and antisymmetric FIR filters – Design of linear-phase FIR filters using windows: Rectangular – Blackman – Hamming – Hanning – Design of linear-phase FIR filters by frequency-sampling method – Optimum equiripple linear-phase FIR filter – Comparison of design methods for linear-phase FIR filter.

UNIT – III: INFINITE IMPULSE RESPONSE (IIR) FILTERS

IIR filter design by approximation of derivatives – Impulse invariance method – Bilinear transformation – Characteristics of analog filters: Butterworth – Chebyshev – Elliptic– Frequency transformation in the analog and digital domain.

UNIT – IV: DISCRETE-TIME SYSTEMS IMPLEMENTATION AND MULTIRATE DSP

Representation of numbers – Quantization of filter coefficients – Round-off effects in Digital filters. Multirate DSP: Introduction – Decimation by a factor D – Interpolation by a factor I – Sampling rate conversion by a rational factor I/D –Implementation of sampling rate conversion – Multistage implementation.

UNIT – V: APPLICATIONS OF DSP

Speech Processing – Speech analysis – Speech coding – Sub band coding – Channel vocoder – Homomorphic vocoder – Digital processing of audio signals – Radar signal processing – DSP based measurement system – Application of Multirate: Sub band coding of speech signals – Transmultiplexers.

BOOKS FOR STUDY

1. Poornachandra S., "Signals and System", Vijay Nicole imprints Pvt. Ltd., 2004
2. John G. Proakis, Dimitris G. Manolakis, "Digital Signal Processing Principles, Algorithm and Applications", 4th Edition, PHI, 2007.
3. Ramesh Babu P., "Digital Signal Processing", 4th Edition, Scitech Publication Pvt. Ltd, 2007.

BOOK FOR REFERENCE

1. Alan V. Opphenehim, Ronald W. Schafer, "Digital Signal Processing", 2nd Edition, PHI, 2004.
2. Salivahanan S, Vallavaraj A, Gnanapriya C, "Digital Signal Processing", Tata McGraw Hill Publishing, 2003.

SECTIONS

Unit	Book	Sections
I	1	9.1 - 9.6, 4.4 - 4.6
II	2	10.2.1 - 10.2.4, 10.2.7
III	2	10.3 - 10.4
IV	2	9.4 - 9.6, 11.1- 11.6
V	3	10.1- 10.10
	2	11.9.4, 11.10.2

SEM: II *Hours: 4*

12PEL2202A *Credit: 4*

ELECTIVE - II: PROGRAMMABLE LOGIC CONTROLLERS AND PROGRAMMING

Objective

- To learn the concepts of PLC.
- To Deal with Ladder Logic programming and Simulation in IDE using OMRON and KEYENCE.

UNIT-I: INTRODUCTION TO PLC, LADDER DIAGRAM FUNDAMENTALS

Introduction to PLC – PLC Vs Microcontroller – Basic Components and their Symbols – Control Transformers – Fuses – Switches – Relays – Time Delay Relays – Fundamentals of Ladder Diagram – Basic diagram framework – Wiring Reference Designators – Boolean Logic & Relay Logic – AND-OR & OR-AND – Ground Test – The Latch – Two handed Anti-Tie Down, Anti-Repeat – Combined Circuit – Machine Control Terminology.

UNIT-II: PROGRAMMABLE LOGIC CONTROLLER & FUNDAMENTAL PROGRAMMING

PLC Configurations – System Block Diagram – Update – Solve the Ladder – Physical Components Vs Program components – Light Control – Internal Relays – Disagreement Circuit - Majority Circuits – Oscillators – Holding Contacts - Always ON & OFF Contacts – Ladder Diagrams having complex Rung.

UNIT - III: ADVANCED PROGRAMMING TECHNIQUES AND OVERVIEW OF MNEMONIC PROGRAMMING CODE

Ladder Program execution Sequence – One Shot– JK-Flip Flop – Counters – Sequencers – Timers – Master control Relays and control Zones – AND Ladder Rung – Entering Normally Closed Contacts – OR Ladder Rung – Simple Branches – Complex Branches.

UNIT- IV: WIRING TECHNIQUES, ANALOG I/O & SENSORS

PLC Power Connection – Input wiring – Inputs having a single common – Isolated inputs – Output wiring – Relay outputs – Solid

state outputs – Analog (A/D) inputs – Analog (D/A) output – Sensor Output classification – Connecting Discrete sensors to PLC inputs – Proximity sensors – Optical Proximity Sensors.

UNIT- V: WORKING IN OMRON & KEYENCE IDE WITH LADDER LOGIC

Introduction to OMRON & KEYENCE – Creating a project – Ladder Programming – Compiling and Executing – Ladder Programs – Logic Gate functions (AND, OR, NOT, NAND, NOR, XOR) – Using Timers (ON delay timer, OFF delay timer, one shot pulse, flashing pulse), Counters – Using Calendar functions

BOOK FOR STUDY

1. John R. Hackworth, Frederick D. Hackworth, Jr., "Programmable Logic Controllers, Programming Methods and Applications", New Delhi: Pearson Education, 3rd edition.

BOOK FOR REFERENCE

1. John. W .Webb, Renoald A. Rein, "Programmable Logic Controller Principles and Application", Prentice Hall India, 5th Edition.

SECTIONS

UNIT	BOOK	SECTIONS
1	1	Lecturer Notes (for 1st two topics), 1.1 – 1.3
2	1	2.2 – 2.6, 3.1 – 3.9
3	1	4.1, 4.2, 4.4, 4.8 – 4.11, 5.1 – 5.5
4	1	6.1 – 6.7, 7.1, 7.2, 8.1 – 8.3, 8.7
5	-	Lecturer Notes

SEM: II *Hours: 4*

12PEL2202B *Credit: 4*

ELECTIVE - II: MOBILE COMMUNICATION

Objective

- To learn the concepts of Mobile Communication.

UNIT - I: TELECOMMUNICATIONS SYSTEMS

GSM: mobile services – System architecture – Radio interface – Protocols – Localization and calling – Handover – Security – New data services.

UNIT - II: MOBILE NETWORK LAYER

Mobile IP: goals, assumptions and requirements – Entities and terminology – IP packet delivery – Agent discovery – Registration – tunneling and encapsulation – Optimizations – Reverse tunneling – IPv6 – IP micro-mobility support – Dynamic host configuration protocol.

UNIT - III: MOBILE TRANSPORT LAYER

Traditional TCP: congestion control – Slow start – Fast transmit/fast recovery – Implications on mobility – Classical TCP improvements: indirect TCP – Snooping TCP – Mobile TCP - Fast transmit/fast recovery – Transmission/time-out freezing – selective transmission – Transaction-oriented TCP – TCP over 2.5/3G wireless networks - Performance enhancing proxies.

UNIT - IV: WIRELESS APPLICATION PROTOCOL (version 1.x)

Architecture – Wireless datagram protocol – Wireless transport layer security – Wireless transaction protocol – Wireless session protocol – Wireless application environment – Wireless markup language – WML Script – Wireless telephony application – Push architecture – Push/pull services – i-mode – syncML – WAP 2.0.

UNIT - V: SYMBIAN OS FUNDAMENTALS

System structure - Hardware resource - Software basics- Processes, threads and Switches - Executable programs - Power

management - The Kernel and E32 - Devices drivers – Timer – memory - files - Event handling – Perspectives even handling - Active objects - Multitasking and Preemption - Servers - API coverd- Fundamental Types - Naming convention - Function – API, Templates - Casting - Classes, Design patterns Class diagrams and UML.

BOOK FOR STUDY

1. Jochen Schiller, "Mobile communications", second edition, Pearson Education Ltd.
2. Richard Harrison, " Symbian OS C++ for mobile phones", volume 2, Wiley publication.

BOOK FOR REFERENCE

1. W.C.Y. Lee, "Mobile Communication Engineering", 2nd edition, McGraw- Hill, 1998.

SECTIONS

Unit	Book No.	Sections
1	1	4.1.1- 4.1.8
2	1	8.1.1 – 8.1.10;8.2
3	1	Chapter 9
4	1	10.3.1 – 10.3.12
5	2	2.1-2.17, 3.1- 3.9

SEM-II *Hours/Week - 4*

12PSK2401 *Credits - 4*

IDC-I: SOFT SKILLS

Unit 1: Effective Communication & Resume Writing 12 Hours

Effective Communication

Definition of communication, Process of Communication, Barriers of Communication, Non-verbal Communication, Johari Window, The Art of Listening, Kinesthetic, Production of Speech, Organization of Speech, Modes of delivery, Conversation Techniques, Dialogue, Good manners and Etiquettes.

Resume Writing

What is Resume? Types of Resume? Chronological, Functional and Mixed Resume, Steps in preparation of Resume.

Unit II: Group Discussion, Interview Skills & Team Building 18 hours

Group Discussion (GD)

Group Discussion Basics, GD Topics for Practice, Points for GD Topics, Case-Based and Article based Group Discussions, Points for Case Studies, and Notes on Current Issues for GD.

Interview Skills

Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews.

Team Building

Team Vs Group – synergy, Stages of Team Formation, Dabbawala-Case Study-PPT, Broken Square-Exercise, Group dynamics, Win as much as you win- Exercise, Leadership – Styles, Work ethics.

Unit III: Personality Development, Attitude & Motivation 18 hours

Personality Development

Self awareness, Assertiveness, Goal setting, Problem-solving, Conflict and Stress Management, Decision-making skills, Positive and Creative thinking, Lateral thinking, Time management.

Attitude

Concept, Significance, Factors affecting attitudes, Positive attitude, Advantages, Negative attitude, Disadvantages, Ways to develop positive attitude, Difference between Personalities having positive and negative attitude.

Motivation

Concept of motivation, Significance, Internal and external motives, Importance of self-motivation, Factors leading to demotivation.

Unit IV: Numerical Ability **8 hours**

- Average, Percentage
- Profit and Loss**,** Simple Interest, Compound Interest
- Time and Work, Pipes and Cisterns
- Time and Distance**,** Problems on Trains**,** Boats and Streams
- Calendar**,** Ratios and Proportions.

Unit- V: Test of Reasoning **8 hours**

Verbal Reasoning

- Series Completion, Analogy
- Data Sufficiency, Assertion and Reasoning
- Logical Deduction

Non-Verbal Reasoning

- Series
- Classification

References

* Aggarwal, R.S. *Quantitative Aptitude*, S.Chand & Sons.
* Aggarwal, R.S. (2010). *A Modern Approach to Verbal and Non Verbal Reasoning*, S.Chand & Co., Revised Edition.
* Alex, K. (2009). *Soft Skills*. New Delhi S. Chand & Company Ltd.

* Covey, Stephen. (2004). *7 Habits of Highly effective people,* Free Press.

* Egan, Gerard. (1994). *The Skilled Helper* (5th Ed), Pacific Grove, Brooks/Cole.

* Khera, Shiv (2003). *You Can Win.* Macmillan Books, Revised Edition.

* Murphy, Raymond. (1998). *Essential English Grammar*, 2nd ed., Cambridge University Press.

* Prasad, L.M. (2000). *Organizational Behaviour*, S.Chand & Sons.

* Ravindran, G., Elango, S.P.B., Arockiam, L. (2009). *Success through Soft skills*, IFCOT Publications.

* Sankaran, K. & Kumar, M. *Group Discussion and Public Speaking*, M.I. Pub, Agra, 5th ed., Adams Media.

* Schuller, Robert. (2010). *Positive Attitudes*, Jaico Books.

* Thamburaj, Francis (2009). *Communication Soft skills*, Grace Publications.

* Trishna's (2006). *How to do well in GDs & Interviews*, Trishna Knowledge Systems.

** Yate, Martin. (2005). H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting**

SEM: III *Hours: 6*

12PEL3108 *Credit: 5*

EMBEDDED SYSTEM – II: PIC CONTROLLER AND RTOS

Objective

- To impart knowledge about the protocols and interfacing techniques using PIC microcontroller and RTOS.

UNIT I - PIC18FXX2 Architecture & C Programming Language

PIC18FXX2 Architecture: Program Memory Organization – Data Memory Organization – The Configuration Registers – Parallel I/O Ports – Timers – Capture/Compare/PWM Modules (CCP) – Analog-to-Digital Converter (A/D) Module – Interrupts – Structure of a mikroC Program – PIC Microcontroller Input-Output Port Programming – Programming Examples.

UNIT II - Libraries Functions & PIC18 Development Tools

mickroC Functions: Function Prototype – Function Prototypes – Passing Arrays to Functions – Passing Variables by Reference to Functions – Variable Number of Arguments –Function Reentrancy – Static Function Variables – mikroC Built-in Functions – mikroC Built-in Functions – mikroC Library Functions – Software Development Tools – Hardware Development – mikroC Integrated Development Environment (IDE).

UNIT III - Applications of PIC18FXX2

Serial Communication - Based Calculator – The SD Card: SPI Bus – Operation of the SD Card in SPI Mode – mikroC Language SD Card Library Functions – Read/Write to SD Card Sectors – Temperature Logger – USB States – USB Bus Communication – Descriptors : Device – Configuration – Interface – HID – Endpoint – PIC18 Microcontroller USB Bus Interface – mikroC Language USB Bus Library Functions – USB-Based Microcontroller Input/output

UNIT IV - Real –Time Operating System

Operating System – Multitasking OS – Scheduler algorithms – Priority inversion – Memory model – Memory management

address translation – Commercial OS – Resource protection – Linux – Disk partitioning

UNIT V - Debugging Techniques and Application of RTOS

Debugging techniques – Role of development system – Emulation techniques – Benchmark examples – Creating software state machines – Design examples: Burglar alarm system – Digital echo unit.

BOOK FOR STUDY

1. Dogan Ibrahim, "Advanced PIC Microcontroller Projects in C from USB to RTOS with the PIC18F Series", Newnes Publication.
2. Steve Heath, " Embedded Systems and Design", 2nd Edition, EDN, 2005.

BOOK FOR REFERENCE

1. Datasheet of PIC 18F series Controller
2. Sam Siewert, "Real-Time Embedded systems and components", DA Vinci engineering series, 2007.

SECTIONS

Units	Books	Sections
I	1	2.1.1 – 2.1.12, 3.1, 3.1.1 – 3.1.20, 3.2, 3.3
II	1	4.1: 4.1.1 – 4.1.6, 4.2, 4.3: 4.3.1 – 4.3.7, 5.1:5.1.1 – 5.1.5, 5.2:5.2.1 – 5.2.5, 5.3: 5.3.1 – 5.3.5
III	1	Project 6.10, 7.1, 7.2, Project 7.2, 7.4, 8.1 – 8.6, Project 8.2
IV	2	Chapter 7
V	2	Chapter 9, 12, 13

SEM: III *Hours: 6*

12PEL3109 *Credit: 5*

VLSI DESIGN AND VHDL PROGRAMMING

Objective

- To learn the basics of VLSI technology and VHDL programming.

UNIT-I: SEMICONDUCTOR DEVICES FOR VLSI TECHNOLOGY

Basic MOS transistor – Enhancement and depletion mode transistor action – NMOS fabrication – CMOS fabrication – BICMOS technology – Pass transistor – nMOS inverter, CMOS and BICMOS inverter – Latch-up in CMOS & BICMOS circuits - MOS layer – Stick diagram – Design rules and layout diagram – Lambda based design rules – Contact cuts – Double metal MOS process rules – CMOS lambda based design rules- symbolic diagram.

UNIT – II: SCALING AND TESTING FOR VLSI SYSTEM

Basic circuit concepts – Sheet resistance – Capacitance – Delays – Driving large capacitive loads – Propagation delays – Wiring capacitance -Scaling factor for device parameter factors – Limitation of scaling - Switch logic - Pass transistors and transmission gates - gate logic - The inverter - CMOS logic – Pseudo nMOS logic – Dynamic CMOS logic – Clocked CMOS – CMOS domino logic – n-p CMOS logic - Real world VLSI design – Design styles and philosophy – The interface with the fabrication house – CAD tools for design and simulation – Aspects of design tools – Graphical entry layout – Design verification prior to fabrication - DRC – Circuit extractors - Test and test ability – System partitioning.

UNIT – III: BASIC CONCEPTS OF VHDL

VHDL Terms - Describing Hardware in VHDL - Entity - Architectures - Concurrent Signal Assignment - Event Scheduling - Statement Concurrency - Structural Designs - Sequential Behavior - Architecture Selection - Configuration Statements - Power of Configurations - Behavioral modeling– Transport versus inertial delay – Simulation deltas – Drivers – Generics – Block statements –

sequential processing – Process statement – Signal assignment Vs variable assignment – Sequential statement.

UNIT-IV: DATA TYPES AND SYNTHESIS CONCEPTS OF VHDL

Object types – Data types – File type caveats – Subtypes Register transfer level description – Constraints – Attributes – Technology libraries – Synthesis – Simple gate – IF control flow statements – Case control flow statements – Simple sequential statements – Asynchronous reset – Asynchronous preset and clear – More complex sequential statements – State machine example – RTL simulation – VHDL synthesis – Function Gate-level verification – Place and route – Post layout timing simulation – Static timing.

UNIT-V: CIRCUIT DESIGN AND SIMULATION USING QUARTUS-II IDE

Quartus II Design Flow - Design Entry Flow - Creating a Project and implementing – Introduction to SOPC and Intellectual property - Constraint Entry: Constraint & Assignment Entry Flow - Synthesis Design Flow - Analyzing Synthesis Results With the Netlist Viewers - Place and Route Design Flow - Analyzing Fitting Results - Using the Chip Planner to Analyze Results - Optimizing the Fit – Running the TimeQuest Timing Analyzer - Specifying Timing Constraints - Viewing Timing Information for a Path - Viewing Timing Delays with the Technology Map Viewer - Using the Chip Planner - Using the Timing Optimization Advisor - Power Analysis with the PowerPlay Power Analyzer - SignalTap II Debugging Flow - Using the SignalTap II Logic Analyzer - Analyzing SignalTap II Data - Using SignalProbe - Using the Chip Planner for Debugging - Identifying Delays & Critical Paths With the Chip Planner - EDA Tool Design Flow – Introduction to NIOS II IDE.

BOOKS FOR STUDY

1. Douglas A. Pucknell & Kamran Eshraghian, "Basic VLSI Design", 3rd edition, Prentice hall of India Pvt. Ltd., New Delhi
2. Douglas L. Perry, "VHDL programming by example", 4th edition, Tata McGraw Hill, New Delhi.

BOOK FOR REFERENCE

1. Wayne Wolf, "Modern VLSI design", 4th edition, PHI, 2009.
2. Sudhakar Yalamanchili, "VHDL Starters Guide", PHI, 2005.

SECTIONS

Units	Book	Sections
I	1	1.1 – 1.11, 2.5-2.10, 2.12.3- 2.14, 3.1-3.3.4, 3.8
II	1	4.1-4.11, 5.1-5.6, 6.1-6.3.4.5, 10.8-10.13.4.2
III	2	Chapters 1, 2, 3
IV	2	Chapters 4, 9, 10, 11
V		Lecture Notes

SEM: III *Hours: 4*

12PEL3203A *Credit: 4*

ELECTIVE - III: MEDICAL ELECTRONICS

Objective

- To get exposure in various measuring techniques in the field of bioelectronics.

UNIT - I: ELECTRODES & TRANSDUCERS

Origin of bioelectric signals – Recording electrodes – Skin contact impedance – Electrodes for ECG – Electrodes for EEG – electrodes for EMG – Electrical conductivity of electrode jellies and cream – Transducers for biomedical parameters (table) – Pressure transducers – Pulse sensors – Respiration sensors.

UNIT - II: BIOMEDICAL RECORDERS

Basic recording system – General considerations for bioelectric recorder amplifiers – Sources of noise in low level recording circuits – Preamplifiers – Main amplifier & driver stage – Writing systems – Electrocardiograph – Phonocardiograph – Electroencephalograph – Electromyograph.

UNIT- III: MEASUREMENT & ANALYSIS TECHNIQUES IN BLOOD

Blood flow meters: Electromagnetic blood flow meter– Blood gas analyzers: blood pH measurement – Measurement of blood pCO_2 – Blood pO_2 measurement- Blood cell counters: methods of cell counting – Coulter counters - Automatic recognition and differential counting of cells.

UNIT- IV: MODERN IMAGING SYSTEMS

X-ray machine – CT scanner: basic principle – Contrast scale – system components – NMR: principles of NMR imaging – Fourier transform of the FID – Bloch equation - Image reconstruction techniques – Discrimination based on relaxation rates – Basic NMR components – Applications, biological effects and advantages of NMR imaging system.

UNIT - V: ADVANCES IN BIOMEDICAL INSTRUMENTATION

Pacemakers - Artificial heart valves – Defibrillators - Ventilators – Audiometers – Anesthesia machine – Angiography – Endoscope – Cryogenic surgery.

BOOK FOR STUDY

1. R. S. Khandpur, "Handbook of biomedical instrumentation", Tata McGraw-Hill Publisher, New Delhi.
2. Dr. M. Arumugam, "Biomedical instrumentation".

BOOK FOR REFERENCE

1. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, "Biomedical instrumentation and measurements", 2nd edition, Prentice Hall of India Pvt Ltd.

SECTIONS

Unit	Book No	Sections
1	1	Pg: 3-12; 14-30; 31-43; 54-57
2	1	Pg: 58-72; 94-117
3	1	Pg: 275-281; 335 – 348; 369-374; 380-384
4	1	Pg: 407-428; 432-457
5	2	5.2, 5.2.1, 5.2.2, 5.4, 5.5, 6.8, 7.7, 7.7.1-7.7.4, 7.12, 10.4, 10.5

SEM: III *Hours: 4*

12PEL3203B *Credit: 4*

ELECTIVE - III: MEMS AND NANO ELECTRONICS

Objective

- To develop expertise in the MEMS field through studying in depth advanced micro/nano fabrication and its application.

UNIT – I: MEMS INTRODUCTION

MEMS or MST, Micromachining, Materials for MEMS-Silicon compatible - Slicon, silicon dioxide and nitride, thin metal films and polymers, other materials - Glass and fused quartz, silicon carbide and diamond, shape memory alloys - Important material properties and physical effects.

UNIT – II: Micro and Nano fabrication

Processes for micromachining Processes for Micromachining, Basic Process Tools, Epitaxy, Oxidation, Sputter Deposition, Evaporation, Chemical-Vapor Deposition, Spin-On Methods, Lithography, Etching, Supercritical Drying, Self-Assembled Monolayers, SU-8 Photosensitive Epoxy

UNIT – III: MEM Structures and systems in RF applications

Signal integrity in RF MEMS-Micromachined passive components, croelectromechanical Resonators, Microelectromechanical switches.

UNIT- IV: NANO LITHOGRAPHY AND NANO MATERIALS

Introduction to Nano lithography-Cross cutting technologies-Emerging nano lithography-Carbon Nano tubes- Application of Nano tubes: for storage application ,for field emission , for sensor application ,and for electronic application – Introduction to Quantum dots-Introduction to nano composites.

UNIT -V: QUANTUM COMPUTATION AND MAGNETO RESISTIVE MATERIALS AND DEVICES

Nano structures for quantum computation-Quantum computation algorithms- Requirements for physical realizations of quantum computers-Introduction to magnetic materials and devices– Acronyms for AMR, GMR, TMR, BMR and CMR-semiconductor spintronics.

BOOK FOR STUDY

1. Nadim Maluf, Kirt Williams, "Introduction to microelectromechanical systems engineering" 2004, Second edition, Artech house, Boston.
2. Massimiliano Di ventra, Stephane Evory and James R. Hefline, Jr., "Introduction to nanoscale science and technology", 2004, Kluwer Academic Publishers, Boston, Dordrecht, New York, London.

SECTIONS

Unit	Book	Chapter and Section
Unit I	1	1.2 & 1.3 and chapter 2 complete
Unit II	1	Chapter 3 complete
Unit III	1	Chapter 7 complete
Unit IV	2	1.1, 1.2, 1.6, 6.1, 6.6, 6.6.1, 6.6.3, 6.6.4, 6.6.7, 7.1,8.1
Unit V	2	12.1,12.2, 12.4, 13.1, 13.2.4, 13.3.6.3

SEM: III *Hours: 4*

12PEL3402 *Credit: 4*

IDC – II: COMPUTER HARDWARE

Objectives

- To learn the basic hardware configuration of a computer system.

UNIT-I: MOTHER BOARDS, CHIPSET, AND CONTROLLERS

Motherboard: Motherboard designs - Motherboard form factors - Motherboard connectors - Back panel connectors - Onboard connectors - Front panel connectors. Chipset and controllers: Chipset groupings - controller chips - Bus architecture - Keyboard controller - Chipset and their functions - chipset characteristics - Built in controller.

UNIT-II: BIOS AND SYSTEM RESOURCES

BIOS chips-ROM BIOS-BIOS setup-BIOS activities-Cold Boots Vs Warm Boots - BIOS startup screen - System configuration data - Standard settings - Advanced features - Plug and Play - Extended system configuration data.

UNIT-III: SECONDARY STORAGE DEVICES

Hard Disk Drive - Logic, controller boards - Connectors and Jumpers-Hard disk Interfaces-FDD-Formatting CD-ROM: Technology of the CD and CDROM.

UNIT-IV: EXPANSION SLOTS AND MONITOR

Expansion buses: Serial and parallel ports - USB & IEEE1394 Interfaces - Different cards. Monitor: PC monitor - CRT displays - Dots and Pixels - LCD's - Signals and connectors – Resolution.

UNIT–V: PRINTER, KEYBOARD AND MOUSE

Printer: Printer characteristics - Printer speed - Text and Graphics - Fonts-Print styles - Print sizes - Font classifications. Keyboard and Pointing devices: Keyboard layouts - Keyboard controllers - Keyboard cable. Mouse: Inside the Mouse - Mouse connectors -Wheel Mouse - Optical Mouse

BOOK FOR STUDY

Material in book form (Department Preparation).

SEM: IV *Hours: 6*
12PEL4112 *Credit: 5*

EMBEDDED SYSTEM – III: ARM AND EMBEDDED LINUX

Objective

- To study 32 bit microcontroller and the concept of operating system in embedded system.

UNIT I: ARM 7 CPU CORE

Outline – Pipeline – Registers – Current Program status register – exception modes – system peripherals: bus structure – memory map – register programming – memory accelerator module – LPC2000 Interrupt system – Interrupt structure – FIQ Interrupt – Vector IRQ – Non vectored interrupts.

UNIT II: PERIPHERAL INTERFACING

General IO – General Purpose Timers – PWM Modulator – Real Time Clock – UART – I2C Interface – SPI interface – Analog to Digital Converter – Digital to Analog Converter – CAN Controller.

UNIT III: INTRODUCTION TO EMBEDDED LINUX

Embedded Linux – Introduction – Advantages- Embedded Linux Distributions - Architecture - Linux kernel architecture - User space – linux startup sequence - GNU cross platform Tool chain.

UNIT IV: BOARD SUPPORT PACKAGE AND EMBEDDED STORAGE

Inclusion of BSP in kernel build procedure - The bootloader Interface – Memory Map – Interrupt Management – PCI Subsystem – Timers – UART – Power Management – Embedded Storage – Flash Map – Memory Technology Device (MTD) –MTD Architecture - MTD Driver for NOR Flash – The Flash Mapping drivers – MTD Block and character devices – mtdutils package – Embedded File Systems – Optimizing storage space – Turning kernel memory

UNIT V: EMBEDDED DRIVERS AND APPLICATION PORTING

Linux serial driver – Ethernet driver – I2C subsystem – USB gadgets – Watchdog timer – Kernel Modules – Application porting roadmap - Programming with pthreads – Operting System Porting Layer – Kernel API Driver - Case studies - RT Linux – uClinux

BOOKS FOR STUDY

1. The Insider's guide to the Philips ARM 7 based microcontrollers - An Engineer's introduction to the LPC2100 series – Trevor Martin.
2. P. Raghavan, Amol Lad, Sriram Neelakandan, 'Embedded Linux System Design and Development', Auerbach Publications 2006.

BOOKS FOR REFERENCE

1. ARM system Developers guide – Designing and optimizing system software – Andrew N.Sloss, Dominic Symes and Chris Wright.
2. ARM System-On-Chip by Steve Furber, II Edition.

SECTIONS

Units	Books	Sections
I	1	Chapter 1: Pg 10 – 15; Chapter 3: Pg 42 – 49; 66 – 73;
II	1	Chapter 4: Pg 78 – 104
III	2	1.2, 1.5, 3/3 – 2.5
IV	2	Chapter 3 and 4
V	2	Chapter 5 and 6

SEM: IV *Hours: 6*
12PEL4113 *Credit: 5*

PROGRAMMABLE DIGITAL SIGNAL PROCESSOR AND MATLAB

Objective

- To imparts the basics about the PDSP's and to develop the Programming skills on MATLAB.

UNIT – I: ARCHITECTURE OF FIXED POINT PDSP

Multiplier and multiplier accumulator (MAC) – Modified bus structure and memory access schemes – Multiple access memory – Multi ported memory – VLIW architecture – Pipelining – Special addressing modes in PDSP's – On-chip peripheral – Architecture of TMS 320 C5X.

UNIT – II: ASSEMBLY LANGUAGE INSTRUCTION AND PROGRAMMING

Syntax – Addressing modes – Load / Store instruction – Addition/Subtraction instruction – Move Instruction – Multiplication instruction – NORM instruction – Program control instruction – Peripheral control – Program for familiarization of the addressing modes – Program for familiarization of the arithmetic instruction – Real time signal processing program.

UNIT – III: ARCHITECTURE OF FLOATING POINT PDSP

Introduction – Overview of TMS 320C3X devices – Internal Architecture – CPU – CPU register file – Memory organization – Cache memory – Peripheral – Data format – Addressing modes – Groups of addressing modes – Assembly language instruction – Processing real time signal – Serial port – Capture and display of sine wave.

UNIT– IV: MATLAB

Desk top tools – Command Window – Launch Pad – Help Browser – Work space browser – Editor/Debugger – Matrices – Expression – Working with matrices – Basic plotting – Flow control

– Data structures – Scripts and functions – Example Programs: Representation of basic signals.

UNIT – V: MATLAB PROGRAMMING

Discrete convolution – Stability test – Fast Fourier transform – Butterworth analog filter: Low-pass filter – Butterworth digital IIR filter: Low-pass filter – FIR filter design using Window techniques – IIR filter design using-bilinear transformation – Up sampling a sinusoidal signal – Down sampling a sinusoidal sequence.

BOOK FOR STUDY

Venkataramani B, Bhaskar M., "Digital signal processors - Architecture, Programming and Applications", First Reprint, TATA McGraw Hill, 2003.

BOOKS FOR REFERENCE

1. Salivahanan S, Vallavaraj A, Gnanapriya C, "Digital Signal Processing", Tata McGraw Hill Publishing, 2003.
2. Rudra Pratap, "Getting started with MATLAB", version 6, Oxford University Press, 2004.

SECTIONS

Unit	Book	Sections
I	1	2.1-2.8,3.1-3.14
II	1	4.1-4.9,6.2-6.4
III	1	7.1-7.8,8.1-8.4, 9.5 - 9.7
IV		Lecture Notes
V		Lecture Notes

SEM: IV *Hours: 6*

12PEL4114 *Credit: 5*

POWER ELECTRONICS

Objective

- To discuss about the power electronics circuits in modern electronics devices

UNIT - I: FUNDAMENTAL OF POWER ELECTRONICS

Introduction to thyristors - Performance parameter of rectifiers - Phase control using SCR: Single phase half wave circuit with RL load and flywheel diode, Single phase full wave controlled rectifier with RL load, Three phase half controlled bridge with resistive load.- IGBT Fundamentals: Basic structure, Operation modes, output characteristics, Transfer characteristics, Switching characteristics, Latch up.

UNIT - II: TRIGGERING CIRCUITS FOR PHASE CONTROLLED RECTIFIERS

Magnetic firing circuit: Single phase circuit MMF Reset control, Voltage RESET control, Three phase magnetic amplifier firing circuit-Solid state firing circuit: Single phase inverse cosine firing circuit scheme, Carrier frequency gating circuit-Firing circuits using logic gates - Three phase inverse cosine control scheme - Timing wave multiplexing - Constant a firing scheme using UJT - Phase locked oscillator pulse timing controlled firing circuit.

UNIT - III: CHOPPERS

Chopper-Type A chopper- Series turn off chopper-Parallel capacitor turn of chopper-Single SCR chopper-Type B chopper-Type C four quadrant chopper-Pulse width modulated IGBT AC chopper: Introduction-Analysis-Triggering signal logic-Current sensing and over current protection-Application fields: (1)Energy saving control,(2) Voltage stabilizer, compensation of unbalanced system, (3) Filtering the upper harmonics,(4)Series compensation,(5) Excitation system of Brushless motor.

UNIT -IV: INVERTERS AND CYCLOCONVERTERS

Single-phase voltage source inverters-Voltage control in single- phase inverters-PWM inverters-Current source inverters-series inverters- Single-phase parallel inverters-Principle of cycloconverter operation.

UNIT - V: DC AND AC MOTOR CONTROL

Introduction to DC motor control- DC motor –Single phase SCR drive – Three phase SCR drive –Application of IGBT in DC motor control for home appliances-Introduction to AC motor control – Induction motor characteristics –Speed control methods of induction motor – Synchronous motor control.

BOOKS FOR STUDY

1. Dr. P. S. Bimbhra, "Power electronics", Khanna publishers, 4th edition, 2006.
2. P.C. Sen, "Power electronics", Tata McGraw-Hill Publishing Company limited, New delhi, 30th reprint, 2008.

BOOK FOR REFERENCE

Muhammad H. Rashid, "Power Electronics: Circuits, Devices and Applications", Pearson Education, 2009.

SECTIONS

Unit	Book	Chapters
I	1	3.7
	2	5.3 ; 5.7 ; 6.3, Lecture Notes
II	2	7.2, 7.3,7.7 .1, 7.11, 7.2.1, 7.3.1, 7.7.2, 7.2.2, 7.3.2, 7.7.3, 7.2.3, 7.6
III	2	9.40, 9.40.1, 9.40.2, 9.40.3, 9.40.4, 9.40.8, 9.40.9 Lecture Notes
IV	1	8.1, 8.5, 8.6, 8.8, 8.9, 8.10, 10.1
V	2	10.1, 10.2, 10.3, 10.4, 10.13, 10.14, 10.15, 10.21 Lecture Notes

SEM: I *Hours: 8*

12PEL1104 *Credit: 5*

ELECTRONICS PRACTICAL - I
ANALOG AND DIGITAL EXPERIMENTS
(Any 12 experiments)

1. Construct and study power supply with Single and Dual – High Current regulator & Short circuit protection.
2. Construct and study Op-Amp applications-I (Non-inverting, Inverting, Integrator, Differentiator, Unity gain amplifier)
3. Construct and study Op-Amp applications-II (Instrumentation Amplifier, V to I, I to V (4-20mA))
4. Construct and study Op-Amp applications-III (Clipper and Clamper)
5. Construct and study Op-Amp applications-IV (Comparator, Zero crossing detector, Window detector, Peak detector Precision rectifier)
6. FET amplifier design
7. Construct and study the 555 Applications (One Shot multivibrator, Square, VCO, FSK modulator & demodulator)
8. Construct and study the Power control rectifier using SCR, TRIAC and UJT
9. Study of sensor (Thermal, optical and mechanical)
10. Design of power amplifier (Class B and C)
11. K-map design for a three variable boolean expression
12. Design of counters based on state machine
13. Study of Adder, subtractor and IC based BCD adder and subtractor
14. Study of Encoder and Decoder
15. Study of Buffer, Latch, Transceiver
16. Study of Shift register (SISO, SIPO, PISO & PIPO) and Universal shift register IC
17. Study of multiplexer and de-multiplexer (Construction and chip study)
18. Design an active filer and study the performance using PSPICE (LP, HP, BP, Notch, AP using Op-amp)
19. Design an oscillator and study the performance using PSPICE (Hartley, Colpit's, Wein bridge, Phase shift oscillators)
20. Construction and Study of Flip-Flop (R-S, J-K, Clocked R-S, Clocked J-K, D and T FF) in LABVIEW
21. Data acquisition system using Parallel port in Labview
22. Construct and study the counter using Modelsim software (Synchronous and Asynchronous).

SEM: II *Hours: 8*

12PEL2107 *Credit: 5*

ELECTRONICS PRACTICAL - II
EMBEDDED EXPERIMENTS
(Any 16 experiments)

1. Interfacing of traffic light controller with 8085 microprocessor
2. Interfacing printer with 8085 microprocessor
3. 8086 microprocessor programming –I (Code conversion and segment register manipulation with 8086 microprocessor)
4. 8086 microprocessor programming –II (Largest, smallest, ascending and descending order)
5. Study of I/O ports in 8051 microcontroller –DIP switch, LED pattern generation, Matrix display and relay
6. Interfacing LCD with 8051 microcontroller
7. Interfacing push button switch and matrix keypad with 8051 microcontroller
8. Study of Timers (delay program) and counters(photo-interrupter) in 8051 microcontroller
9. Study of interrupts in 8051 microcontroller (External, timer and serial)
10. Study of serial communication in 8051 microcontroller and developing Labview based data acquisition system using serial communication
11. Study of I/O ports in AVR microcontroller- DIP switch, LED pattern generation, Matrix display and relay
12. Interfacing PWM in AVR microcontroller to control the speed of a DC motor
13. Interfacing of I2C in AVR microcontroller
14. Study of in-built ADC in AVR microcontroller
15. Study of timers and counters in AVR
16. Study of serial communication with AVR
17. Study of I/O ports in PIC microcontroller - DIP switch, LED pattern generation, Matrix display and relay
18. Study and interfacing SPI protocol in PIC microcontroller
19. Communicating through USB with PIC microcontroller input/output.
20. Study of timers and counters in PIC.
21. Study of serial communication with PIC.

SEM: III ***Hours: 8***

12PEL3110 ***Credit: 5***

ELECTRONICS PRACTICAL - III
VLSI, DSP AND ARM EXPERIMENTS
(Any 16 experiments)

1. Developing test bench for MUX and DMUX and verifying the same in ModelSIM
2. Implementing Full adder, Full subtractor, Multiplexer, divider and ALU in FPGA
3. Implementing Decoder, priority encoder, 8-bit comparator and 8-bit latch in FPGA
4. Implementing D flip-flop with synchronous and asynchronous inputs, 4-bit up/down counter with control input in FPGA (clock source to be switch)
5. Implementing clock divider, pulse counter (for delay program) shift register and barrel shifter in FPGA
6. Interfacing FPGA with PC through DB9 by implementing UART
7. Interfacing keypad with FPGA
8. Interfacing LCD with FPGA
9. Interfacing ADC with Xilinx Spartan-II
10. Implementing the design using FSM; (Moore & Melay State Machine)
11. Implementing I2C protocol in FPGA
12. Implementing SPI protocol in FPGA
13. Implementing softcore processor in FPGA (NIOS-II, Microblaze, Picoblaze, Mico8)
14. Application with Nios-II processor
15. Designing standalone CPLD system for interfacing stepper module using XC9572XC CPLD

16. Modeling a simple microprocessor with in FPGA
17. Waveform/signal generation (sine wave, square wave, sawtooth wave, AM wave, unit impulse, unit step, Ramp signal and expontial) in MATLAB / PDSP kit
18. Linear convolution, circular convolution, autocorrelation and cross correlation in MATLAB / PDSP kit
19. Sampling and aliasing in PDSP kit / MATLAB
20. Discrete fourier and inverse discrete fourier, fast fourier and inverse fast fourier transform in MATLAB / PDSP kit
21. Study of filters using simulink in MATLAB
22. Implementation of IIR filter in PDSP kit
23. Implementation of FIR filter in PDSP kit

Study of FIR filter

24. Study of I/O interfacing for ARM
25. Study of internal RTC of ARM
26. Study of closed loop control system using internal ADC and DAC.

INTER DEPARTMENTAL COURSE – IDC

BIOCHEMISTRY

12PSK2401 SOFT SKILLS

12PBI3402 FIRST AID MANAGEMENT

BIOTECHNOLOGY

12PSK2401 SOFT SKILLS

12PBT3402 APPLIED BIOTECHNOLOGY

BOTANY

12PSK2401 SOFT SKILLS

12PBO3402 HORTICULTURE & LANDSCAPING

CHEMISTRY

12PSK2401 SOFT SKILLS

12PCH3402 HEALTH CHEMISTRY

COMMERCE

12PSK2401 SOFT SKILLS

12PCO3402 FINANCIAL ACCOUNTING FOR MANAGERS

COMMERCE (CA)

12PSK2401 SOFT SKILLS

12PCC3402 CAREER PLANNING AND MANAGEMENT

COMPUTER APPLICATIONS

12PSK2401 SOFT SKILLS

12PCA3402 COMPUTER APPLICATIONS FOR SOCIAL SCIENCES

12PCA3403 FUNDAMENTALS OF PROGRAMMING

COMPUTER SCIENCE

12PSK2401 SOFT SKILLS

12PCS3402A FLASH

12PCS3402B WEB DESIGN

ECONOMICS

12PSK2401 SOFT SKILLS

12PEC3402 INDIAN ECONOMY

ELECTRONICS

12PSK2401 SOFT SKILLS

12PEL3402 COMPUTER HARDWARE

ENGLISH

12PSK2401 SOFT SKILLS

12PEN3402 ENGLISH FOR MEDIA STUDIES

HISTORY

12PSK2401 SOFT SKILLS

12PHI3402 INDIAN CONSTITUTION

HUMAN RESOURCE MANAGEMENT

12PSK2401 SOFT SKILLS

12PHR3402 FUNDAMENTALS OF HRM

INFORMATION TECHNOLOGY

12PSK2401 SOFT SKILLS

12PIT3402A FLASH

12PIT3402B WEB DESIGN

MATHEMATICS

12PSK2401 SOFT SKILLS

12PMA3402 OPERATIONS RESEARCH

PHYSICS

12PSK2401 SOFT SKILLS

12PPH3402 MODERN PHOTOGRAPHY

TAMIL

12PSK2401 நுண்வகைமைத்திறன்கள்

12PTA3402 அரசுப்பணித்தேர்வுத் தமிழ் - I