M. Sc. ELECTRONICS

SYLLABUS - 2014

SCHOOLS OF EXCELLENCE
with
CHOICE BASED CREDIT SYSTEM (CBCS)

SCHOOL OF PHYSICAL SCIENCES
St. JOSEPH'S COLLEGE (Autonomous)
Accredited at 'A' Grade (3rd Cycle) by NAAC
College with Potential for Excellence by UGC
TIRUCHIRAPPALLI - 620 002, INDIA

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS)

POST GRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to work towards the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from this academic year 2014 – 15, to standup to the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system allows the enhanced academic mobility and enriched employability of the students. At the same time this system preserves the identity, autonomy and uniqueness of every department and reinforces their efforts to be student centric in curriculum designing and skill imparting. These five schools will work concertedly to achieve and accomplish the following objectives.

- Optimal utilization of resources both human and material for the academic flexibility leading to excellence.
- Students experience or enjoy their choice of courses and credits for their horizontal mobility.
- The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.
- Human excellence in specialized areas
- Thrust in internship and / or projects as a lead towards research and
- The **multi-discipline** nature of the newly evolved structure (School System) caters to the needs of stake-holders, especially the employers.

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 correlation between credits and hours.

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

For PG courses a student must earn a minimum of 110 credits. The total number of courses offered by a department is given above. However within their working hours few departments / School can offer extra credit courses.

SUMMARY OF HOURS AND CREDITS PG COURSES - ELECTRONICS

Part	Semester	Specification	No. of Courses	Hours	Credits	Total Credits
1	I-IV	**Core Courses** Theory Practical	 9 3	 52 24	 45 15	
	II	**Self Paced Learning**	1	-	2	
	III	**Common Core**	1	6	5	**81**
	IV	**Comprehensive Examination**	1	-	2	
	III	**IPT and Literature Survey**	1	-	5	
	IV	**Dissertation & Viva Voce**	1	14	7	
2	III-IV	**Core Electives**	3	12	12	**12**
3	I-III	**IDC (WS)** **IDC (Common)** **IDC (BS)**	1 1 1	4 4 4	4 4 4	**12**
4	I-IV	**Additional Core Courses**	-	-	-	
5	IV	SHEPHERD & Gender Studies	-	-	5	**5**
		TOTAL		**120**		**110**

IDC – Inter Departmental Courses
BS – Between School
WS – Within School

Total Hours : **120**
Total Credits : **110**

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Course Pattern

The Post Graduate degree course consists of five vital components. They are cores courses, core electives, additional core courses, IDC's and SHEPHERD. Additional Core courses are purely optional on the part of the student. SHEPHERD, the extension components are mandatory.

CORE COURSE

A core course is the course offered by the parent department related to the major subjects, components like theories, practicals, self paced learning, common core, comprehensive examinations, dissertations & viva voce, field visits, library record form part of the core courses.

CORE ELECTIVE

The core elective course is also offered by the parent department. The objective is to provide choice and flexibility within the School. There are three core electives. It is offered in different semester according to the choice of the school.

ADDITIONAL CORE COURSES (If any)

In order to facilitate the students gaining extra credit, the additional core courses are given. The students are encouraged to avail this option of enriching with the extra credits.

INTER DEPARTMENTAL COURSES (IDC)

IDC is an interdepartmental course offered by a department / School for the students belonging to other departments / school. The objective is to provide mobility and flexibility outside the parent department / School. 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.

There are three IDC's. Among three, one is the Soft-Skill course offered by the JASS in the II Semester for the students of all the Departments. The other one is offered "With-in the school" (WS) and the third one is offered "Between the school" (BS). The IDC's are of application oriented and inter disciplinary in nature.

Subject Code Fixation

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

14	PXX	X	X	XX
↓	↓	↓	↓	↓
Year of Revision	PG Code of the Dept	Semester of the Part	Specification of Part	Running number in the part
14	**PEL**	**1**	**1**	**01**

For Example :

I M.Sc. Electronics, first semester, Design of Analog and Digital Circuits
The code of the paper is 14PEL1101.
Thus, the subject code is fixed for other subjects.

Specification of the Part

1. Core Courses: (Theory, Practical, Self paced Learning, Common Core, Comprehensive Examination, Dissertation and Viva-voce)
2. Core Electives
3. Additional Core Courses (if any)
4. Inter Departmental Courses (WS, Soft Skill & BS)
5. SHEPHERD & Gender Studies

EXAMINATION

Continuous Internal Assessment (CIA):

PG - Distribution of CIA Marks	
Passing Minimum: 50 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
CIA	**100**

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective + Descriptive elements; with the existing question pattern PART-A; PART-B; and PART-C
2. CIA Component III for UG & PG will be of 15 marks and compulsorily objective multiple choice question type.
3. The CIA Component III must be conducted by the department / faculty concerned at a suitable computer centres.
4. The 10 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS; TRUE / FALSE; and FILL-IN BLANKS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.

SEMESTER EXAMINATION

Testing with Objective and Descriptive questions

Part-A: 30 Marks

Objective MCQs only

Answers are to be marked on OMR score-sheet. The OMR score-sheets will be supplied along with the Main Answer Book. 40 minutes after the start of the examination the OMR score-sheets will be collected.

Part-B + C = 70 Marks

Descriptive

Part-B: 5 x 5 = 25 marks; inbuilt choice;

Part-C: 3 x 15 = 45 marks; 3 out of 5 questions, open choice.

The Accounts Paper of Commerce will have

Part-A: Objective = 25

Part-B: 25 x 3 = 75 marks.

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

EVALUATION

Percentage Marks, Grades & Grade Points

UG (Passing minimum 40 Marks)

Qualitative Assessment	Grade Points	Grade	Mark Range %)
Exemplary	10	S	90 & above
Outstanding	9	A+	85-89.99
Excellent	8	A	80-84.99
Very Good	7	B	70-79.99
Good	6	C	60-69.99
Pass (PG)	5	D	50-59.99
RA (PG)	0	RA	< 50

CGPA - Calculation

Grade Point Average for a semester is calculated as indicated here under:

$$\frac{\text{Sum total of weighted Grade Points}}{\text{Sum of Gredits}}$$

Weighted Grade Points is ***Grade point x Course Credits.*** The final CGPA will only include: Core, Core Electives & IDCs.

A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.

POSTGRADUATE		
CLASS	Mark Range (%)	
	ARTS	SCIENCES
Distinction	75 & above, first attempt	80 & above, first attempt
First	60 - 74.99	60 - 79.99
Second	50 - 59.99	50 - 59.99

Declaration of Result:

Mr./Ms. _____ has successfully completed the Post Graduate in _____ programme. The candidate's Cumulative Grade Point Average (CGPA) is _____ and the class secured _____ by completing the minimum of 110 credits.

The candidate has also acquired _____ (if any) additional credits from courses offered by the parent department.

_____

M. Sc. Electronics

Course Pattern - 2014 Set

Sem	Code	Subject Title	Hrs	Credits
I	14PEL1101	Design of Analog and Digital Circuits	6	5
	14PEL1102	Microprocessors and Programming	6	5
	14PEL1103	Signals and Systems	6	5
	14PEL1104	Electronics Practical – I	8	5
	14PEL1401	IDC (WS) – Electronics media	4	4
		Total for Semester I	***30***	***24***
II	14PEL2105	Embedded systems I – Microcontrollers and Programming with IDEs	6	5
	14PEL2106	Digital Signals Processing	6	5
	14PEL2107	Power Electronics	6	5
	14PEL2108	Electronics Practical – II	8	5
	14PEL2109	Self Paced Learning	-	2
	14PSS2401	IDC: Soft Skills	4	4
		Total for Semesters II	***30***	***26***
III	14PEL3110	Embedded system II - PIC controllers and RTOS	5	5
	14PEL3111	VLSI design and VHDL programming	5	5
	14PEL3112	Electronics Practical – III	8	5
	14PEL3113	IPT and Literature Survey		5
	14PEL3201 A	Sensors and Transducers OR	4	4
	14PEL3201 B	Communication Systems		
	14PEL3202 A	Programmable Logic Controllers and Programming / OR	4	4
	14PEL3202 B	Mobile Communication		
	14PEL 3402	IDC: (BS) Computer Hardware	4	4
		Total for Semester III	***30***	***32***
IV	14PEL4114	Embedded systems III – ARM and embedded Linux	6	5
	14PEL4115	Programmable digital signal processor and CCS	6	5
	14PEL4203 A	Medical Electronics **OR**	4	4
	14PEL4203 B	MEMS and Nano Electronics		
	14PEL4116	Dissertation & *Viva voce*	14	7
	14PEL4117	Comprehensive examination		2
		Total for Semester 4	***30***	***23***
I-IV	14PCW4501	SHEPHERD and Gender Studies		5
		Total Credits for all Semesters	***120***	***110***

Sem. I **Hours/Week: 6**

14PEL1101 **Credits: 5**

DESIGN OF ANALOG AND DIGITAL CIRCUITS

Objectives

- 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 - NMOS - PMOS 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: Types of 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.

Books 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.

Books 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	4	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/Week: 6**
14PEL1102 **Credits: 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
1	1	3.1- 3.4, 4.1- 4.6.5
2	1	7.1 – 7.7.4, 7.9- 7.11, 7.12.5
3	2	2.11 – 2.20, 3.6 – 3.29
4	2	4.1- 4.4, 4.8 – 4.33 7.1 – 7.42, 11.1 -11.10
5	2	15.16 – 15.24, 16.1 – 16.19, Lecture Notes

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Sem. I **Hours/Week: 6**
14PEL1103 **Credits: 5**

SIGNALS AND SYSTEMS

Objective

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

Unit - I: LAPLACE TRANSFORM

Definition of Laplace transform-Problems-Piecewise or sectional continuity-Sufficient condition for the existence of Laplace transform-Some properties of Laplace transform-Some methods for finding Laplace transforms-Laplace transform of some special function.

Unit - II: Fourier series

Definition and expansion of a function - Dirichlet conditions - Parselval's identity for Fourier series- Fourier's integral- Remark on convergence of Fourier series- Physical applications of Fourier series.

Unit - III: FOURIER TRANSFORM

Signals: Definition - Classification of signals - Basic operations on signals - Types of signals. Continuous-time Fourier Transform (CTFT) - 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- IV: Z-TRANSFORM

Z-Transforms (Double and Single sided) - 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.

Unit - V: MATLAB PROGRAMMING

Introduction to MATLAB-Matrices - Working with matrices - Basic plotting - Example Programs: Representation of basic signals -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.

Books for Study

1. B.D Gupta, Mathematical Physics, 3rd repring, Vikas publishing House Pvt Limited, New Delhi.
2. Poornachandra S., "Signals and System", Vijay Nicole imprints Pvt. Ltd., 2004.

Books 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
1	1	10.1,10.2, 10.6,10.8,10.9,10.11
2	1	9.1,9.2,9.5,9.6,9.8,9.9
3	2	1.1-1.4,7.1-7.4,8.1-8.3
4	2	11.1-11.4,11.7-11.9,11.12
5	2	Lecture Notes

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Sem. I **Hours/Week: 8**
14PEL1104 **Credits: 5**

Electronics Practicals-I:

ANALOG AND DIGITAL EXPERIMENTS

Any 12 Experiments:

1. Construct and study of power supply with Single and Dual - High Current regulator & Short circuit protection.
2. Construct and study of an Op-Amp applications-I (Non-inverting, Inverting,Integrator, Differentiator, Unity gain amplifier)
3. Construct and study of an Op-Amp applications-II (Instrumentation Amplifier, V to I, I to V (4-20mA))
4. Construct and study of an Op-Amp applications-III (Clipper and Clamper)
5. Construct and study of an 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).
23. Solving simultaneous equation using op-amp.
24. Construction of variable DC power supply using Voltage regulator ICs.
25. Construction of UP and DOWN counter using flipflops.

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Sem. I **Hours/Week: 4**
14PEL1401 **Credits: 4**

IDC (WS):

ELECTRONICS MEDIA

Objective

- To learn about technological innovation of electronic media

Unit I: PUBLIC ADDRESSING MEDIA

Introduction to public addressing media - Block diagram of PA system - Basic of PA system - watts and volume - matching ohms - Avoiding hum - Avoiding feedback - microphone - wired and wireless - wireless frequency consideration -Active and passive speakers - Size of speakers - Types of input on a mixer - mixer channel — cable and types of plugs - multicores - Home theater network - connection diagram - home network connection diagram - Front projector connection diagram - Summary of Home theater networks and working.

Unit II: AUDIO SYSTEM AND BROADCASTING SYSTEM

Audio System: Voice signal- Musical signal- Multi track recording- Mixing console: structure-channel input- master output control- Digital versus Analog mixing console-Studio Monitor-Broadcasting System: Pilot signal-Information signal- Frequency and amplitude modulation-Transmission line.

Unit-III: VIDEO SYSTEM

Introduction to digital video equipment: working principle of a digital video camera -major components - operation and functions of camera - types of cameras - characteristics and features of cameras - Angle of view -TV: transmission and propagation of tv signal, tv antenna- receiver: VHF tuners-vision IF subsystem- inter carrier sound system- video amplifiers -television display technology: CRT, plasma, LCD-LED - 3D- television standards: NTSC, PAL, HDTV- distribution technology - cable television, DTH, - interactive television- IPTV-process of webcasting.

Unit -IV VIDEO PRODUCTION AND TELECASTING

Introduction to digital production studio: basic studio structure and equipment- roles of the production - production process - video editing systems and their components - video mixers - Telecasting of audio and video signal - role of satellite in tv system-satellite and terrestrial broadcasting - different transmission bands-multimedia projector.

Unit V: TABS AND SMART PHONES IN MEDIA

A smart phone as communication device- Mobile devices hardware-ARM cortex processors evolution- Mobile operating system-symbian-Linux-windows-java-Android-Garnet-Mobile applications-mobile tv-mobile radio-mobile internet.

Books for Study

Material prepared by the Department.

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Sem. II **Hours/Week: 6**
14PEL2105 **Credits: 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.

Books for Reference

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

SECTIONS

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

Sem. II **Hours/Week: 6**
14PEL2106 **Credits: 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 linearphase 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 - Subband 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.

Books 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
1	1	9.1 - 9.6, 4.4 - 4.6
2	2	10.2.1 - 10.2.4, 10.2.7
3	2	10.3 - 10.4
4	2	9.4 - 9.6, 11.1- 11.6
5	3	10.1- 10.10
	2	11.9.4, 11.10.2

Sem. II **Hours/Week: 6**
14PEL2107 **Credits: 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.

Books for Reference

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

SECTIONS

UNIT	BOOK	SECTIONS
1	1	3.7
	2	5.3 ; 5.7 ; 6.3, Lecture Note
2	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
3	2	9.40, 9.40.1, 9.40.2, 9.40.3, 9.40.4, 9.40.8, 9.40.9 Lecture Notes
4	1	8.1, 8.5, 8.6, 8.8, 8.9, 8.10, 10.1
5	2	10.1, 10.2, 10.3, 10.4, 10.13, 10.14, 10.15, 10.21 Lecture Notes

Sem. II **Hours/Week: 8**

14PEL2108 **Credits: 5**

Electronics Practicals-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.
22. Interfacing of DTMF IC with microcontroller.
23. Interfacing of RF-ID module with microcontroller.
24. Interfacing of Zigbee module with microcontroller.
25. Interfacing of GSM module with microcontroller.

Sem. II **Hours/Week: 5**
14PEL2109 **Credits: 2**

SELF PACED LEARNING

Objective

- To improve self learning ability in novel trends in electronics.

SCADA and power electronics

Introduction to SCADA-Common system components: Remote terminal units-Telemetry system-Human-Machine interface- System concepts-Hardware solution: SCADA architecture-Security issues. Power electronics: Introduction to power electronics - Concept of power electronics- Application of power electronics-Types of power electronics converters- Power semiconductor device: Diode and Transistors.

PROTEUS and embedded simulation

Actual use of proteus - Creating a new design - Function of icons in design window - Knowing the components available in proteus ISIS - Use of libray to pick device/symbol and place - Icons of pick device window and its explanation -Use of virtual terminal - Use of oscilloscope - DC motor drive circuit - Stepper motor drive circuit - Servo motor driver- Component designing - PCB designing in proteus ARES - Steps to design single and double side PCB.

Reference

- http://www.theengineeringprojects.com/2013/03/a-complete-tutorial-on-how-to-use.html

Multi Sim and circuit simulation

Multisim opening screen - Principle icons on the three main tool bars of workbench - Parts bin - Instruments - mode and simulation - Opening and saving the file - Placing the components - Building a circuit - Wiring the circuit - Editing a component - adding instrumentation in the circuit - Simulation - Virtual instrumentation - Analysis - The grapher - The postprocessor - Examples - Simple resistor network - An RC network using the oscilloscope and Bode plotter - Sequential Logic - D-Type and JK Flip Flops

Reference

- http://csserver.evansville.edu/~blandfor/WrkBnchTutorial.pdf
- http://www.me.psu.edu/rahn/me462/Multisim.pdf
- http://www.ni.com/pdf/manuals/372330a.pdf

Cloud computing and data acquisition

Trends of computing- Introduction to distributed computing - Cloud computing - Properties and characteristics-Service Models-Deployment models-Infrastructure as a service (IaaS)-Platform as a service (PaaS)-Software as a service (SaaS)-Web 2.0-Web OS-Cloud issues and challenges-cloud provider lock in-Security-Connecting data logger online-complete data logging using cloud computing.

PSpice and analog circuit simulation

Introduction to PSPICE- Project creation- Libraries- Creating a schematic parts library- Preparing for layout: Annotation-Creating footprint libraries-Assigning footprints to parts-Creating a netlist- Creating a board template file- Layout-Creating a new board-Getting around and placing part - autorouting - Manual routing- Cleaning up the design-Documenting the design-place ground- Display properties-place net alias-Simulation settings.

Embedded Design using MSP430

Introduction to MSP430- Pin Description- Functional Block Diagram- CPU Description- Instruction set- Interrupt Vector addresses- Operation Mode-Special function register- Boot Strap Loader - Memory Organization- Flash Memory-Watch Dog Timer -Absolute Maximum Rating - Basic Programming: LED Blinking— Concepts of Interrupt- Serial port communication- Serial port Echo - ADC -ADC in serial port- Pulse Width Modulation.

References

- MSP430 Data Sheet
- http://www.referencedesigner.com/tutorials/msp430/msp430_01.php

Android and data acquisition

Introduction to Android - Starting with android - The Android emulator - Development environment - Creating database - Designing - SQLite-Programming - SQLite databases.- Develop user - Friendly Android applications.

Book for Study

1. Material prepared by the Department.

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Sem. II **Hours/Week: 4**
14PSS2401 **Credits: 4**

IDC-1:
SOFT SKILLS

Objectives

* Introducing learners to the relevant soft skills at the territory level in order to make them gain competitive advantage both professionally and personally.

Module 1: Basics of communication and Effective communication

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

Module II: Resume writing and Interview skills

Resume Writing: What is Resume? Types of Resume? Chronological, Functional and Mixed Resume, Steps in preparation of Resume. Interview Skills: Common interview questions, Attitude, Body Language, The mock interviews, Phone interviews, Behavioral interviews.

Module III: Group discussion and team building

Group Discussion: 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 GDS. Team Building: Team Vs Group - synergy, Stages of Team Formation, the Dabbawala. Leadership - Styles, Work ethics. Personal Effectiveness: Personal Effectiveness: Self Discovery, Self Esteem, and Goal setting. Conflict and Stress Management.

Module IV: Numerical Ability

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, Rations and Proportions.

Module V: Test of reasoning

Verbal Reasoning: Series Completion, Analogy, Data Sufficiency, Assertion and Reasoning, Logical Deduction. Non-Verbal Reasoning: Series, Classification

References

1. Aggarwal, R.S. 2010 Quantitative Aptitude, S.Chand & Sons
2. Aggarwal, R.S. 2010. A Modern Approach to Verbal and Non Verbal Reasoning. S.Chand
3. Covey, Stephen. 2004. 7 Habits of Highly effective people, Free Press.
4. Egan, Gerard. 1994. The Skilled Helper (5th Ed). Pacific Grove, Brooks / Cole.
5. Khera, Shiv 2003. You Can Win. Macmillan Books , Revised Edition
6. Murphy, Raymond. 1998. Essential English Grammar. 2nd ed., Cambridge Univ. Press.
7. Prasad, L. M. 2000. Organizational Behaviour, S.Chand
8. Sankaran, K., & Kumar, M. 2010 Group Discussion and Public Speaking. M.I. Pub, Agra, Adams Media.
9. Schuller, Robert. (2010). Positive Attitudes. Jaico Books.
10. Trishna's (2006). How to do well in GDs & Interviews, Trishna Knowledge Systems.
11. Yate, Martin. (2005). Hiring the Best: A Manager's Guide to Effective Interviewing and Recruiting.

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Sem. III **Hours/Week: 5**
14PEL3110 **Credits: 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 - Watchdog timer-Reset -Parallel I/O Ports - Timers - Capture/Compare/PWM Modules (CCP)- Analog-to-Digital convertor(A/D)module- Interrupts - PIC Microcontroller Input-Output Port Programming.

Unit II - Functions and Libraries in mikroC

MickroC Functions: Function Prototypes- Passing Arrays to Functions - Passing Variables by Reference to Functions - Variable Number of Arguments -Function Reentrancy- mikroC Built-in Functions-mikroC Library Functions: EEPROM -LCD- UART- USART - Sound- Miscellaneous library.

Unit III - Applications of PIC18FXX2

Serial Communication - Based Calculator - The SD Card: SPI Bus - Operation of the SD Card in SPI Mode -Read CID -Read/Write to SD Card Sectors - USB States - USB Bus Communication -Descriptors : Device - Configuration - Interface - HID - Endpoint -PIC18 Microcontroller USB Bus Interface - USB Based Microcontroller output port.

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.

Books 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.

Books for Reference

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

SECTIONS

UNIT	BOOK	SECTIONS
1	1	2.1.1 – 2.1.12, 3.1, 3.1.1 – 3.1.20, 3.2, 3.3
2	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
3	1	Project 6.10, 7.1, 7.2, Project 7.2, 7.4, 8.1 – 8.6, Project 8.2
4	2	Chapter 7
5	2	Chapter 9, 12, 13

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Sem. III **Hours/Week: 5**
14PEL3111 **Credits: 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 - 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.

Books for Reference

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

SECTIONS

UNIT	BOOK	SECTIONS
1	1	1.4,1.5,1.7,1.8,1.10,2.5,2.6,2.10,2.12.3,2.13,2.14,3.1,3.3,3.3.4,3.8
2	1	4.1,4.2,4.6,4.8-4.10,5.1-5.3,6.1-6.3,10.8-10.13,4.2
3	2	Chapters 1,2,3
4	2	Chapters 4,9,10,11
5		Lectures Notes

Sem. III **Hours/Week: 8**
14PEL3112 **Credits: 5**

Electronics Practical-III:

VLSI, DSP AND ARM EXPERIMENTS

1. Developing test bench for MUX and DEMUX 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 & Mealy 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 exponential) 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.
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.

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Sem. III **Hours/Week: 4**
14PEL3201A **Credits: 4**

Elective-1A:

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.

Books for Study

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

Books for Reference

1. H. S. Kalsi, “Electronic Instrumentation”, Tata McGraw-Hill publishers.
2. Albert D. Helfrick 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

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Sem. III **Hours/Week: 4**
14PEL3201B **Credits: 4**

Elective-1B:

COMMUNICATION 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.

Books 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.

Books 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	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

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Sem. III **Hours/Week: 4**
14PEL3202A **Credits: 4**

Elective-1IA:

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

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Sem. III **Hours/Week: 4**
14PEL3202B **Credits: 4**

Elective-1IB:

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 - C++ and Object orientation- Fundamental Types - Naming convention - Function - API, Templates - Casting - Classes, Design patterns Class diagrams and UML.

Books 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.

Books for Reference

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

SECTIONS

UNIT	BOOK	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

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Sem. III **Hours/Week: 4**
14PEL3403 **Credits: 4**

IDC-II:

COMPUTER HARDWARE

Objectives

- To learn the basic hardware configuration of a computer System.
- To know the troubleshooting of PC and its network

Unit-I: Organization of computer

Mother board organization: Motherboard Architecture - form factors - Motherboard connectors - Chipset and controllers - Bus architecture - BIOS and BIOS setup- System configuration data - Standard settings-Advanced setting- Security - Power management setting - Bios update.

Unit-II: PC Assembling and Testing

Assembling Tools - Precautions- Power supply-SMPS- Output voltage measurement- Assembling producer -verify the computer peripheral and assembling parts- followed some step precaution - Bios level diagnosis - Beep sounds - On screen POST indication - Proper Earth.

Unit-III: OS installation

Booting sequence setting and Booting - Installation Menu- Selection-Partitioning- Formatting-Copying and installation - Account creation- Device driver installation.

Unit-IV: Troubleshooting

Troubleshooting: SMPS - motherboard -bios battery - RAM-RAM slot- PCI slot - AGP slot - Display card - types of display cards-HDD- Pumping problem-Detection problem - Bad sectors - PS/2 port - USB Port-Monitor-keyboard-mouse- sound card.

Unit-V: Small office networks

Network concept: WAN -MAN-LAN - Ethernet - Wi-Fi - Server - Peer to Peer Network - - Network accessories: Hub- switches - access point - Cable and cable coding - RJ45 connector - Cabling - Protocols - TCP/IP setting-Internet connectivity: Broadband modem and setting.

Book for Study

- Material prepared by the Department.

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Sem. IV **Hours/Week: 6**
14PEL4114 **Credits: 5**

Embeded 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 - Tuning 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 - Operating 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

UNIT	BOOK	SECTIONS
1	1	Chapter 1: Pg 10 – 15; Chapter 3: Pg 42 – 49; 66 – 73
2	1	Chapter 4: Pg 78 – 104
3	2	1.2, 1.5, 2.3 – 2.5
4	2	Chapter 3 and 4
5	2	Chapter 5 and 6

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Sem. IV **Hours/Week: 6**
14PEL4115 **Credits: 5**

PROGRAMMABLE DIGITAL SIGNAL PROCESSOR AND CCS

Objective

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

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: ARCHITECTURE AND INSTRUCTION SET OF TMS320C6713

Introduction -TMS320C6x Architecture- Functional Units-Fetch and Execute Packets-Pipelining- Registers- Linear and Circular Addressing Modes-Indirect Addressing-Circular Addressing-TMS320C6x Instruction Set -Assembly Code Format-Types of Instructions-Timers-Interrupts-Interrupt Control-Registers-Interrupt Acknowledgment-Direct Memory Access

Unit - V: PROGRAMMING OF TMS320C6713 USING CODE COMPOSER STUDIO

Code Composer Studio Development- Code Generation Tools -Creating a New Project-Adding Files to a Project-Reviewing the Code-Building and Running the Program-Changing Program Options and Fixing Syntax Errors.

Examples: Sine Generation Using Eight Points with DIP Switch Control-Ramp Generation without a Lookup Table-Amplitude Modulation- FIR Filter Implementation: Bandstop and Bandpass-IIR Filter Implementation Using Second-Order Stages in Cascade.

Books for Study

1. Venkataramani B, Bhaskar M., "Digital signal processors - Architecture, Programming and Applications", First Reprint, TATA McGraw Hill, 2003
2. Digital Signal Processing and Applications with the C6713 and C6416 DSK, Rulph Chassaing, A JOHN WILEY & SONS, INC., PUBLICATION, 2005.
3. TMS320C6000 Code Composer Studio Tutorial

BOOKS FOR REFERENCE

1. Salivahanan S, Vallavaraj A, Gnanapriya C, "Digital Signal Processing", Tata McGraw Hill Publishing, 2003.
2. TMS320C6713 data sheet.

SECTIONS

UNIT	BOOK	SECTIONS
1	1	2.1-2.8,3.1-3.14
2	1	4.1-4.9,6.2-6.4
3	1	7.1-7.8,8.1-8.4, 9.5 - 9.7
4	2	3.1-3.8, 3.13,3.14,3.16
5	3 2	1.1, 1.2, 2.1-2.5 List of Examples:1.1,2.9,2.14,4.1,5.1

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Sem. IV **Hours/Week: 4**
14PEL4203A **Credits: 4**

Elective-IIIA:

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 pCO2 - Blood pO2 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.

Books for Study

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

Books 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	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

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Sem. IV **Hours/Week: 4**
14PEL4203B **Credits: 4**

Elective-IIIB

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 - Silicon, 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 - Microelectromechanical 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 MAGNETORESISTIVE 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.

Books 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.

Book for Reference

1. Anupama B. Kaul, "Microelectronics to Nanoelectronics: Materials, Devices & Manufacturability" CRC press, 2013.

SECTIONS

UNIT	BOOK	SECTIONS
1	1	1.2 & 1.3 and chapter 2 complete
2	1	Chapter 3 complete
3	1	Chapter 7 complete
4	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
5	2	12.1,12.2, 12.4, 13.1, 13.2.4, 13.3.6.3

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Sem. IV
14PEL4117 **Credits: 2**

COMPREHENSIVE EXAMINATIONS

Unit - I: 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 - II: 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 - III: INTEL 8085 AND 8086 ARCHITECTURE AND ITS PHERIPHERAL

Introduction to INTEL8085 -Instruction set - Addressing modes - Status flags - 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. - Introduction to 8086 microprocessor - Internal architecture - Addressing modes - Instruction set -Segment registers - Memory segmentation.

Unit - IV: POWER ELCTRONICS

Chopper-Type A chopper-Type B chopper-Type C four quadrant chopper-Pulse width modulated IGBT AC chopper - Single-phase voltage source inverters- PWM inverters - Current source inverters series inverters- Single-phase parallel inverters-Principle of cycloconverter operation- DC motor - Single phase SCR drive - Three phase SCR drive - Application of IGBT in DC Motor control for home appliances - Induction motor characteristics -Speed control methods of induction motor - Synchronous motor control.

Unit - V: TRANSDUCERS AND SENSORS

Introduction to measurement - Direct and indirect measuring methods - Transducers - Resistive transducers - Potentiometers - 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 - Differential amplifier - Voltage follower - Instrumentation amplifier - Wheatstone bridge - AC bridges.

Unit VI: COMMUNICATION SYSTEM

The sampling theorem - PAM - Natural sampling - Flat top sampling - PCM - Companding - Multiplexing PCM signal - Phase shift keying - binary PSK - Differential PSK - FSK - Binary FSK - Similarity of BFSK and BPSK - Physical nature of optical fiber - Basic principle involved in optical fiber technology - Fiber classification - Acceptance angle, acceptance cone and numerical aperture of fiber -Fiber splices, connector and couplers - Fiber attenuation Advantages/disadvantages of using optical fiber as communication medium - LED - Structures of LED - LASER - Types of laser - Photo Detectors - characteristics - PIN photo diode - APD photo Transistor - Repeater- MUX-DMUX-Line coding - Fibre optic switches - Bypass switches.

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