EE-306-E **MOS ICs AND TECHNOLOGY**
(EL, EI)

L	T	P
3	1	0

CLASS WORK	:	50
EXAM	:	100
TOTAL	:	150
DURATION OF EXAM	:	3 HRS

UNIT1. REVIEW OF MOS TECHNOLOGY :
Introduction to IC technology, MOS Transistor enhancement mode and depletion mode operations, fabrication of NMOS, CMOS and BiCMOS devices. Equivalent circuit for MOSFET and CMOS.

UNIT2. MOS TRANSISTOR THEORY:
MOS device design equations, MOS transistor, Evaluation aspects of MOS transistor, threshold voltage, MOS transistor transconductance & output conductance, figure of merit, determination of pull-up to pull-down ratio for an n-MOS inverter driven by another n-MOS inverter & by one or more pass transistor, alternative forms of pull-up, CMOS and BiCMOS-inverters. Latch up in CMOS circuitry and BiCMOS Latch up susceptibility.

UNIT3. MOS CIRCUITS AND LOGIC DESIGN :
Basic physical design of simple logic gates using n-MOS, p-MOS and CMOS, CMOS logic gate design considerations, CMOS logic structures, clocking strategies.

UNIT4. CIRCUIT CHARACTERIZATION AND PERFORMANCE ESTIMATION :
Resistance estimation, capacitance estimation, inductance, switching characteristics, CMOS gate transistor sizing, power dissipation.

UNIT5. VLSI FABRICATION :
Crystal growth, wafer preparation, epitaxy, oxidation, lithography, etching, diffusion, dielectric and poly-silicon film deposition, ion implantation, yield and reliability, metalization.

UNIT6. DESIGN EXAMPLE USING CMOS :
Incrementer / decrementer, left/right shift serial/parallel register, comparator for two n-bit number, a two-phase non-overlapping clock generator with buffered output on both phases, design of an event driven element for EDL system

TEXT BOOKS :
1. Introduction to Digital Integrated Circuits : Rabaey,Chandrakasan & Nikolic.
2. Principles of CMOS VLSI Design : Neil H.E. Weste and Kamran Eshraghian; Pearson.

REFERENCE BOOKS :
1. 1. Introduction to Digital Circuits : Rabaey and ……..LPE (PH)
2. 2. ……: S.K.Gandhi.
3. 3. VLSI Technology: S.M. Sze; McGraw-Hill.
4. 4. Integrated Circuits: K.R. Botkar; Khanna

NOTE: Eight questions are to be set –atleast one from each unit. Students have to attempt any five questions

IC- 401-C INDUSTRIAL PROCESS CONTROL

L	T	P
3	1	-

Theory	:	100 Marks
Class work	:	50 Marks
Total	:	150 Marks
Duration of Exam.	:	3 Hrs.

UNIT-1.BASIC CONSIDERATIONS

Introduction to process control system, control loop study-Generalization with load-changes at arbitrary points in the loop, offset and its analysis, modelling consideration for control purposes, degree of freedom and process controllers, formulating the scope at modelling for process control. Computer simulation and linearization of non linear system transfer function and input output models, Dynamic behaviour of first order lag system, process with variable time constant and gain. Dynamic behaviour of second order and higher order system-multicaplacity process, real time process, inverse response process, Introduction to feedback control and effects P, I & D controllers.

UNIT-2. DESIGNING FEED BACK CONTROLLER :

Outline of the design problems, Selection of type of feedback controller. Time-Integral performance criterion, Process Reaction Curveand frequency response characteristic, Ziegler-Nichol Rule, effect of dead time, dead time compensator and inverse response cdompensator.

UNIT-3.CONTROL SYSTEMS WITH MULTIPLE LOOPS:

Cascade, spilt-range feedforward, ratio inferential and adaptive control.

UNIT-4. INTERACTION & DE-COUPLING OF CONTROL LOOP :

Interaction of control loops, relative gain array and selection of the loops, Design of non-interacting control loop.

UNIT-5. COMPUTER PROCESS INTERFACE FOR DATA ACQUISITION & CONTROL :

Introduction to digital computer control of processes. Design of control system for complete plant.

Text Book: Chemical process Control – George Stephanopoulos. Pub. PHI

Ref. Books: 1) Digital Computer Process Control-C.L.Smith Pub: Intext Educational Publisher
2)Process Control-F.G.Shinskey, Pub. Mc-Graw Hill
3)Advanced Process Control-W.H.Ray, Pub. Mc Graw Hill
4)Process system and analysis and control-D.R.Coushanour, TMH
5)Process Instrument & Control handbook-D.M.Considins,Pub: Mc -Graw Hill

Note: 8 questions are to be set –at least one from each unit. Students have to attempt any five Questions.

IC-403-E **EMBEDDED SYSTEM DESIGN**

L	T	P
3	1	-

Class Work : 50 Marks
Exam : 100 Marks
Total : 150 Marks
Duration of Exam : 3 Hrs.

UNIT 1 : INTRODUCTION

Different types of microcontrollers: Embedded microcontrollers, External memory microcontrollers; Processor Architectures: Harvard V/S Princeton , CISC V/S RISC; microcontrollers memory types; microcontrollers features : clocking, i/o pins, interrupts, timers, peripherals.

UNIT 2 : MICROCONTROLLER ARCHITECTURE

Introduction to PIC microcontrollers, Architecture and pipelining, program memory considerations, Addressing modes, CPU registers, Instruction set, simple operations.

UNIT 3 : INTERRUPTS AND I/O PORTS

Interrupt logic, Timer2 scalar initialization, IntService Interrupt service routine, loop time subroutine, External interrupts and timers, Synchronous serial port module, Serial peripheral device, O/p port Expansion, I/p port expansion, UART.

UNIT 4 : SOFTWARE

Development tools/ environments, Assembly language programming style, Interpreters, High level languages, Intel hex format object files, Debugging.

UNIT 5 : PROGRAMMING WITH MICROCONTROLLERS

Arithmetic operations, Bit addressing, Loop control, Stack operation, Subroutines, RAM direct addressing, state machines, Oscillators, Timer Interrupts, Memory mapped I/O.

UNIT 6 : DESINING USING MICROCONTROLLERS

Music box, Mouse wheel turning, PWM motor control, Aircraft Demonstration, ultra sonic distance measuring, Temperature Sensor, Pressure Sensor, Magnetic Field Sensor.

TEXT BOOK:

1. Design with PIC Microcontrollers by John B. Peatman , Pearson.

REFERENCE BOOKS :

1. 1. Programming and Customizing the 8051 Microcontroller : Predko ; TMH.
2. 2. Designing Embedded Hardware : John Catsoulis ;SHROFF PUB. & DISTR. ND.

3. 3. Programming Embedded Systems in C and C++ : Michael Barr; SHROFF PUB. & DISTR. ND.

EE-407-E **DIGITAL SIGNAL PROCESSING**

L	T	P
3	1	0

CLASS WORK	:	50
EXAM	:	100
TOTAL	:	150
DURATION OF EXAM	:	3 HRS

UNIT1. DISCRETE-TIME SIGNALS:
Signal classifications, frequency domain representation, time domain representation, representation of sequences by Fourier transform, properties of Fourier transform, discrete time random signals, energy and power theorems.

UNIT2. DISCRETE-TIME SYSTEMS :
Classification, properties, time invariant system, finite impulse Response (FIR) system, infinite impulse response (IIR) system.

UNIT3. SAMPLING OF TIME SIGNALS:
Sampling theorem, application, frequency domain representation of sampling, reconstruction of band limited signal from its samples. discrete time processing of continuous time signals, changing the sampling rate using discrete time processing.

UNIT4. Z-TRANSFORM :
Introduction, properties of the region of convergence, properties of the Z-transform, inversion of the Z-transform, applications of Z-transform.

UNIT5. BASICS OF DIGITAL FILTERS :
Fundamentals of digital filtering, various types of digital filters, design techniques of digital filters : window technique for FIR, bi-linear transformation and backward difference methods for IIR filter design, analysis of finite word length effects in DSP, DSP algorithm implementation consideration. Applications of DSP.

UNIT6. MULTIRATE DIGITAL SIGNAL PROCESSING:
Introduction to multirate digital signal processing, sampling rate conversion, filter structures, multistage decimator and interpolators, digital filter banks.

TEXT BOOKS :
1. Digital Signal Processing : Proakis and Manolakis; PHI
2. Digital Signal Processing: Salivahanan, Vallavaraj and Gnanapriya;TMH

REFERENCE BOOKS:
1. Digital Signal Processing: Alon V. Oppenhelm;PHI
2. Digital Signal processing(II-Edition): Mitra, TMH

NOTE : Eight questions are to be set - at least one from each unit. Students have to attempt five questions.

IC-415-E **INDUSTRIAL PROCESS CONTROL LAB**

L	T	P
0	0	2

CLASS WORK	:	25
EXAM	:	25
TOTAL	:	50
DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

1. To study response of single & multiple Ist order systems in series.

a) a) Coupled

b) b) on-coupled

2. To perform PID control on Ist order system without lag(on a pilot plant).

3. To perform PID control on a non-coupled & coupled two-tank system(Pilot plant)

4. To perform PID control on a 2nd order system with lag.

5. To determine the system T.F. by conducting step test.

6. To determine system T.F. by conducting freq. Test.

7. PLC programming.

NOTE: At least ten experiments have to be performed in the semester, taking seven experiments of the above list and three be set by the concerned institution as per the scope of syllabus contents of IC-401-C.

IC –417-E EMBEDED SYSTEM DESIGN LAB

L	T	P
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Class Work	:	25
Exam	:	25
Total	:	50
Duration of Exam	:	3 Hrs.

8051 Micro Controller

1. 1. Write an Assembly language Programme (ALP) to generate 10kHz square wave.
2. 2. Write an ALP to generate 10 kHz frequency using interrupts.
3. 3. Write an ALP to interface one Microcontroller with other wring serial/parallel communication.
4. 4. Write an ALP for temperature & pressure measurement & to display on intelligent LCD display

PIC Microcontroller

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5. 5. Write an ALP for PWM based speed control of motor .
6. 6. Write an ALP for PWM based regulator of voltage.
7. 7. Write an ALP to send/receive the data from an computer to MC through serial communication

General

8. 8. Study of Development tools/environment for Microcontroller Programme.
9. 9. Develop an embedded system for traffic light controller using Micro controller
10. 10. Develop an embedded system for the automatic motion of a car (Model of car) & Subsequent display on LCD using Microcontroller..

EE-427-E DIGITAL SIGNAL PROCESSING LAB

L	T	P
0	0	2

CLASS WORK	:	25
EXAM	:	25
TOTAL	:	50
DURATION OF EXAM	:	3 HRS

LIST OF EXPERIMENTS:

Perform the experiments using MATLAB:

1. 1. To represent basic signals (Unit step, unit impulse, ramp, exponential, sine and cosine).
2. 2. To develop program for discrete convolution.
3. 3. To develop program for discrete correlation.
4. 4. To understand stability test.
5. 5. To understand sampling theorem.
6. 6. To design analog filter(low-pass, high pass, band-pass, band-stop).
7. 7. To design digital IIR filters(low-pass, high pass, band-pass, band-stop).

8. 8. To design FIR filters using windows technique.
9. 9. To design a program to compare direct realization values of IIR digital filter
10. 10. To develop a program for computing parallel realization values of IIR digital filter.
11. 11. To develop a program for computing cascade realization values of IIR digital filter
12. 12. To develop a program for computing inverse Z-transform of a rational transfer function.]

NOTE: At least ten experiments have to be performed in the semester; out of which at least seven experiments should be performed from above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution.