EE 332

CONTROL SYSTEMS LAB

(Common to IE & EEE)

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

List of Experiments:

1. Characteristics of D.C. and A.C. Servo motors.
2. Characteristics of Synchro Pair.
3. Frequency response of compensating networks.
4. Step response of second order system.
5. D.C.Positon Control System.
6. A.C.position Control System.
7. Closed loop P, PI and PID Controller.
8. Step response and Frequency response of a given plant.
9. Design of lag and lead compensation for the given plant.
10. ON/OFF Temperature Control systems.
11. Temperature control system.
12. Level Control system

Note : Atleast 10 experiments should be conducted in the Semester.

SCHEME OF INSTRUCTION & EXAMINATION

B.E. IIIrd YEAR

(ELECTRICAL AND ELECTRONICS ENGINEERING)

SEMESTER - II

Sl. No.	Syllabus Ref. No.	SUBJECT	Scheme of Instruction		Scheme of Examination		
			Periods per week		Duration In Hours	Maximum Marks	
			L/T	D/P		Univ. Exam	Sessionals
		THEORY					
1.	EE 351	Digital Signal Processing	4	-	3	75	25
2.	EE 352	Electrical Machinery - III	4/1	-	3	75	25
3.	EE 353	Switchgear and Protection	4	-	3	75	25
4.	EE 354	Microprocessor and Microcontrollers	4	-	3	75	25
5.	CM 371	Managerial Economics and Accountancy	4	-	3	75	25
		PRACTICALS					
1.	EE 381	Electrical Machines Lab-II	-	3	3	50	25
2.	EE 382	Power Electronics Lab	-	3	3	50	25
3.	EE 383	Integrated Circuits Lab	-	3	3	50	25
4.	EE 384	Industrial Visit	-	-	-	-	*Gr
		Total	**20/1**	**9**	**24**	**525**	**200**

**Excellent / Very Good / Good / Satisfactory / Unsatisfactory*

M.J.C.E.T.

EE 351

DIGITAL SIGNAL PROCESSING

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT-I

Introduction to Digital Signal Processing: Classification of Signals & Systems. Linear shift invariant systems, stability and causality, Sampling of Continuous signals -Signal Reconstruction, quantizing & encoding, linear constant co-efficient difference equations, properties of discrete system-linearity.

UNIT-II

Fourier Analysis: Distinguishing Fourier transform of discrete singular & discrete Fourier transform, Discrete Fourier series, Phase and amplitude spectra, Properties of Discrete Fourier Transform, Linear Convolution of sequence using DFT, Frequency domain representation of discrete time system DTFT and DFT , Computation of DFT. Fast Fourier transform: Radix- 2 decimation in time and decimation in frequency FFT algorithms, Inverse FFT.

UNIT-III

Z- Transform: Application of Z- Transforms for solution of difference equations of digital filters system function -stability criterion, Realization of filters -direct, canonic. Cascade and parallel form, linear phase realization.

UNIT-IV

IIR Filters: Design of Butterworth Chebyshev filters, IIR filter design by impulse invariant bilinear transformation, impulse invariance method, step invariance method

UNIT-V

FIR Filters: Characteristics of FIR Digital Filters. Frequency response, comparison of FIR, IIR filters -Window techniques, Design of these filters,

using -Rectangular, Hamming, Bartlet, Kaiser windows, Architecture and features of TMS 320F/2047 and ADSP signal processing chips, Applications of DSP.

Suggested Reading:

1. P. VenkataRamani, M.Bhaskar, *"Digital Signal Processor; Architecture, Programming & Application "*, TataMcGrawHill-2004
2. Avatar Singh, S.Srinivasan, *"Digital Signal Processing"*, Thomson Publication, 2004.
3. Lafley, *"DSP Processing. fundamentals. architecture & feature*". S Chand Publishers & Co. 2000
4. Jackson L.B. *"Digital Filters and Signal Processing"*. Second edition, Kluwer Academic Publishers. 1989
5. Oppenheim A V, and Schafer R. W. *"Digital Signal Processin"*, Prentice Hall Inc. 1975.

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EE 352

ELECTRICAL MACHINERY - III

Instruction	4/1	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT-I

Synchronous Machines: Constructional Details, Types of windings – Winding factors -e.m.f. equation -Fractional pitch and fractional slot windings -Suppression of harmonics and tooth ripple -Armature reaction and reactance -Synchronous impedance.

UNIT-II

Synchronous Generator: Voltage Regulation -Phasor diagram of alternator with non-salient poles -O.C. and S.C characteristics – Synchronous impedance, Ampere turn, ZPF methods for finding regulation –Principle of two reaction theory and its application for the salient pole synchronous machine analysis -Synchronism and parallel operation.

UNIT-III

Synchronous Motor: Theory of operation- Vector diagram –Variation of current and p.f. with excitation -Hunting and its prevention –Current and power diagram Predetermination of performance –Methods of Starting and Synchronizing. Synchronizing Power. Synchronous Condenser.

UNIT-IV

Transient Stability Studies of Synchronous Machines: Elementary ideas of transient behavior of an Alternator -Three phase short circuit of an Alternator -Elementary ideas of the stability of synchronous machine connected to infinite Bus. Special Machines -Permanent Magnet Motors, Switched Reluctance Motors, Hysteresis Motors.

UNIT-V

Two phase servo motor characteristics- Single phase motors- Theory and operation of single phase motors-Shaded pole, Split phase and capacitor motors -Compensated and uncompensated series and repulsion motors. Linear Induction motors.

Suggested Reading:

1. I.J.Nagrath & D.P. Kothari, *Electrical Machines,* Tata McGraw Hill, 2004, 3rd ede.
2. S.K.Bhattacharya, *Electrical Machines,* Tata McGraw Hill, 2002.
3. P.S.Bhimbhra, *Generalized Theory of Electrical Machines,* Fifth Edition, Khanna Publishers, 1995,
4. M.G Say, *The Performance and Degin of A.C Machine,* Pitman Publications, 1985.

M.J.C.E.T

EE 353

SWITCHGEAR AND PROTECTION

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT-I

Introduction to protective relays, Need for protection, Backup protection, Zones of protection, Definitions of relay pickup, Dropout and reset values, Classification of relays, Operating principles and construction of electromagnetic and induction relays, Over current, Over voltage and power relays, Directional features, Universal relay torque equation. Over current protection for radial feeders and ring mains, Protection of parallel lines, Relay settings for over Current relays, Earth fault and phase fault protection.

UNIT-II

Static phase and Amplitude comparators, Characteristics of Dual input comparators, Distance protection, 3-step Distance relays, Characteristics Distance relays on the R-X diagram, Sampling comparator, static over current relay, Microprocessor based over current relaying.

UNIT-III

Transformer and generator protection, Different relays, Percentage differential relays, Protection of generator and transformer using percentage differential relays, Split phase, Inter turn protection, Overheating, Loss of excitation, Protection of generators, Protection of transformers against magnetizing inrush, Bucholz relay, Protection of earthing transformers, Generator transformer unit protection.

UNIT-IV

Circuit breakers, Need for circuit breakers, Arc Properties, Principles of arc quenching. Theories, Recovery and restricing voltages, Definitions in circuit breakers, Rated symmetrical and asymmetrical breaking current, Rated making current, Rated capacity, Voltage and Frequency of circuit breakers, Auto reclosure, Duty cycle, Current chopping, Resistance switching, Derivations of RRRV, Maximum RRRV etc., Circuit breaker calculations, Types of circuit breakers, Oil, Poor oil, Air, Air blast, SF6 and Vacuum circuit breakers, Testing of circuit breakers.

UNIT-V

Over voltage protection, Protection of transmission lines against direct lightening strokes, Ground wires, Protection angle, Protection zones, Height of ground wire, Conductor clearances. Conductor heights, Tower footing resistance and its effects, Equipment protection assuming rod gaps, Arcing horns, Different types of lightening arrestors, Their construction, Surge absorbers, Peterson coil, Insulation co-ordination.

Suggested Reading:

1. C.L. Wadhwa, *Electrical Power System,* Wiley Eastern Ltd., 2nd Edition, 2003
2. Badriram and Viswakarma, *Power System Protection and Switchgear,* Tata McGraw Hill, 2004.
3. Sunil S. Rao, *Switchgear and Protection,* Khanna Publications, 2000.

M.J.C.E.T

EE 354

MICROPROCESSORS AND MICROCONTROLLERS

(Common to EEE & IE)

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT-I

Microprocessor Architecture of 8086- Segmented memory, Addressing modes, Instruction set, Minimum and maximum mode operations.

UNIT-II

Assembly language programming, Assembler directive, simple programs using Assembler, stings, procedures, Macros, Timing.

UNIT-III

Memory and I/O interfacing, A/D and D/A interfacing, 8255(PPI) , Programmable interval Timer(8253), Keyboard and display interface, interrupts of 8086.

UNIT-IV

Microcontrollers-8051 microcontrollers, Architecture, I/O ports, Connecting external memory, Instruction set, Assembly language programming.

UNIT-V

Interrupts, serial I/O, Timers, Counters, Applications of microcontrollers-interfacing LEDs, Seven Segment display, keyboard interfacing.

Suggested Reading:

1. Douglas. V. Hall - *Microprocessors and Interfacing* - Tata McGraw Hill- Revised 2nd edition, 2006
2. Krishna Kant – *"Microprocessors and Microcontrollers- Architecture, programming and system design 8085, 8086, 8051, 8096"*, Prentice-Hall india-2007
3. Kenneth. J. Ayala – *"The 8051 Microcontrollers Architecture, programming and Applications"*, Thomson publishers, 2nd edition.
4. Walter A. Triebel & Avtar Singh- *The 8088 & 8086 Microprocessor*- Fourth edition, Pearson.
5. Myke Predko, *"Programming and Customizing the 8051 micro controller"*, Tata-McGraw Hill, 3rd reprint 2002.

CM 371

MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction	4	Periods per week
Duration of University Examination	3	Hours
University Examination	75	Marks
Sessional	25	Marks

UNIT-I

Meaning and Nature of Managerial Economics: Managerial Economics its usefulness to Engineers, Fundamental Concepts of Managerial Economics, Scarcity, Marginalism, Equi-marginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

UNIT-II

Consumer Behaviour: Law of Demand, Determinants, Kinds; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply, Concept of Equilibrium. (Theory questions and small numerical problems can be asked).

UNIT-III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price – Output determination under Perfect Competition and Monopoly (theory and problems can be asked).

UNIT-IV

Capital Management: Its significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions are numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT-V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts Trial Balance, concept and

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preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.

(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

Suggested Reading:

1. Mehta P.L., "*Managerial Economics – Analysis, Problems and Cases*", Sulthan Chand & Son's Educational publishers, 2011.
2. Maheswari S.N. "*Introduction to Accountancy*", Vikas Publishing House, 2005.
3. Panday I.M. "*Financial Management*", Vikas Publishing House, 2009.

WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

EE 381

ELECTRICAL MACHINES LAB - II

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

LIST OF EXPERIMENTS:

1. Three phase to Two phase conversion (Scott connection).
2. Heat run test on Three phase transformer.
3. No-load test blocked rotor test and load test on 3-phase Induction motor.
4. Speed control of Three phase Induction motor by any three of the Following.
   a. Cascade connection
   b. Rotor impedance control
   c. Pole changing
   d. Rotor slip recovery -Kramer drive
   e. V/f control.
5. Retardation Test, Dynamic Braking of DC Shunt Motors.

6. Performance characteristics of Single phase Induction motor.
7. Voltage regulation of Alternator by
   a. Synchronous impedance method
   b. Ampere-turn method.
   c. Z.P.F. Method.
8. Regulation of Alternator by slip test.
9. Determination of V curves and inverted V curves of synchronous motor.
10. Power angle characteristics of a synchronous motor.
11. Load characteristics of Induction Generator.
12. P.F Improvement of Induction motor using capacitors.

Note : Atleast 10 experiments should be conducted in the Semester.

WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

EE 382

POWER ELECTRONICS LAB

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

List of Experiments:

1. S.C.R, BJT MOSFET and IGBT Characteristics.
2. Gate Triggering circuits for SCR.BJT,MOSFET and IGBT using R,RC, UJT and IC's
3. Single Phase step down cyclo-converter with R and RL loads
4. A.C Voltage controllers with R and RL loads
5. Study of forced commutation techniques.
6. Two quadrant D.C.drive.
7. Bridge rectifiers-half control and full control with R and RL loads.
8. Simulation of Single Phase Full converter and Semi converter

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9. Simulation of Single Phase and three phase Inverter
10. Buck and Boost choppers
11. Study of 1 KVA UPS and SMPS for variable voltage with constant load, Constant voltage with variable load.
12. V/f Control of AC drive.
13. Single phase inverter with R & RL load.

Note : Atleast 10 experiments should be conducted in the Semester.

WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

EE 383

INTEGRATED CIRCUITS LAB

(Common to IE & EEE)

Instruction	3	Periods per week
Duration of University Examination	3	Hours
University Examination	50	Marks
Sessional	25	Marks

LIST OF EXPERIMENTS:

1. Generation of triangular, sine and square wave using IC's.
2. PLL (Phase locked loop).
3. Design of a stable multivibrator using 555 timer.
4. Active filters.
5. Instrumentation amplifier —Sample and hold circuit.
6. Design of integrator and differentiator using Op-Amp.
7. Multiplexer —application for logic realization and parallel to serial Conversions.
8. Synchronous counters.
9. Asynchronous counters.
10. Clippers and clampers using Op-Amps.
11. Monostable operation using IC's.

12. Boot-strap sweep circuit using Op-Amp.
13. Half adder, full adder and subtractor and realization of combinational logic.
14. A/D converters.
15. D/ A converters.

Note : Atleast 10 experiments should be conducted in the Semester.

WITH EFFECT FROM THE ACADEMIC YEAR 2012 - 2013

EE 384

INDUSTRIAL VISIT / STUDY

Atleast 3 days in Semester	3 x 8 = 24 hours
Sessional	Grade*

Students are expected to visit at least two industries during the semester and submit a detailed technical report on the study -visits to the Department. The Department should evaluate the reports through a Committee consisting of Head of the Department and two more faculty members to award the Grades.

****Excellent /Very Good/Good /Satisfactory /Unsatisfactory.***

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