UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025

REGULATIONS – 2008

CURRICULUM FROM III & IV SEMESTERS FOR

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

SEMESTER III

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9211	Mathematics – III	3	1	0	4
EC9211	Electronic Devices and Circuits	3	1	0	4
EE9201	Control Systems	3	1	0	4
EE9202	Electromagnetic Theory	3	0	0	3
EE9203	Measurements and Instrumentation	3	0	0	3
EE9204	Digital System Design	3	1	0	4
PRACTICAL					
EC9212	Electronics Laboratory	0	0	3	2
EE9205	Control and Instrumentation laboratory	0	0	3	2
EE9206	Field Measurement and Computation Laboratory	0	0	3	2
	TOTAL				**28**

SEMESTER IV

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
EC9261	Communication Engineering	3	0	0	3
EE9251	Transmission and Distribution	3	0	0	3
EE9252	Microprocessors and Microcontrollers	3	0	0	3
EE9253	Electrical Machines – I	3	1	0	4
EE9254	Digital Signal Processing	3	0	0	3
	Elective – I	3	1	0	4
PRACTICAL					
EE9255	Microprocessor and Microcontroller Laboratory	0	0	3	2
EE9256	Electrical Machines Laboratory – I	0	0	3	2
	TOTAL				**24**

MA 9211 MATHEMATICS III

L	T	P	C
3	1	0	4

UNIT I - FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT II - PARTIAL DIFFERENTIAL EQUATIONS **9**

Formation – Solutions of first order equations – Sandard types and Equations reducible to standard types – Singular solutions - Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT III - APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Method of separation of Variables – Solutions of one dimensional wave equation, - One-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT IV - FOURIER TRANSFORM **9**

Fourier integral theorem – Fourier transform pair-Sine and Consine transforms – Properties – Transform of simple function – Convolution theorem - Parseval's identity.

UNIT V - Z – TRANSFORM AND DIFFERENCE EQUATION **9**

Z-transform-Elementary properties-Inverse z transform – Convolution theorem-Formation of difference equation-Solution of difference equation using z transform.

Lecture – 45 **Tutorial – 15** **Total : 60 PERIODS**

TEXT BOOK:

1 B.S.Grewal, "Higher Engineering Mathematics", Khanna Publications (2007)

REFERENCES:

1 Glyn James, "Advanced Modern Engineering Mathematics, Pearson Education (2007)
2 B.V.Ramana, "Higher Engineering Mathematics" Tata McGraw Hill 2007.
3 N.P.Bali, and Manish Goyal, "A Text Book of Engineering 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

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EC 9211 ELECTRONIC DEVICES AND CIRCUITS

L T P C
3 1 0 4

AIM:
To study the characteristics and applications of electronic devices.

OBJECTIVES:
To acquaint the students with construction, theory and characteristics of the following electronic devices:

P-N junction diode, Bipolar transistor, Field Effect transistor, LED, LCD and other photo electronic devices, Power control/regulator devices, Feedback amplifiers and oscillators

UNIT I - PN JUNCTION DEVICES **9+3**

PN junction diode –structure, operation and V-I characteristic-current equation of drift current density and diffusion current density-diffusion and transient capacitance – display devices- LED, Laser diodes Zener breakdown-zener reverse characteristic – zener as regulator

UNIT II - IPOLAR JUNCTION TRANSISTORS **9+3**

– structure , operation and V-I characteristic- MOSFET – structure, operation and V-I characteristic – types of MOSFET – JFET –structure, operation and V-I characteristic

UNIT III - AMPLIFIERS **9+3**

BJT small signal model – biasing – analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model – biasing – analysis of CS and source follower – gain and frequency response.

UNIT IV - MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER **9+3**

BIMOS cascade amplifier, differential amplifier – common mode and difference mode analysis – FET input stages – tuned amplifiers- single tuned amplifiers – gain and frequency response – neutralization methods.

UNIT V - FEEDBACK AMPLIFIERS AND OSCILLATORS **9+3**

Advantages of negative feedback – voltage ./ current, series , shunt feedback – positive feedback – condition for oscillations, phase shift – Wien bridge, Hartley, colpitts and crystal oscillators.

Lecture – 45 **Tutorial – 15** **Total : 60 PERIODS**

TEXT BOOKS:

1. David A. Bell ,"Electronic devices and circuits", Prentice Hall of India, 2004.
2. Seda smith, "Microelectronic circuits " Oxford University Press, 2004.

REFERENCES:

1. Rashid, "Micro electronic circuits" Thomson publications, 1999.
2. Floyd, "Electron devices" Pearson Asia 5th Edition, 2001.
3. Donald A Neamen, "Electronic Circuit Analysis and Design" Tata McGrawHill, 3rd Edition, 2003.

EE 9201 **CONTROL SYSTEMS**

L	T	P	C
3	1	0	4

AIM:

To learn the basic concepts of linear control theory and its analysis.

OBJECTIVE:

To impart knowledge on

- Different system representation, block diagram reduction and Mason's rule.
- Time response analysis of LTI systems and steady state error.
- The open loop and closed loop frequency responses of systems.
- Stability concept.
- State variable analysis.

UNIT I - MATHEMATICAL MODELS OF PHYSICAL SYSTEMS 9+3

Definition & classification of system – terminology & structure of feedback control theory –Analogous systems - Physical system representation by Differential equations – Block diagram reduction– Signal flow graphs.

UNIT II - TIME RESPONSE ANALYSIS & ROOT LOCUS TECHNIQUE 9+3

Standard test signals – Steady state error & error constants – Time Response of I and II order system – Root locus – Rules for sketching root loci.

UNIT III - FREQUENCY RESPONSE ANALYSIS 9+3

Correlation between Time & Frequency response – Polar plots – Bode Plots – Determination of Transfer Function from Bode plot.

UNIT IV - STABILITY CONCEPTS & ANALYSIS 9+3

Concept of stability – Necessary condition – RH criterion – Relative stability – Nyquist stability criterion – Stability from Bode plot – Relative stability from Nyquist & Bode – Closed loop frequency response.

UNIT V - STATE VARIABLE ANALYSIS 9+3

Concept of state – State Variable & State Model – State models for linear & continuous time systems – Solution of state & output equation – controllability & observability.

Lecture – 45 Tutorial – 15 Total : 60 PERIODS

TEXT BOOK:

1. Nagrath I.J & M. Gopal, Control systems Engineering, 4th Edition, New Age International, New Delhi, 2005.
2. Benzamin C. Kuo, Automatic Control systems, 7th Edition, Prentice-Hall (Pearson Education, Inc.), New Delhi, 2003.

REFERENCES:

1. Norman S. Nise, Control Systems Engineering, 4th Edition, John Wiley, New Delhi, 2007.
2. Richard C Dorf, Robert H Bishop, Modern control systems , 8th edition, Prentice Hall (Pearson education, Inc.), New Delhi 2003.
3. Benzamin C. Kuo and Farid Golnaraghi, Automatic Control systems, 8th Edition, John Wiley, New Delhi, 2003.
4. Eronini umez – Eronini – System Dynamics & Control, Thomson, New Delhi, 1999.

EE 9202 ELECTROMAGNETIC THEORY

L	T	P	C
3	0	0	3

AIM:

To introduce the fundamentals of electromagnetic fields and their applications in Engineering.

OBJECTIVES:

To impart knowledge on vector fields - electrostatic and magnetostatic fields, electrodynamics and electromagnetic waves.

PREREQUISITES

Vector algebra, Differential and Integral Calculus

UNIT I - INTRODUCTION 6

Sources and effects of electromagnetic fields – Vector fields – Different co-ordinate systems – Vector calculus – Gradient, Divergence and Curl – Divergence theorem – Stoke's theorem.

UNIT II - ELECTROSTATICS 12

Coulomb's Law – electric field intensity – Field due to point and continuous charges – Gauss's law and its applications – electrical potential – Electric field and equipotential plots – electric field in free space, conductors, dielectric – dielectric polarization. Electric field in multiple dielectrics – boundary conditions, Poisson's and Laplace's equations – Capacitance – Energy density – Dielectric strength – Applications.

UNIT III - MAGNETOSTATICS 9

Lorentz Law of force, magnetic field intensity – Biot – Savart Law – Ampere's Law – Magnetic field due to straight conductors, circular loop, infinite sheet of current – Magnetic flux density (B) – B in free space, conductor, magnetic materials. Magnetization-Magnetic field in multiple media – Boundary conditions – Scalar and vector potential – Magnetic force – Torque – Inductance – Energy density – Magnetic circuits – Applications.

UNIT IV - ELECTRO DYNAMIC FIELDS 9

Faraday's law, induced emf – transformer and motional EMF, Maxwell's equations (differential and integral forms)- Displacement current – Applications - Relation between field theory and circuit theory.

UNIT VI - ELECTROMAGNETIC WAVES 9

Generation – electro magnetic wave equations – Wave parameters; velocity, intrinsic impedance, propagation constant – Waves in free space, lossy and lossless dielectrics, conductors – skin depth, Poynting vector – Plane wave reflection and refraction - Applications

TOTAL : 45 PERIODS

TEXT BOOKS:

1 Matthew. N.O. Sadiku, “Elements of Electromagnetics”, Fourth Edition, Oxford University Press, First Indian Edition 2007.
2. Ashutosh Pramanik, “Electromagnetism – theory and application,” Prentice Hall of
India Private Ltd., New Delhi, 2006.

REFERENCES:

1. William H.Hayt Jr. and John A Buck “Engineering Electromagnetics”, Seventh Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.
2. J.A.Edminister, Schaum’s Outlines “Theory and problems of Electromagnetics”, Tata Mc Graw hill, Second Edition, Special Indian Edition 2006.
3. Guru and Hiziroghu “Electromagnetic field theory fundamentals”, Thomson Asia Pvt. Ltd., 1998.
4. John D Kraus, Daniel A Fleisch “Electromagenetics with Applications”, Tata McGraw Hill International Edition, 1999.

EE 9203 MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

AIM:

To provide adequate knowledge of measurements techniques using electrical and electronic instruments.

OBJECTIVES:

- Introduction to general instrument system, error, calibration etc.
- Emphasis is laid on analog and digital techniques used to measure voltage, current, energy, power and non-electrical parameters.
- To have an adequate knowledge of comparison methods of measurement.
- Elaborate discussion about storage & display devices.
- Exposure to various transducers and data acquisition system.

UNIT I - QUALITIES OF MEASUREMENT 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and calibration.

UNIT II - PRIMARY SENSING ELEMENTS AND SIGNAL CONDITIONING 9

Principles, Classification of sensors and transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, optical and digital transducers – Basic Instrumentation Amplifier, Sample and Hold Circuit, A/D and D/A converters

UNIT III - LECTRICAL MEASUREMNETS AND INSTRUMENTS 9

Principle and types of analog voltmeters, ammeters, multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements –Instrument transformers – Instruments for measurement of frequency and phase.

UNIT IV - MEASUREMENT OF PASSIVE ELEMENTS 9

Resistance measurement: Conventional methods, Wheatstone bridge, sensitivity of wheatstone bridge – Kelvin's bridges – Kelvin's double bridge method – Measurement of high resistance – megohm bridge method – Inductance measurement: Maxwell's inductance bridge – Maxwell's LC bridge – Hay's bridge – Anderson's bridge – Capacitance measurement: De Sauty's bridge – Schering bridge – Measurement of frequency : Wien's bridge.

UNIT V - BASIC MEASUREMENT METHODS OF NON-ELECTRICAL PARAMETERS 9

Measurement of Pressure: Comparison with known dead weights - Temperature: Thermocouple – pyrometers - Flow: Flow meters – Rotameters – Electromagnetic flow metres – Level: Mechanical, Electrical and optical level indicators - Speed: tachometers – stroboscopic methods, gyroscopes - Acceleration, Humidity:Wet and dry bulb hygrometer – Dunmore and pope cells, conductivity cells.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. A.K. Sawhney, 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, 2004.
2. J. B. Gupta, 'A Course in Electronic and Electrical Measurements', S. K. Kataria & Sons, Delhi, 2003.

REFERENCES:

1. E.O. Doebelin, 'Measurement Systems – Application and Design', Tata McGraw Hill publishing company, 2003.
2. Alan S. Morris," Measurement & Instrumentation Principles", Elsevier Publications, 2001
3. Arun K. Ghosh, " Introduction to Measurements and Instrumentation", Second Edition, PHI, 2007.

EE 9204 **DIGITAL SYSTEM DESIGN**

L	T	P	C
3	1	0	4

AIM:

To introduce the fundamentals of Digital Circuits, combinational and sequential circuit.

OBJECTIVES:

i. To study various number systems and to simplify the mathematical expressions using Boolean functions – simple problems.
ii. To study implementation of combinational circuits
iii. To study the design of various synchronous and asynchronous circuits.
iv. To expose the students to various memory devices.
v. To introduce digital simulation techniques for development of application oriented logic circuit.

UNIT I - BOOLEAN ALGEBRA AND COMBINATIONAL CIRCUITS **9+3**

Boolean algebra: De-Morgan's theorem, switching functions and simplification using K-maps & Quine McCluskey method, Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers.

UNIT II - SYNCHRONOUS SEQUENTIAL CIRCUITS **9+3**

Flip flops - SR, D, JK and T. Analysis of synchronous sequential circuits; design of synchronous sequential circuits – Counters, state diagram; state reduction; state assignment**.**

UNIT III - ASYNCHRONOUS SEQUENCTIAL CIRCUIT **9+3**

Analysis of asynchronous sequential machines, state assignment, asynchronous design problem.

UNIT IV - PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES **9+3**

Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, digital logic families: TTL, ECL, CMOS.

UNIT V – VHDL **9+3**

RTL Design – combinational logic – Types – Operators – Packages – Sequential circuit – Sub programs – Test benches. (Examples: adders, counters, flipflops, FSM, Multiplexers / Demltiplexers).

Lecture – 45 **Tutorial – 15** **TOTAL : 60 PERIODS**

TEXT BOOKS:

1. M. Morris Mano, 'Digital Design', Pearson Education, 2006.
2. John M.Yarbrough, 'Digital Logic, Application & Design', Thomson, 2002.

REFERENCES:

1. Raj Kamal, ' Digital systems-Principles and Design', Pearson education 2nd edition, 2007
2. Charles H.Roth, 'Fundamentals Logic Design', Jaico Publishing, IV edition, 2002.
3. Floyd and Jain, 'Digital Fundamentals', 8th edition, Pearson Education, 2003.
4. John F.Wakerly, 'Digital Design Principles and Practice', 3rd edition, Pearson Education, 2002.
5. Tocci, "Digital Systems : Principles and applications, 8th Edition" Pearson Education.

EC 9212 **ELECTRONICS LABORATORY**

L	T	P	C
0	0	3	2

AIM:

To provide hands on experience in characterization of electronic devices and development of electronic circuits.

OBJECTIVES:

1. To obtain the characteristics of electronic devices
2. To obtain the characteristics of amplifier circuits
3. To simulate electronic circuits using standard software packages

LIST OF EXPERIMENTS

1. PN Junction diode and Rectifier Applications
2. Bipolar Junction transistor - CE, CB, CC characteristics
3. JFET – characteristics and parameter determination
4. UJT & SCR Characteristics & UJT – Controlled SCR
5. Characteristics of DIAC and TRIAC
6. Characteristics of BJT Amplifier frequency response
7. Characteristics of FET amplifier frequency response
8. Characteristics of Class B amplifier – Darlington pair
9. Characteristics of Differential amplifier
10. Class D – Totempole configuration
11. PSPICE modeling of electronic circuits

TOTAL : 45 PERIODS

EE 9205 CONTROL AND INSTRUMENTATION LABORATORY

L	T	P	C
0	0	3	2

AIM:

To provide a platform for understanding the basic concepts of measurement and control and its application to practical systems.

OBJECTIVE:

i. To model, analyze and design linear and nonlinear systems.
ii. To study different measurement techniques and to give exposure in design of a closed loop control system.

List of Experiments

1. Digital simulation of linear systems.
2. Digital simulation of non-linear systems.
3. Study of P, PI and PID controllers and its applications to SISO systems.
4. Study of Lead-Lag compensators and applications to SISO systems.
5. State space analysis of physical systems
6. Stability analysis using conventional techniques.
7. Study of transducers and their characterization (Electrical, and Thermal)
8. Study of transducers and their characterization (Mechanical and flow)
9. Measurement of passive elements using Bridge networks
10. Instrument Transformers – Calibration and Analysis
11. Design of signal conditioning circuits.
12. Closed loop control system design.
13. Measurement systems-Simulation& analysis using LABVIEW

TOTAL : 45 PERIODS

EE 9206 FIELD MEASUREMENT AND COMPUTATION LABORATORY

L	T	P	C
0	0	3	2

AIM:

To study about the computational and measurement techniques of electromagnetic fields.

LIST OF EXPERIMENTS

1. A study of solution techniques for electromagnetic field problem using analytical and numerical methods (FDM and FEM).

Graphical Representation of fields (using MATLAB)

2. Plotting of vector, divergence and curl fields.
3. Plotting of electric field and equipotential lines
4. Plotting of Magnetic fields

Computation of Electric (E) and Magnetic (H) fields (using FEM/FDM packages) for simple configurations

5. Computation of Electric field intensity, voltage distribution and capacitance.
6. Computation of Magnetic field intensity and inductance
7. Calculation of Skin depth

Measurement using field meter

8. Measurement of Electrical Fields
9. Measurement of Magnetic fields
10. Measurement of E and H around practical appliances

TOTAL : 45 PERIODS

EC 9261 COMMUNICATION ENGINEERING

L	T	P	C
3	0	0	3

AIM:

To introduce the concepts of communication systems engineering using wire and wireless medium

OBJECTIVES:

To introduce different methods of analog communication and their significance
To introduce Digital Communication methods for high bit rate transmission
To introduce the concepts of source and line coding techniques for enhancing rating of transmission of minimizing the errors in transmission.
To introduce MAC used in communication systems for enhancing the number of users.
To introduce various media for digital communication

UNIT I - ANALOG COMMUNICATION 9

AM – Frequency spectrum – vector representation – power relations – generation of AM – DSB, DSB/SC, SSB, VSB AM Transmitter & Receiver; FM and PM – frequency spectrum – power relations : NBFM & WBFM, Generation of FM and DM, Amstrong method & Reactance modulations : FM & PM frequency.

UNIT II - DIGITAL COMMUNICATION 9

Pulse modulations – concepts of sampling and sampling theorems, PAM, PWM, PPM, PTM, quantization and coding : DCM, DM, slope overload error. ADM, DPCM, OOK systems – ASK, FSK, PSK, BSK, QPSK, QAM, MSK, GMSK, applications of Data communication.

UNIT III - SOURCE CODES, LINE CODES & ERROR CONTROL (Qualitative only) 9

Binary communication – entropy, properties, BSC, BEC, source coding : Shannon, Fano, Huffman coding : noiseless coding theorem, BW – SNR trade off, Line codes: NRZ, RZ, AMI, HDBP, ARQ, mBnB codes : Efficiency of transmission, error control codes and applications: convolution& block codes.

UNIT IV - MULTIPLE ACCESS TECHNIQUES 9

Spread Spectrum& Multiple (MA)Access techniques : FDMA, TDMA, CDMA, SDMA application in wire and wireless communication : Advantages.

UNIT V - POWER SYSTEM COMMUNICAITON 9

Satellites, Orbits-Types-frequencies used, link establishment, MA techniques used in satellite communication, earth station; aperture antennas used in satellite – INTELSAT and INSAT: fibers – types: sources, detectors, digital filters, optical link: Basics of power line carrier communications and SCADA

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Taub & Schiling “Principles of communication systems” Tata McGraw hill 2007
2. J.Das “Principles of digital communication” New Age International, 1986

REFERENCES:

1. Kennedy and Davis “Electronic communication systems” Tata McGraw hill, 4th edition, 1993.
2. Sklar “Digital communication fundamentals and applications“ Pearson Education, 2001
3. Bary le, Memuschmidt, digital Communication, Kluwer Publication, 2004.
4. B.P.Lathi “Modern digital and analog communication systems” Oxford University Press, 1998.

EE 9251 TRANSMISSION AND DISTRIBUTION

L	T	P	C
3	0	0	3

AIM:

To become familiar with the function of different components used in Transmission and Distribution levels of power systems and modeling of these components.

OBJECTIVES:

- To develop expression for computation of fundamental parameters of lines.
- To categorize the lines into different classes and develop equivalent circuits for these classes.
- To analyse the voltage distribution in insulator strings and cables and methods to improve the same.

UNIT I – INTRODUCTION 9

Structure of electric power system: generation, transmission and distribution; Types of AC and DC distributors – distributed and concentrated loads – interconnection - HVDC and EHV AC transmission

UNIT II - TRANSMISSION LINE PARAMETERS 9

Parameters of single and three phase transmission lines with single and double circuits: Resistance, inductance and capacitance of solid, stranded and bundled conductors: Symmetrical and unsymmetrical spacing and transposition; application of self and mutual GMD; skin and proximity effects; interference with neighbouring communication circuits. Typical configuration, conductor types and electrical parameters of 400, 220, 110, 66 and 33 kV lines.

UNIT III - MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Classification of lines: Short line, medium line and long line; equivalent circuits, attenuation constant, phase constant, surge impedance; transmission efficiency and voltage regulation; real and reactive power flow in lines: Power-angle diagram; surge-impedance loading, shunt and series compensation; Ferranti effect and corona loss.

UNIT IV - INSULATORS AND CABLES 9

Insulators: Types, voltage distribution in insulator string and grading, improvement of string efficiency. Underground cables: Introduction-Types of cables, Capacitance of Single-core cable, Grading of cables, Power factor and heating of cables, Capacitance of 3- core belted cable, D.C cables

UNIT V - MECHANICAL DESIGN OF LINES AND GROUNDING 9

Mechanical design of transmission line – sag and tension calculations for different weather conditions – Methods of grounding – Peterson coil - Substation layout-Tower Spotting

TOTAL : 45 PERIODS

TEXT BOOKS:

1 C.L.Wadhwa, 'Electrical Power Systems', New Age International Pvt., Ltd., 2007
2. D.P.Kothari , I.J. Nagarath, 'Power System Engineering',Tata McGraw-Hill Publishing Company limited, New Delhi, 2007.

REFERENCES:

1. B.R.Gupta, 'Power System Analysis and Design', S.Chand, New Delhi, 2003.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, 2002.
3. Luces M.Fualkenberry ,Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 1996.
4. Hadi Saadat, 'Power System Analysis,' Tata McGraw Hill Publishing Company', 2003.
5. J.Brian, Hardy and Colin R.Bayliss 'Transmission and Distribution in Electrical Engineering'

EE 9252 MICROPROCESSORS AND MICRO CONTROLLERS

L	T	P	C
3	0	0	3

AIM:

To introduce Microprocessor Intel 8085, 8086 and the Micro Controller 8051

OBJECTIVES:

i. To study the Architecture of 8085, 8086 & 8051.
ii. To study the addressing modes & instruction set of 8085, 8086 & 8051.
iii. To introduce the need & use of Interrupt structure.
iv. To develop skill in simple program writing.
v. To introduce commonly used peripheral/ interfacing ICs

UNIT I - 8085 PROCESSOR **9**

8085: Functional block diagram –- Signals – Memory interfacing – I/O ports and data transfer concepts – Timing Diagram – Interrupt structure, 8086 Architecture.

UNIT II - PROGRAMMING OF 8085 PROCESSOR **9**

Instruction format and addressing modes – Assembly language format – Data transfer, data manipulation & control instructions – Programming: Loop structure with counting & Indexing - Look up table - Subroutine instructions stack.

UNIT III - PERIPHERAL INTERFACING **9**

Study of Architecture and programming of ICs: 8255 PPI, 8259 PIC, 8251 USART, 8279 Key board display controller and 8253 Timer/ Counter – Interfacing with 8085 - A/D and D/A converter interfacing.

UNIT IV - MICRO CONTROLLER 8051 **9**

Functional block diagram - Instruction format and addressing modes – Interrupt structure – Timer –I/O ports – Serial communication, Simple programming.

UNIT V - MICRO CONTROLLER PROGRAMMING & APPLICATIONS **9**

Data Transfer, Manipulation, Control & I/O instructions – Simple programming exercises key board and display interface – Closed loop control of DC shunt motor-stepper motor control.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', Wiley Eastern Ltd., New Delhi,
2. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, 2007.

REFERENCES:

1. Antonakos, 'The Pentium microprocessor', Pearson Education, 2007
2. Kenneth Ayala, 'The 8051Microcontroller', Thomson, 2005
3. N.K De and P.K Sen, 'Electric Drives', Prentice Hall of India, 2005

EE 9253 ELECTRICAL MACHINES – I

L	T	P	C
3	1	0	4

AIM:

To study the fundamental principles of Electrical machines and the characteristics of D.C Machines and Transformers.

OBJECTIVES:

To study the fundamental principles of Electro-mechanical energy conversion
To study the machine windings and the MMF pattern of armature and field windings.
To study the theory, operation and characteristics of DC machines and Transformers.

UNIT I - ELECTRO-MECHANICAL ENERGY CONVERSION 6+2

Flux linkage, inductance and energy – time varying and rotational induced emf's – losses – conservation of energy – energy and co energy – force and torque – singly and doubly excited systems – reluctance and mutual torque.

UNIT II – TRANSFORMERS 12+4

Construction – principle of operation – ideal transformer – equivalent circuit – testing and efficiency – voltage regulation – auto-transformer – three phase connections – parallel operation of transformers – phase conversion – tap-changing – harmonics – three-winding transformers – applications.

UNIT III - BASIC CONCEPTS IN ELECTRICAL MACHINES 9+3

Armature windings: D.C Machine – armature winding (lap and wave connection), field winding – MMF pattern of commutator winding and field winding. A.C Machine (single-phase and three-phase) – concentrated and distributed windings – single – layer and double-layer windings – distribution and pitch factors – MMF pattern for alternating and rotating fields – concept of space phasors – EMF and torque equations.

UNIT IV - D.C. MACHINES 12+4

Construction – EMF and torque equation of generator – armature reaction – commutation – methods of excitation – equivalent circuits – characteristics of generators – parallel operation – EMF and torque equation of motor – principle of operation – characteristics of motors.

UNIT V - DC MOTORS 6+2

Starting and speed control – testing and efficiency – braking – applications – Permanent Magnet DC Machines.

Lecture – 45 Tutorial – 15 TOTAL : 60 PERIODS

TEXT BOOKS:

1. Fitzgerald, A.E.Charles Kingsley Jr.Stephen D.Umans, ‘Elecric Machiney’, McGraw Hill Book Company, Third Edition 2002.
2. Nagrath, I.J. and Kothari.D.P., Electric Machines’, T.M.H. publishing Co. Ltd., New Delhi

REFERENCES:

1. Say M.G "Performance and Design of Alternating Machines ' CBS Publishers and Distributors, New Delhi, First Indian Edition, Reprint 1998.
2. Irving L.Kosow, "Electric Machinery and Transformers", Prentice Hall of India Private Ltd., New Delhi, Second Edition, Reprint 2007.
3. Stephen J.Chapman, "Electric Machinery Fundamentals', "McGraw Hill Intl. Edition, New Delhi, 2005.

EE 9254 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

AIM:

To introduce the concept of analyzing discrete time signals & systems in the time and frequency domain.

OBJECTIVES:

- To classify signals and systems & their mathematical representation.
- To analyse the discrete time systems.
- To study various transformation techniques & their computation.
- To study about filters and their design for digital implementation.
- To study about a programmable digital signal processor & quantization effects.

UNIT I - INTRODUCTION 9

Classification of systems: Continuous, discrete, linear, causal, stable, dynamic, recursive, time variance; classification of signals: continuous and discrete, energy and power; mathematical representation of signals; spectral density; sampling techniques, quantization, quantization error, Nyquist rate, aliasing effect. Digital signal representation.

UNIT II - DISCRETE TIME SYSTEM ANALYSIS 9

Z-transform and its properties, inverse z-transforms; difference equation – Solution by z-transform, application to discrete systems - Stability analysis, frequency response – Convolution – Fourier transform of discrete sequence – Discrete Fourier series.

UNIT III - DISCRETE FOURIER TRANSFORM & COMPUTATION 9

DFT properties, magnitude and phase representation - Computation of DFT using FFT algorithm – DIT & DIF - FFT using radix 2 – Butterfly structure.

UNIT IV - DESIGN OF DIGITAL FILTERS 9

FIR & IIR filter realization – Parallel & cascade forms. FIR design: Windowing Techniques – Need and choice of windows – Linear phase characteristics. IIR design: Analog filter design - Butterworth and Chebyshev approximations; digital design using impulse invariant and bilinear transformation - Warping, prewarping - Frequency transformation.

UNIT V - DIGIRAL SIGNAL PROCESSORS 9

Introduction – Architecture – Features – Addressing Formats – Functional modes - Introduction to Commercial Processors

TOTAL : 45 PERIODS

TEXT BOOKS:

1. J.G. Proakis and D.G. Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications', Pearson Education, New Delhi, 2003 / PHI.
2. S.K. Mitra, 'Digital Signal Processing – A Computer Based Approach', Tata McGraw Hill, New Delhi, 2001.

REFERENCES:

1. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, 'Discrete – Time Signal Processing', Pearson Education, New Delhi, 2003.
2. Emmanuel C Ifeachor and Barrie W Jervis ,"Digital Signal Processing – A Practical approach" Pearson Education, Second edition, 2002.
3. Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing", Second Edition, California Technical Publishing San Diego, California. (www.DSPguide.com)
4. B. Venkataramani, M. Bhaskar, 'Digital Signal Processors, Architecture, Programming and Applications', Tata McGraw Hill, New Delhi, 2003.

EE 9255 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

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AIM:

To experimentally understand the operation of Intel 8085 microprocessor
To realize the interfacing concepts with 8251, 8279, 8254.
To verify and interpret the function of IC 741 by conducting various tests

OBJECTIVE:

- To perform simple arithmetic operations using assembly language program.
- To write an assembly language program using the control instructions
- To write an assembly language program to convert Analog input to Digital output and Digital input to Analog output.
- To demonstrate use of control logic instructors.
- To demonstrate the access of parallel port.
- To study various digital & linear integrated circuits used in simple system configuration.
- To test of ICs by using verification of truth table of basic ICs.
- Minimization of functions using K-map implementation and combination Circuit.
- Realizing code conversion of numbers of different bar.
- Design and implementation of 4 bit modulo counters.
- Design and implementation of shift register.
- Design and Realization of Op-Amp application.
- Realization of circuit for digital conversions.
- Demonstration of circuit for communication application

LIST OF EXPERIMENTS

1. Simple arithmetic operations: Multi precision addition / subtraction / multiplication / division.
2. Programming with control instructions: Increment / Decrement, Ascending / Descending order, Maximum / Minimum of numbers, Rotate instructions, Hex / ASCII / BCD code conversions.
3. Interface Experiments:
    - A/D Interfacing.
    - D/A Interfacing.
    - Traffic light controller.
4. Interface Experiments:
    - Simple experiments using 8251, 8279, 8254.
5. Demonstration of basic instructions with 8051 Micro controller execution, including:
    - Conditional jumps, looping
    - Calling subroutines.
    - Stack parameter testing
6. Parallel port programming with 8051 using port 1 facility:
    - Stepper motor and D / A converter.
7. Study of Basic Digital IC's.
   (Verification of truth table for AND, OR, EXOR, NOT, NOR, NAND, JK FF, RS FF, D FF)
8. Implementation of Boolean Functions, Adder/ Subtractor circuits.
9 Combination Logic: Adder, Subtractor, Code converters, Encoder and Decoder.

10. Sequential Logic: Study of Flip-Flop, Counters (synchronous and asynchronous), Shift Registers
11. Op-Amp Linear Application: Comparator, Differentiator, Integrator, Adder, Subtractor. Op-amp Non Linear Application: Clipper, Clamper, Peak detector, Timer IC application, VCO and PLL.

REFERENCES

1. R.S. Gaonkar, 'Microprocessor Architecture Programming and Applications', Wiley Eastern Ltd., New Delhi, 1995.
2. Myke Predko, 'Programming and Customizing the 8051 Microcontroller', Tata McGraw Hill, 1999.
3. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003

EE 9256 ELECTRICAL MACHINES LABORATORY – I

L	T	P	C
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AIM:

To provide experimental skill in the operation of DC machines and Transformers.

OBJECTIVES:

To experimentally verify the principle of operation, performance and characteristics of DC Motors, DC Generators and Transformers
To study the operation of DC motor starters, different connections of Transformers.

LIST OF EXPERIMENTS

1. Open circuit and load characteristics of a separately excited DC Generator
2. Open circuit and load characteristics of DC shunt Generator
3. Load characteristics of DC compound motor
4. Load test on DC shunt motor.
5. Load test on DC series motor.
6. Speed control of DC shunt motor.
7. Swinburne's test
8. Study of DC motor starters.
9. Open circuit and short circuit test on single-phase transformer
10. Separation of no load losses in a single phase transformer
11. Sumpner's test
12. Three phase connection
13. Scott connection