B.E. ELECTRICAL AND ELECTRONICS ENGINEERING
REGULATION – 2007
(REVISION - 2010)

First Semester					
Code.No	**Courses**	**L**	**T**	**P**	**C**
07G101	Engineering Mathematics – I*	3	2	0	4
07G102	Engineering Physics*	3	0	0	3
07G103	Engineering Chemistry*	3	0	0	3
07G104	"C" Programming*	3	0	0	3
07E105	Basics of Civil and Mechanical Engineering♣	4	0	0	4
07E106	Electric Circuit Analysis – I@	2	1	0	3
07G001	Communication Skills – I**	3	0	0	3
07G108	"C" Programming Laboratory*	0	0	3	2
07E109	Engineering Graphics#	2	0	3	4
07E110	Workshop Practice#	0	0	3	2
	Total	**23**	**3**	**9**	**31**

Second Semester					
Code No.	**Course**	**L**	**T**	**P**	**C**
07G201	Engineering Mathematics –II*	3	2	0	4
07G202	Environmental Science and Engineering*	3	0	0	3
07G203	Object Oriented Programming*	3	0	0	3
07E204	Electrical Engineering Materials@	3	0	0	3
07E205	Electric Circuit Analysis – II@	3	1	0	4
07E206	Solid State Devices@	3	1	0	4
07G002	Communication Skills – II**	3	0	0	3
07G208	Object Oriented Programming Laboratory*	0	0	3	2
07E209	Engineering Physics Laboratory$	0	0	2	1
07E210	Engineering Chemistry Laboratory$	0	0	2	1
	Total	**21**	**4**	**7**	**28**

* Common to all branches of B.E./B.Tech.
♣ Common to ECE, EEE, CSE, IT, FT, TT, BT & EIE
Common to ECE, EEE, EIE, IT (first semester); FT, CE, BT, CSE, TT & ME (second semester)
$ Common to FT, CE, BT, CSE, TT & ME (first semester); ECE, EEE, EIE, IT (second semester)
@ Common to EEE & EIE
** Common to all branches of B. E./B. Tech and evaluation by continuous assessment

Third Semester					
Code.No	**Courses**	**L**	**T**	**P**	**C**
07G301	Engineering Mathematics – III*	3	2	0	4
07E302	Solid State Circuits#	3	0	0	3
07E303	DC Machines & Transformers	3	1	0	4
07E304	Field Theory	3	1	0	4
07E305	Applied Thermodynamics	3	0	0	3
07E306	Data Structures*	3	0	0	3
07E307	Concepts of Engineering Design	2	0	2	3
07E308	Electric Circuits Laboratory#	0	0	3	2
07E309	DC Machines & Transformers Laboratory	0	0	3	2
07E310	Data Structures Laboratory*	0	0	3	2
	Total	**20**	**4**	**11**	**30**

Fourth Semester					
Code.No	**Courses**	**L**	**T**	**P**	**C**
07E401	Numerical Methods & Operations Research#	3	2	0	4
07E402	Digital Logic Circuits#	3	0	0	3
07E403	Control Engineering#	3	1	0	4
07E404	Measurements & Instrumentation Systems	3	0	0	3
07E405	AC Machines	3	1	0	4
07E406	Communication Engineering	3	0	0	3
07G003	Professional Communication**	3	0	0	3
07E408	AC Machines Laboratory	0	0	3	2
07E409	Solid State Circuits and Devices Laboratory#	0	0	3	2
07E410	Measurements and Instrumentation Laboratory	0	0	3	2
	Total	**21**	**4**	**9**	**30**

* Common to all branches of B.E./B.Tech.
# Common to EEE & EIE
** Common to all branches of B. E./B. Tech and evaluation by continuous assessment

Fifth Semester					
Code.No	**Courses**	**L**	**T**	**P**	**C**
07E501	Power Electronics #	3	1	0	4
07E502	Power Systems – I	3	1	0	4
07E503	Linear Integrated Circuits#	3	0	0	3
07E504	Advanced Control Engineering#	3	1	0	4
07E505	Power System Protection & Switch Gears	3	0	0	3
07E506	Signals & Systems#	3	1	0	4
07G005	Engineering Economics**	3	0	0	3
07E508	Power Electronics Laboratory	0	0	3	2
07E509	Control Engineering Laboratory	0	0	3	2
07E510	Linear & Digital IC Laboratory#	0	0	3	2
	Total	**21**	**4**	**9**	**33**

Sixth Semester					
07E601	Solid State Drives	3	1	0	4
07E602	Power Systems - II	3	1	0	3
07E603	Microprocessors & Microcontrollers#	3	1	0	4
07E604	Digital Signal Processing#	3	1	0	4
07E605	Software Engineering	3	0	0	3
	Elective I	3	0	0	3
07G006	Total Quality Management**	3	0	0	3
07E608	Microprocessors & Microcontrollers Laboratory#	0	0	3	2
07E609	Electrical Workshop	0	0	3	2
07E610	Technical Seminar	0	0	3	2
	Total	21	4	9	30

** Common to all branches of B. E./B. Tech and evaluation by continuous assessment

Seventh Semester					
Code.No	**Courses**	**L**	**T**	**P**	**C**
07E701	Electrical Machine Design	3	0	0	3
07E702	Computer Networks	3	0	0	3
07E703	VLSI Design#	3	0	0	3
07E704	Renewable Energy Sources	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
07G007	Creativity and Innovation**	3	0	0	3
07E708	Power Systems Laboratory	0	0	3	2
07E709	Electrical Drives & Power Quality Laboratory	0	0	3	2
07E710	Project Work - Phase I				3
	Total	21	0	6	28

Eighth Semester					
Code No.s	**Course**	**L**	**T**	**P**	**C**
07E801	Embedded System#	3	0	0	3
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
07G004	Professional Ethics**	3	0	0	3
07E805	Project Work - Phase II				12
	Total	12	0	0	24

** Common to all branches of B. E./B. Tech and evaluation by continuous assessment

ELECTIVE I
07E001 Insulation Technology
07E002 Special Electrical Machines
07E003 Virtual Instrumentation#
07E004 Power Semiconductor Devices
07E0A1Process Control Instrumentation

ELECTIVE II
07E005 Power System Operation & Control
07E006 Power System Stability
07E007 Power Electronic Interfaces for Renewable Energy Sources of Power Generation
07E008 Power Quality Management
07E009 Digital Control System

ELECTIVE III
07E010 Computer Aided Analysis & Design of Systems#
07E011 Computer Graphics
07E012 Evolutionary Computation
07E019 Value Engineering

ELECTIVE IV
07E013 Bio Medical Instrumentation #
07E014 Bio Medical Signal Processing #
07E015 Robotics and Automation#
07E0A3 Switched Mode Power Converters

ELECTIVE V
07E016 Digital Image Processing#
07E017 Advanced Microprocessors & Microcontrollers#
07E018 Artificial Intelligence & Expert Systems
07E0A4 Industrial Psychology and Safety
07E020 Energy Auditing, Conservation and Management
07E0A6 Management Information System
07E0A7 Power System Stability Studies
07G008 Organizational Behavior and Management**

Syllabi of

B.E. Electrical and Electronics Engineering

07G101 ENGINEERING MATHEMATICS – I
(Common to all branches) 3 2 0 4

Unit I

Matrices

The characteristic equation - Eigen values and eigen vectors of a real matrix-Some properties of eigen values - Cayley–Hamilton theorem - Reduction of a real matrix to a diagonal form- Orthogonal matrices properties - Reduction of a quadratic form to a canonical form by orthogonal transformation. **12 Hours**

Unit II

Three Dimensional Analytical Geometry

Direction cosines and ratios- Angle between two lines- Equation of a plane- Equation of a straight line-Coplanar lines- Shortest distance between skew lines – Sphere - Tangent plane - Plane section of a sphere - Orthogonal spheres.

12 Hours

Unit III

Geometrical Applications of Differential Calculus

Curvature - Cartesian and polar coordinates - Circle of curvature - Involutes and Evolutes - Envelopes - Properties of the envelopes - Evolutes as envelopes of normal. **12 Hours**

Unit IV

Differential Equations

Simultaneous first order linear equations with constant coefficients - Linear equations of second and higher order with constant and variable coefficients - Homogeneous linear equations of Euler type - Equations reducible to homogeneous form - Method of reduction of order - Method of variation of parameters.

12 Hours

Unit V

Laplace Transforms

Transforms of simple functions - Basic operational properties - Transforms of derivatives and integrals - Initial and Final value theorems - Inverse transforms - Convolution theorems - Periodic functions - Applications of Laplace transforms for solving the ordinary differential equations up to second order with constant coefficients and simultaneous equations of first order with constant coefficients.

12 Hours
Total : 60 Hours

Textbooks:

1. Lakshminarayanan K.A. and et al, "Engineering Mathematics - I, 6th edition, Vikas Publishing House, New Delhi, 2006.
2. Veerarajan T., "Engineering Mathematics", 5th Edition, Tata McGraw Hill Publications, New Delhi, 2006.

References:

1. Kandasamy P. and et al., "Engineering Mathematics", Volumes I & II, S. Chand & Co., New Delhi 2001.
2. Narayanan S., Manicavachagam Pillai, Ramaiah. T.K "Advanced Mathematics for Engineering Students" Volume I, Viswanathan Printers & Publishers, 1993.
3. Grewal B.S "Higher Engineering Mathematics", Khanna Publications, New Delhi 2000.
4. Kreyszig E, "Advanced Engineering Mathematics" 8th Edition, John Wiley & Sons, Inc, Singapore, 2002.

07G102 ENGINEERING PHYSICS
(Common to all branches)

3 0 0 3

Unit I

Properties of Matter and Acoustics

Properties of Matter: Elasticity – Stress–Strain Diagram – Twisting couple on a wire – Shafts – Torsion pendulum – Depression of a cantilever – Young's Modulus by cantilever – Uniform and Nonuniform bending. Acoustics: Classification of sound – Characteristics of musical sound – Loudness – Weber – Fechner law – Decibel – Absorption coefficient – Reverberation – Reverberation time – Sabine's formula (growth & decay) – Factors affecting acoustics of buildings and their remedies.

10 Hours

Unit II

Crystallography and Ultrasonics

Crystal Physics: Lattice – Unit cell – Bravais lattices – Lattice planes – Miller indices – 'd' spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures. Ultrasonics: Ultrasonic production – Magnetostriction – Piezo electric methods – Applications – Determination of velocity of ultrasonic waves (acoustic grating) – SONAR.

10 Hours

Unit III

Waveoptics

Interference : Air wedge – Theory – Uses – Testing of flat surfaces – Thickness of a thin wire – Polarization: Expressions for plane, circularly and elliptically polarized light (derivation) – Quarter and Half wave plates – Uses – Production of plane, circularly and elliptically polarized light – Analysis of plane, circularly and elliptically polarized light. LASER: Types of lasers – Nd – YAG laser – CO_2 laser – semiconductor laser (homojunction) – Applications – Holography – Construction – Reconstruction – Uses.

10 Hours

Unit IV

Modern Physics

Quantum Physics: Development of quantum theory – de Broglie wavelength – Schrödinger's wave equation – Time dependent – Time independent wave equations – Physical significance – Applications – Particle in a box (1d). X-rays**:** Scattering of X-rays – Compton Effect – Theory and experimental verification – Diffraction – Laue's method – Powder crystal method.

10 Hours

Unit V

New Engineering Materials

Metallic glasses: Manufacturing – Properties – Uses. Shape Memory Alloys**:** Working Principle – Shape memory Effect – Applications. Nanomaterials**:** Preparation method – Sol gel technique – Mechanical – Magnetic characteristics – Uses. Ceramics**:** Classification – Crystalline – Non-crystalline – Bonded ceramics – Manufacturing methods – Slip casting – Isostatic pressing – Thermal and electrical properties. Bio-materials**:** Metals and alloys bio materials – Polymer bio materials – Ceramic bio material – Bio polymers.

10 Hours

Total: 50 Hours

Textbooks:

1. Arumugam M., "Engineering Physics", 5th Edition, Anuradha Publications, Kumbokonam, 2006.
2. Palanisami P.K., "Physics For Engineers", Volume1, 2nd Reprint, Scitech Publications (India), Pvt Ltd., Chennai, 2002.

References:

1. Avadhanulu M.N. and Kshirsagar P.G., "A Textbook: of Engineering Physics", 7th Enlarged Revised Edition, S.Chand & Company Ltd., New Delhi, 2005.
2. Pillai S.O., "Solid State Physics", Fifth Edition, New Age International Publication, New Delhi, 2003.
3. Rajendran V. and Marikani A., "Physics I", First Reprint, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2004.
4. Arthur Beiser, "Concepts of Modern Physics", Tata McGraw Hill Co. New Delhi, 1995.
5. Gaur R. K. and Gupta S. L., "Engineering Physics", Dhanpat Rai Publishers, New Delhi, 2001.

07G103 ENGINEERING CHEMISTRY

(Common to all branches) **3 0 0 3**

Unit I

Chemistry of Water and its Industrial Applications

Hardness of water: Equivalents of calcium carbonate - Units of hardness- Degree of hardness and its estimation (EDTA method)-numerical problems on degree of hardness- pH value of water. Use of water for industrial purposes: boiler feed water-scale-sludge-caustic embitterment. Softening of hard water: external conditioning – zeolite - ion exchange methods - internal conditioning- calgon- phosphate methods. Use of water for domestic purposes: domestic water treatment - disinfection of water-break point chlorination.

10 Hours

Unit II

Electrochemistry for Materials Processing

Electrolytic conductance: Kohlrausch's law and its applications: problems - emf. Electrodics: single electrode potential - Nernst equation - problems - Hydrogen electrode - Calomel electrode - Glass electrode - pH measurement using glass electrode - Electrochemical series. Cells: electrochemical cells - Cell reactions- Daniel cell - standard Weston cadmium cell - electrode concentration cells, electrolytic concentration cells - reversible cells - irreversible cells - Electrolytic cells - concept of electroplating - electrode reactions of electroplating of Ni.

10 Hours

Unit III

Chemistry of Corrosion and its Control

Corrosion: theories of corrosion - chemical (Pilling-Bed worth rule) - electrochemical (oxygen absorption - hydrogen evolution) - Galvanic series. Types of corrosion: galvanic corrosion - differential aeration corrosion - stress corrosion - pitting corrosion - waterline corrosion - Factors affecting corrosion. Methods of corrosion control: sacrificial anodic protection - impressed current method - Protective coatings - metallic coating – galvanizing - tinning.

10 Hours

Unit IV

Introduction to Polymer and Nanotechnology

Polymers: Monomer - Functionality - Degree of polymerization - Classification based on source- applications. Types of polymerization: Addition - condensation - copolymerization - addition polymerization by free radical mechanism only. Thermoplastic and thermosetting resins: Preparation - properties and applications of epoxy resins- TEFLON- nylon - bakelite. Nanomaterials: introduction-Bulk nano structured materials-Nano electrodes-Nanoclusters-Carbon nano tubes - nano polymers - applications.

10 Hours

Unit V

Instrumental Techniques of Chemical Analysis

Beer–Lambert's law - problems. UV visible and IR spectroscopy: principle- instrumentation (block diagram only) - applications. Colorimetry: principle – instrumentation (block diagram only) - estimation of iron by colorimetry. Flame photometry: principle - instrumentation (block diagram) - estimation of Na by flame photometry. Atomic absorption spectroscopy: principle - instrumentation (block diagram) - estimation of Ni by atomic absorption spectroscopy.

10 Hours

Total: 50 Hours

Textbooks:

1. Puri B.R., Sharma L.R., and Madan S. Pathania, "Principles of Physical Chemistry", Thirty eighth Edition, Shoban Lal Nagin Chand & Co., Jalandhar, 2000.
2. Jain P.C., and Monika Jain, "Engineering Chemistry", Fourteenth Edition, Dhanpat Rai Publishing Company PVT Ltd, New Delhi. 2005.

References:

1. Bahl B.S., Tuli G.D., and Arun Bahl, "Essentials of Physical Chemistry", Twenty fourth Edition, S.Chand & Company Ltd., New Delhi, 2004.
2. Kuriacose J.C., and Rajaram J., "Chemistry in Engineering & Technology", Vol. 1&2, Tata McGraw Hill publishing company, New Delhi, 1996.
3. Kenneth J. Klabunde, "Nanoscale Materials in Chemistry", Wiley Inter science, 2001.
4. Andre Arsenault and Geoffrey A. Ozin, "Nanochemistry: A Chemical Approach to Nanomaterials", First Edition, Royal Society of Chemistry, 2005.
5. Skoog and West, "Fundamentals of Analytical Chemistry", Seventh Edition, Wiley, New York, 1996.

07G104 C PROGRAMMING
(Common to all branches)

3 0 0 3

Unit I

Introduction to C

About ANSI C Standard – Overview of compilers and interpreters – structure of a C program – programming rules. Executing the program The C Character Set – Delimiters – The C Keywords – Identifiers – Constants – Variables – Rules for Defining Variables – Data Types – Declaring Variables – Initializing Variables – Type Conversion – Constant and Volatile Variables

Operators and Expressions

Priority of Operators and their Clubbing – Comma and Conditional Operators – Arithmetic Operators – Relational Operators – Logical Operators – Bitwise Operators

Input and Output in C

Formatted Functions - Unformatted Functions – Commonly used Library Functions

10 Hours

Unit II

Decision Statements

The if Statement - The if…..else Statement – Nested if-else Statement – The break Statement – The Continue Statement - The goto Statement -– The switch Statement – Nested Switch () Case– The Switch () Case and Nested Ifs

Loop Control Statements

The for Loop – Nested for Loops – The While loop – The do-while – The do-while Statement with while Loop

Arrays

Array Initialization – Definition of Array – Characteristic of Array – One-Dimensional Array – Predefined Streams – Two-Dimensional Array – Three or Multi Dimensional Arrays – The sscanf ( ) and sprintf ( ) Functions

10 Hours

Unit III

Working with strings and standard functions

Declaration and Initialization of string – Display of strings with Different Formats – String Standard Functions – Applications of Strings

Pointers

Features of Pointers – Pointer Declaration – Arithmetic Operations with Pointers – Pointers and Arrays – Pointers and Two-Dimensional Arrays – Array of Pointers – Pointers to Pointers – Pointers and Strings – Void Pointers

Additional In C

Dynamic Memory Allocation – Memory Models – Linked Lists - Graphics

10 Hours

Unit IV

Functions

Definition of Function – Declaration of Function and Function Prototypes – The return Statement – Types of Functions – Call by Value and Reference: – Functions Returning More Values – Function as an Argument – Function with Operators – Function and Decision Statement - Function and Loop Statements – Function with Arrays and Pointers – Recursion – Pointer to Function

Storage class

Automatic Variables – External Variables – Static Variables – Register Variables

Preprocessor Directives

The #define Directive – Undefining a Macro – Token Pasting a Stringizing Operators – The #include Directive – Conditional Compilation – The #ifndef Directive – The #error Directive – The #line Directive – Inline Directive – The #pragma Saveregs – The #pragma Directive – The predefined Macros in ANSI and Turbo C – Standard I/O Predefined Streams in stdio.h – The Predefined Macros in ctype.h

10 Hours

Unit V

Structure and Union

Features of Structures – Declaration and Initialization of Structures – Structure within Structure – Array of Structures – Pointer to Structures – Structure and Functions – typedef – Bit Fields – Enumerated Data Type – Union – Calling BIOS and DOS Services – Union of Structures

Files

Streams and File Types – Steps for File Operations – File I/O – Structures Read and Write – Other File Functions – Searching Errors in Reading\Writing Files – Low Level Disk I/O – Command Line Arguments – Environment Variables – I/O Redirection

10 Hours

Total: 50 Hours

Textbook:

Ashok N Kamthane "Programming with ANSI and Turbo C", 1st edition Pearson, 2006.

References:

1. Byron S. Gottfried "Schaum's Outline of Programming with C" 2nd edition, McGraw Hill, 1996.
2. Ritchie D.M, Kernighan B.W, "C Programming Language", PHI, 2000.
3. Deitel & Deitel, "C How to program", Pearson Education, 2001.
4. Herbert Schidt, "C- The complete Reference:" McGraw Hill, 2002.
5. Gary J Bronson, "First book of ANSI C", Third Edition, Thomson Learning, 2001.

BASICS OF CIVIL AND MECHANICAL ENGINEERING

(07T105, 07F105, 07B105, 07E105, 07L105, 07Z105 & 07I105)

4 0 0 4

Unit I

Introduction to Civil Engineering

History and development of Civil Engineering – Scope of Civil Engineering – Functions of Civil Engineers. Construction Materials: Characteristics of good building materials such as stones, bricks, A.C. sheets, G.I. sheets and Ceramic tiles, timber, cement, aggregates and concrete. Surveying: Definition and purpose – Classification – Basic principles – Measurement of length by chains and tapes – Calculation of area of a plot – Measurement of bearings and angles using a prismatic compass – Leveling – Contours and their applications.

10 Hours

Unit II

General concepts relating to Buildings

Selection of site – Basic functions of buildings – Major components of buildings. Foundations: Purpose of foundation – Bearing capacity of soils – Types of foundations. Proper methods of construction of: Brick masonry – Stone masonry – Hollow Block masonry. Beams – Lintels – Columns – Flooring – Damp proof course – Surface finishes – Doors and windows – Roofing.

10 Hours

Unit III

Importance of roads

Classification of Highways – Cross sections of water bound macadam, bituminous and cement concrete roads – Traffic signs and signals. Importance of railways - Gauges – Components of a permanent way – Classification of bridges. Stress, Strain, Elastic Constants: Young's Modules, Bulk Modules, Poisson's ratio (no derivation) – Simple problems.

10 Hours

Unit IV

Alternate Sources of Energy

Solar, Wind, Tidal, Geothermal and Ocean Thermal Energy Conversion (OTEC). Power Plant: Classification of Power Plants- Steam - Nuclear, Diesel, Hydro, and Gas Turbine Power Plants. Types of Boilers – Boiler mounting & accessories – Cochran – Locomotive – Bobcock and Wilcox, Lamont boilers differences between fire tube and water tube boiler. Types of turbines- working of a single stage impulse and reaction turbine.

10 Hours

Unit V

Internal Combustion Engines

Classification of IC engines, Main components of IC engines, working of a 4 stroke & 2 stroke petrol and diesel engine, differences between 4 stroke and 2 stroke engine. Refrigeration: Working Principle of vapour compression and vapour absorption system, domestic refrigerator.

10 Hours

Unit VI

Manufacturing Processes

Casting Pattern, Mould, Moulding Sand –Melting of Cast Iron – Cupola Furnace – Fettling – Casting Defects. Arc & Gas Welding, Soldering & Brazing, Extrusion, Forging, Rolling, & Drawing Processes. Lathe, Drilling and Milling – Types, Operations & Equipments. Classification of Engineering materials, Composition, Mechanical properties and uses of cast iron, mild steel, high carbon steel and high speed steel.

10 Hours

Total: 60 Hours

Textbook:

Shanmugam G., Palanichamy M.S.,"Basic Civil and Mechanical Engineering", 2nd Edition, Tata McGraw Hill Company, New Delhi, 2000.

References:

1. Arunachalam N., "Basic Civil Engineering", 2nd Edition, Pratheba Publishers, Coimbatore, 2000.
2. Sarkar B. K.,"Thermal Engineering" Tata McGraw Hill Company, New Delhi.
3. Rao N., "Manufacturing Technology: Foundry, Forming and Welding", Tata McGraw Hill Company, New Delhi, Paperback Edition.
4. Ramesh babu V., "Basic Civil Engineering", 2nd Edition, Anuradha Publishers, Kumbakonam, 2001.

ELECTRIC CIRCUIT ANALYSIS - I

(07E106 & 07N106)

2 1 0 3

Unit I

Introductory Circuit Analysis

Independent and dependent voltage and current sources – Source transformation- Solutions of resistive circuits with dependents sources – Mesh and nodal analysis - Nodal conductance matrix and mesh resistance matrix- Concept of linear circuits.

10 Hours

Unit II

Network Theorems

Star Delta Transformation – Super position theorem – Thevenin's theorem – Norton's theorem – Reciprocity theorem - Substitution theorem. – Tellegen's theorem – Millman's theorem – Maximum power transfer theorem.

10 Hours

Unit III

Electrostatics

Capacitance – Parallel plate capacitor – Capacitors in series and parallel – Charging and discharging of capacitor – Energy stored in electrostatic fields – Potential gradient – Dielectric strength.

10 Hours

Unit IV

Coupled Circuits

Coupled circuits – Self and mutual inductance – Inductances in series and parallel – Mutual and leakage flux – Coefficient of Coupling – Ideal Transformers - Dot convention.

10 Hours

Unit V

Transients

Time domain analysis of circuits – Linear differential equations for series and parallel RL, RC and RLC Circuits – Transient response – Time Constant – Rise and fall times.

10 Hours

Total: 50 Hours

Textbook:

Sudhakar A and Shyam Mohan S P, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2007.

References:

1. William H.Hayt Jr, Jack E.Kemmerly, and Steven M.Durbin, "Engineering Circuit Analysis", Tata McGraw Hill Publishing Co Ltd, New Delhi, 2002.
2. Joseph A.Edminister, Mahmood Nahvi, "Electric Circuits", Schaum's Series, Tata McGraw- Hill, New Delhi 2001.
3. Eugene Xavier.S.P., "Electric Circuit Analysis", New Age International (P) Ltd. Publishers, 2003.

07G001 COMMUNICATION SKILLS – I
(Common to all branches)

3 0 0 3

Unit I

Grammar and Vocabulary

Word formation with prefixes and suffixes - synonyms and antonyms – verb patterns – tenses – subject-verb agreement – modal auxiliaries – prepositions – conditionals – use of articles – commonly confused, mispronounced and misspelt words – British and American vocabulary – formal and informal English – Vocabulary building activities such as crossword, mind mapping, etc.

10 Hours

Unit II

Listening

Listening for and noting specific information, listening to identify topic, context, function, speaker's opinion, attitude, etc. – Extensive listening – listening for general content – listening to short conversations to fill up gapped texts – intensive listening – listening for specific information – note-taking (guided and unguided).

10 Hours

Unit III

Speaking

Speech sounds – syllables – Word stress – Sentence stress – Content words and Function words – Intonation and pause – Pronunciation of ed-words – first language intrusions – Accent neutralisation – Pronunciation drills / tongue twisters

10 Hours

Unit IV

Reading

Using dictionaries & Thesaurus – Predicting the content – skimming the text – understanding the gist – identifying the topic sentence and its role in each paragraph – scanning – inferring / identifying lexical and contextual meanings – transfer of information / note-making – understanding discourse coherence – sequencing of sentences. **10 Hours**

Unit V

Writing

Writing definitions and descriptions – paragraph writing (unity, coherence and use of cohesive expressions) – Formal and Informal letter writing – process description (use of sequencing connectives) – comparison and contrast – Reports – Proposals. **10 Hours**

Total: 50 Hours

Textbook:

Rizvi M Ashraf, "Effective Communication", Tata McGraw – Hill Publishing Company Ltd., New Delhi, 2005.

References:

1. Sharon J. Gerson, Steven M. Gerson, "Technical Writing – Process and Product", 3rd Edition, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2004.
2. Andrea J. Rutherford, "Basic Communication Skills for Technology", 1st Edition, Pearson Education Asia (Singapore) Pvt. Ltd., Bangalore, 2001.
3. Nell Ann Pickett, Ann A. Laster, Katherine E. Staples, "Technical English (Writing, Reading and Speaking)", 8th Edition, Pearson Education, USA, Addison Wesley Longman Inc., 2001.
4. Stevenson, Susan and Steve Whitmore, "Strategies for Engineering Communication", Wiley Edition, 2002.
5. Mitra K. Barun, "Effective Technical Communication – A Guide for Scientists and Engineers", Oxford University Press, New Delhi, 2006.

07G108 C PROGRAMMING LABORATORY
(Common to all branches)

0 0 3 2

Programs Using Decision-Making and Looping Statements:

1. Write a program to calculate the simple interest, given the principle, period and rate of interest (Simple Interest = PNR /100)
2. Write a program to convert the temperature from Fahrenheit to Centigrade and vice versa. (F = 1.8 x (C +32)) ; C = (F- 32) /1.8)
3. Write a program to find the largest of 3 numbers using the minimum possible checks. (Simple if)
4. Write a program to convert binary to decimal number using while loop.
5. Write a program to find all possible roots of quadratic equation using switch case.
6. Write a program to read a particular number and to check whether it is a prime number or not.
7. The Electricity Production company has to print up the bills for its customers at the following rate:

For the 1st 50 KWH	rate is Rs.2
For the next 100 KWH	rate is Rs.6
For the next 200 KWH	rate is Rs.7
For more than 350 KWH	rate is Rs.8

Write a program to do the above and the output should be in the following order Customer name, Number of Units and the Total Bill.

Programs Using Functions:

8. Write a program using function that will round a floating point number to an indicated decimal place. For example, the number 12.758
9. Would Yield the value 12.76 when it is rounded off to two decimal places.
10. Write a function exchange to interchange the values of two variables say X and Y
11. Write a recursive function that will generate and print first n Fibonacci series.

Programs Using Arrays:

12. Write a program to merge two different sized arrays and eliminate the duplicate from the merged array.
13. Write a menu driven program for inserting an element into an array and for deleting an element from the array. Program should also have the provision for deleting the duplicates in an array.
14. Write a program to multiply two matrices. Use separate functions to read, process and print the data in matrix form. Also find the trace and transpose of the given matrix.
15. A list of N numbers is given. Write a program to find:
    a. Their average and standard deviation.
    b. The number of integers, which are greater than equal to a specified number in the list.
16. Using arrays write a program to arrange the given set of N numbers in ascending order and hence to pick the greatest and the smallest number. And also find the presence of a specified number

String Handling Programs:

17. Write a program to count number of vowels, consonants, words, white spaces and other characters in a given line of text.
18. Write a program to check whether the given string is a palindrome or not.
19. Write a program to find the occurrence of a sub string in a main string and if found replace it with new string.
20. Write a program to sort the set of names in alphabetical order.
21. Write a program using gets O(Capital) and puts o (Small) which converts a given 'C' program typed in uppercase to a program in lowercase

Programs Using Structures:

22. Create a structure to store the following details:
    Rollno, Name, Mark1, Mark2, Mark3, Total, Average, Result and Class.
    Write a program to read Rollno, name and 3 subject marks. Find out the total, result and class as follows:

a. Total is the addition of 3 subject marks.
b Result is "Pass" if all subject marks are greater than or equal to 50 else "Fail".
c. Class will be awarded for students who have cleared 3 subjects
i) Class "Distinction" if average >=75
ii) Class "First" if average lies between 60 to 74 (both inclusive)
iii) Class "Second" if average lies between 50 & 59 (both inclusive)
d. Repeat the above program to manipulate 10 students' details and sort the structures as per rank obtained by them

23. Define a structure that can describe the employees with the fields Eno, Ename. Basic. Write a program to calculate DA = 32% of Basic. HRA = 15% of Basic. CCA = 10% of BASIC, PF = 150,0 of Basic and print all details with Net pay All processing should be using pointer notation.

Programs Using Pointers:

24. Write a program to count the number of consonants, vowels, digits, white spaces and other characters in a line of text using pointers
25. Write menu driven program to perform all string handling operations using pointers.
26. Write a program to sort a list of strings in an alphabetical order (using pointers with DMA)
27. Write a menu driven program to perform addition, subtraction and multiplication of matrices using pointers.
28. Write a program to search for an element using binary search.
29. Write a program for encryption of a given sentence and decryption of the same sentence.

ENGINEERING GRAPHICS

(07I109, 07E109, 07L109 & 07N109) /
(07C209, 07M209, 07T209, 07Z209, 07F209 & 07B209)

2 0 3 4

Concepts and Conventions

Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

2 Hours

Unit I

Plane Curves and Projection of Points, Lines

Curves used in Engineering Practices

Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – Construction of involutes of square, pentagon and circle.

Projection of Points and Lines

General principles of orthographic projection – First angle projection – Layout of views – Projection of points, located in all quadrant and straight lines located in the first quadrant – Determination of true lengths and true inclinations.

10 Hours

Unit II

Projection of Plane Surfaces, Solids and Section of Solids

Projection of polygonal surface and circular lamina inclined to one reference plane. Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method. Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane – Obtaining true shape of section.

10 Hours

Unit III

Development of surfaces and Intersection of solids

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones, Development of lateral surfaces of solids with square and cylindrical cutouts, perpendicular to the axis. Development of lateral surfaces of two Intersecting solids – Cylinder & cylinder – Prism & cylinder – Axis at right angles with no offset.

10 Hours

Unit IV

Isometric and Perspective projections

Principles of isometric projection – Isometric scale – Isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids by visual ray method and vanishing point method.

8 Hours

Unit V

Computer Aided Drafting (AutoCAD)

Introduction to AutoCAD and Drawing Setup - Getting Started with AutoCAD, Advanced sketching - Drawing aids – Edit Commands. Controlling the drawing display – Basic dimensioning - Edit dimensioning –Dimension styles – Hatching – Blocks – Introduction to 3D – Simple exercises.

10 Hours

Total: 50 Hours

Textbook:

Venugopal K and Prabhu Raja V, "Engineering Graphics", Eighth Edition (Revised), New Age International (P) Limited, 2007.

References:

1. Ramesh Babu V, "Engineering Graphics", VRB Publishers Pvt. Ltd., 2007
2. Bhatt. N D,"Engineering Drawing", 6th Edition, Charotar Publishing House, 2003.
3. Nataraajan K V, "A Text Book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2006.
4. Gopalakrishnan K R, "Engineering Drawing", (Vol. I & II), Subhas Publications.
5. Shah M B and Rana B C, "Engineering Drawing", Pearson Education, 2005.
6. Sham Tickoo and Deepak Maini, "AutoCAD 2006 – For Engineers and Designers", Dreamtech Publishers, New Delhi, 2005.

WORKSHOP PRACTICE

(07I110, 07E110, 07L110 & 07N110) / (07C210, 07M210, 07T210, 07Z210, 07F210 & 07B210)

0 0 3 2

Carpentry

- Handling of carpentry tools – Practice in marking, sawing, planning and chiseling to size – Making simple joints such as half lap joint, T-Joint, dovetail joint and mortise & tenon joint.
- Use of modern materials like Plywood, Chip board, Nova-Pan and laminated sheets.
- Study of joints in door panels, wooden furniture, etc

Fitting

- Use of fitting tools – Practices in marking, filing and fitting to size.
- Making of simple mating – Preparing the joints like square joint, V-Joint,

Basic Machining

- Simple Turning and Taper turning
- Drilling Practice

Plumbing

- Preparation of plumbing line sketches for water supply and sewage lines
- Basic pipe connection using valves, taps, couplings, unions, reducers and elbows in household fitting.
- Practice in mixed pipe connections: Metal, plastic and flexible pipes used in house hold appliances.
- Study of pipe connections on the suction

Demonstration

- Domestic Refrigerator, Air conditioner, Centrifugal pump, Blower and Single stage air compressor

07G201 ENGINEERING MATHEMATICS – II
(Common to all branches)

3 2 0 4

Unit I

Functions of Several Variables

Functions of two variables-Partial derivatives - Total differential - Derivative of implicit functions -Taylor's expansion - Maxima and minima - Constrained Maxima and Minima by Lagrangian Multiplier method - Jacobians.

12 Hours

Unit II

Multiple Integrals

Double integration in polar and Cartesian Co-ordinates - Change of order of integration - Area as a double integral - Volume as triple integral in Cartesian Co-ordinates - Change of variables.

12 Hours

Unit III

Vector Calculus

Curvilinear coordinates – Gradient – Divergence – curl – Line - Surface and surface integrals - Statement of Green's - Gauss divergence and Stokes theorems - Verification and applications.

12 Hours

Unit IV

Analytic Functions

Cauchy - Riemann equations - Properties and analytic functions - Determination of harmonic conjugates - Milne's Thomson's method - Conformal mappings - Mappings of $w = z + a$, $1/z$, az , z^2 - Bilinear transformation.

12 Hours

Unit V

Complex Integration

Cauchy's theorem - statement and application of Cauchy's integral formula - Taylor and Laurent's series – Singularities – Classification – Residues - Cauchy's residue theorem - Contour integration - Circular and semi circular contours (excluding poles on the real axis). **12 Hours**

Total: 60 Hours

Textbooks

1. Lakshminarayanan K.A. *et al*., "Engineering Mathematics - II, 6th edition, Vikas Publishing House, New Delhi 2006.
2. Veerarajan T., "Engineering Mathematics", 5th Edition, Tata McGraw Hill Publications, New Delhi, 2007.

References

1. Kandasamy P., *et al*., "Engineering Mathematics", Volume I & II, S. Chand & Co., New Delhi 2000.
2. Narayanan S., Manicavachagam Pillai, Ramaiah.T.K, "Advanced Mathematics for Engineering Students", Volume I, Viswanathan Printers & Publishers, 2002.
3. Grewal.B.S., "Higher Engineering Mathematics", Khanna Publications, New Delhi 2000.
4. Kreyszig, E, "Advanced Engineering Mathematics", 8th Edition, John Wiley & Sons, Inc, Singapore, 2002.

07G202 ENVIRONMENTAL SCIENCE AND ENGINEERING
(Common to all branches)

3 0 0 3

Unit I

Introduction to Environmental Studies and Natural Resources

Environment: Definition – scope – importance – Need for public awareness. Forest resources: Use – over exploitation – deforestation – case studies- mining – effects on forests and tribal people. Water resources: Use – over utilization of surface and ground water – floods – drought – conflicts over water. Mineral resources: Use – exploitation – environmental effects of extracting and using mineral resources – case studies. Food resources: World food problems – changes caused by agriculture and overgrazing – effects of modern agriculture – fertilizer-pesticide problems – water logging – salinity – case studies. Energy resources: Growing energy needs – renewable and non renewable energy sources – use of alternate energy sources – case studies. Land resources: Land as a resource – land degradation – man induced landslides – soil erosion and desertification. Role of an individual in conservation of natural resources. **10 Hours**

Unit II

Ecosystems and Biodiversity

Concept of an ecosystem: Structure and function of an ecosystem – Producers – consumers – decomposers – Energy flow in the ecosystem – Ecological succession – Food chains – food webs and ecological pyramids. Types of ecosystem: Introduction – characteristic features – Forest ecosystem – Grassland ecosystem – Desert ecosystem – Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Introduction – Definition (genetic – species –ecosystem) diversity. Value of biodiversity: consumptive use – productive use – social values – ethical values – aesthetic values. Biodiversity level: global – National – local levels. India as a mega diversity nation. Hotspots of biodiversity. Threats to biodiversity: habitat loss – poaching of wildlife – man wildlife conflicts – Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

10 Hours

Unit III

Environmental Pollution

Pollution: Definition – Air pollution – Water pollution – Soil pollution – Marine pollution – Noise pollution – Thermal pollution – Nuclear hazards. Soil waste management: Causes – effects – control measures of urban and industrial wastes. Role of an individual in prevention of pollution - Pollution case studies. Disaster management: floods – earthquake – cyclone – landslides. Field study of local polluted site – Urban – Rural – Industrial – Agricultural.

10 Hours

Unit IV

Social Issues and the Environment

Sustainable development – from unsustainable to sustainable development – Urban problems related to energy. Water conservation – rain water harvesting – watershed management. Resettlement and rehabilitation of people: its problems – concerns – case studies. Environmental ethics: Issues – possible solutions – Climate change – global warming – acid rain – ozone layer depletion – nuclear accidents – nuclear holocaust – case studies. Wasteland reclamation. Consumerism and waste products. Environment production act: Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – Issues involved in enforcement of environmental legislation – Public awareness.

10 Hours

Unit V

Human Population and the Environment

Population growth – variation among nations – Population explosion – Family welfare programme – Environment and human health – Human rights – Value education – HIV / AIDS – Women and child welfare – Role of information technology in environment and human health – Case studies. Field study of local area to document environmental assets: river – forest – grassland – hill – mountain. Field study: common plants – insects – birds. Field study of simple ecosystems – pond – river – hill slopes.

10 Hours
Total: 50 Hours

Textbooks:

1. Miller T.G. Jr., **"**Environmental Science", Tenth Edition, Wadsworth Publishing Co., 2004.

2. Raman Sivakumar, “Introduction to Environmental Science and Engineering” Second Edition, Vijay Nicole Imprints, Chennai, 2006.

References:

1. Bharucha Erach, “The Biodiversity of India”, Mapin Publishing Pvt. Ltd., Ahmedabad India. 2003.
2. Divan S., “Environmental Law and Policy in India” Oxford University Press, New Delhi 2001.
3. Wager K.D., “Environmental Management”, W.B. Saunders Co., Philadelphia, USA, 1998.
4. Cunningham W.P., “Environmental Encyclopedia”, Jaico Publising House, Mumbai, 2004.
5. Santosh Kumar Garg, Rajeshwari garg, smf Ranjni Garg “Ecological & Environmental Studies” Khanna Publishers, Nai Sarak, Delhi, 2006.

07G203 OBJECT ORIENTED PROGRAMMING
(Common to all branches)

3 0 0 3

Unit I

Introduction

Need for object oriented programming – difference between procedural languages and the object oriented approach – characteristics of object oriented languages – C and C++. C++ Basics: Basic programming construction – output using cout – input using cin –variables –integer variables – character variables –float variables – manipulators – type conversion. **9**

Hours

Unit II

Objects and Classes

A Simple Class – C++ Objects as Physical Objects – C++ Object as Data Types – Constructors – Object as Function Arguments – Returning Objects from Functions – A Card Game Example – Structure and Classes – Classes, Objects and Memory – Static Class Data. Arrays: Array Fundamentals – Arrays as Class Member Data - Arrays of Objects – Strings.

9 Hours

Unit III

Operator Overloading

Overloading Unary Operators – Overloading Binary Operators – Data Conversion – Pitfalls of Operator Overloading and Conversion. Inheritance : Derived Class and Base Class – Derived Class Constructors – Overriding Member Functions – Inheritance in the English Distance Class – Class Hierarchies – Public and Private Inheritance – Levels of Inheritance – Multiple Inheritance – Ambiguity in Multiple Inheritance – Containership : Classes within Classes – Inheritance and Program Development.

9 Hours

Unit IV

Pointers

Addresses and Pointers – Pointers and Arrays – Pointers and Functions – Pointers and Strings – Memory Management: new and delete – Pointers to Objects – A Linked List Example – Pointers to Pointers – Debugging Pointers. Virtual Functions and Other Subtleties: Virtual Functions – Friend Function – Static Functions – Assignment and Copy-Initialization – The this Pointer.

9

Hours

Unit V

Files and Streams

Streams – String I/O – Character I/O – Object I/O – I/O with Multiple Objects – File Pointers – Disk I/O with Member Functions – Error Handling – Redirection – Command-Line Arguments – Printer Output – Overloading the Extraction and Insertion Operators. Exception: Throwing an Exception – The Try Block – Catching an Exception – Exception Specifications – Exceptions and Design Issues Class Templates : Class Template Definition – Class Template Instantiation – Member Function of Class Templates – Friend Declarations in Class Templates – Static Data Members of Class Templates – Nested Types of Class Templates – Members Templates – Class Templates and Compilation Model – Class Templates Specialization – Name Resolution in Class Templates – Namespaces and Class Templates – A Template Array Class.

9 Hours

Total: 45 Hours

Textbooks:

1. Robert Lafore, "Object-Oriented Programming in C++", Galgotia Publications, 2000.
2. Stanley B. Lippman, Josée Lajoie, "C ++ Primer", Third Edition, Addison Wesley, 1998.

References:

1. Malik D.S., "C++ Programming", Third Edition, Thomson, 2007.
2. Ashok N. Kamthane, "Object-Oriented Programming with ANSI & Turbo C++", Pearson Education, 2004.
3. Venugopal K.R. and Rajkumar, Ravishankar T., "Mastering C++", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2006.

ELECTRICAL ENGINEERING MATERIALS

(07E204/07N204)

3 0 0 3

Unit I

Conducting and Superconducting Materials

Classical theory: Drude-Lorentz theory - Electrical conductivity - Thermal conductivity - Wiedemann-Franz law - Drawbacks of Classical theory- Quantum theory - Fermi distribution function - Density of energy states. Superconductivity**:** Superconducting phenomena - Properties of superconductors - Type I and Type II superconductors - High temperature superconductors – Applications.

10 Hours

Unit II

Semiconducting Materials

Intrinsic Semiconductors: Carrier concentration - Calculation of density of holes and electrons - Fermi level and its variation with temperature - Mobility and conductivity – Determination of band gap. Extrinsic Semiconductors: Expression for carrier concentration - N-type and P-type semiconductors - Variation of Fermi level with temperature and impurity concentration - Hall effect – Theory - Determination of Hall Coefficient - Uses.

10 Hours

Unit III

Dielectrics and Magnetic Materials

Dielectrics: Basic Definitions - Electrical susceptibility - Dielectric constant – Electronic, ionic, orientation and space charge polarizations - Frequency and temperature dependence of polarization - Internal field - Claussius-Mosotti relation (derivation) - Dielectric loss - Dielectric breakdown – Uses. Magnetic Materials: Origin of magnetic moment - Bohr magneton - Ferromagnetism - Hysteresis - Soft and Hard magnetic materials – Ferrites - Applications.

10 Hours

Unit IV

Electrostatics, Electromagnetism and Optical Materials

Electrostatics and Electromagnetism**:** Gauss law and its applications in electrostatics in vector form - Energy density in an electric field - Ampere's law - Charged particle motion in E and B fields - Equation of continuity - Generalized Ampere's law - Maxwell's equations. Optical Materials**:** Optical properties of semiconductors – Exciton – Trap - Colour centres - Types of color centres – Luminescence – Fluorescence - Phosphorescence - Liquid Crystal – Properties - Types of display - Uses.

10 Hours

Unit V

Quantum Physics and Statistical Mechanics

Quantum Physics: Black body radiation - Planck’s hypothesis - Radiation formula - Matter waves - Experimental verification of de Broglie theory - GP Thomson experiment - Heisenberg’s uncertainty principle - Principle of wave mechanics - Bohr’s second postulate - Significance - Schrödinger wave equation – Application - Hydrogen atom. Statistical Mechanics: Fundamental postulates - Phase space - Statistical equilibrium - Maxwell – Boltzmann distribution law – Quantum Statistics - Bose - Einstein statistics (photon gas) - Fermi - Dirac Statistics (electron gas).

10 Hours

Total: 50

Hours

Textbook:

ArumugamM., “Physics I - (Material Science For EEE, E&I, ICE)”, Fifth Edition, Anuradha Publications, Kumbokonam, 2005.

References:

1. Palanisami P.K., “Physics For Engineers”, Volume 2, Scitech Publications (India) Pvt Ltd, Chennai, 2003.
2. Pillai S. O., “Solid State Physics”, Fifth Edition, New Age International Publications, New Delhi, 2003.
3. Avadhanulu M.N. and Kshirsagar P.G., “A Text Book of EngineeringPhysics”, 7th Enlarged Revised Edition., S.Chand&Company Ltd.,New Delhi, 2005.
4. Raghavan V., “Materials Science & Engineering,” A first course, Prentice Hall of India, New Delhi, 2001.
5. Murugaesan.R., “Modern Physics”, Fifth Edition, S. Chand And Company Ltd., NewDelhi, 1995.
6. Sze S.M, “Physics Of Semiconductor Devices”, 2nd Edition ,John Wiley & sons, NewDelhi, 1982.

ELECTRIC CIRCUIT ANALYSIS – II

(07E205 & 07N205)

3 1 0 4

Unit I

Introduction to Alternating Voltages and Currents

Generation of AC voltages – Phase relation in pure resistor, inductor and capacitor – Power and power factor – Series and parallel circuits – Application of network theorems to AC circuits.

10 Hours

Unit II

Polyphase Circuits

Generation of Three phase voltages - Phase sequence – Three phase Star and delta connected sources and loads – Three phase balanced and unbalanced circuits – Power measurement in three phase circuits using two Wattmeter method – Neutral shift.

10 Hours

Unit III

Resonance

Series resonant circuits – Bandwidth of an RLC circuit - Q factor and its effect on bandwidth - Parallel resonance - Resonant frequency for a tank circuit – Locus diagram.

10 Hours

Unit IV

Two Port Networks

Open circuit impendence (Z) parameters – Short circuit admittance (Y) parameters – h Parameters - Transmission parameters- T and π representation – Lattice network.

10 Hours

Unit V

PSpice

Introduction to PSpice - Simulation steps – DC analysis – Dependent sources - AC analysis– Transient analysis.

10 Hours

Total: 50 Hours

Textbook:

Sudhakar A and Shyam Mohan S P, "Circuits and Network Analysis and Synthesis", Tata McGraw Hill, 2007.

References:

1. Muhammed.H.Rashid, "SPICE for Electronic Circuits using PSPICE", Second Edition, Prentice Hall of India, 1996.
2. William H.Hayt Jr, Jack E.Kemmerly, and Steven M.Durbin, "Engineering Circuit Analysis", Tata McGraw-Hill Publishing Co Ltd, New Delhi, 2002.
3. Joseph A.Edminister, Mahmood Nahvi, "Electric Circuits", Schaum's Series, Tata McGraw Hill, New Delhi, 2001.
4. Eugene Xavier.S.P., "Electric Circuit Analysis", New Age International (P) Ltd. Publishers, 2003.

SOLID STATE DEVICES

(07E206 & 07N206)

3 1 0 4

Unit I

Semiconductor Devices

Theory of P-N junction – P-N junction as diode – P-N diode currents – Volt-Ampere characteristics – Diode resistance – Temperature effect on P-N junction – Transition and diffusion capacitance of P-N diode – Diode switching times.

10 Hours

Unit II

Bi-Polar Transistor

Junction transistor – Transistor construction – Detailed study of currents in transistor – Input and output characteristics of CE, CB and CC configurations – Transistor hybrid model for CE configuration – Analysis based on h parameters – Transistor switching times – Transistor ratings – Power transistors.

10 Hours

Unit III

Field Effect Transistors

Junction Field Effect Transistor – Pinch off voltage – JFET Volt-Ampere characteristics – JFET small signal model – MOSFETS and their characteristics – FET as a variable resistor.

10 Hours

Unit IV

Optoelectronic Devices

Photo emissivity and photo electric theory – Construction and working of: Light emitting diodes, liquid crystal cell, seven segment display, photo conductive cell, photo diode, solar cell, photo transistor, opto couplers, LDR and laser diode.

10 Hours

Unit V

Miscellaneous Devices

Theory, characteristics and applications of: UJT, SCR, TRIAC, PUT, tunnel diode, thermistors, piezo electric devices, Zener diode, charge coupled devices and varactor diode.

10 Hours

Total: 50 Hours

Textbook:

Jacob. Millman, Christos C.Halkias, "Electronic Devices and Circuits", Tata McGraw Hill Publishing Limited, New Delhi, 2003

References:

1. David A.Bell, "Electronic Devices and Circuits", Prentice Hall of India Private Limited, New Delhi, 2003
2. Theodre. F. Boghert, "Electronic Devices & Circuits", 6th Edition, Pearson Education, 2003
3. Ben G. Streetman and Sanjay Banerjee, "Solid State Electronic Devices", Pearson Education, 2002
4. Allen Mottershead, "Electronic Devices and Circuits – An Introduction", Prentice Hall of India Private Limited, New Delhi, 2003

07G002 COMMUNICATION SKILLS – II
(Common for all branches)

3 0 0 3

Unit I

Grammar and Vocabulary

Impersonal passive – cause and effect expressions – indicators of purpose and function – imperatives – question patterns - infinitives and gerunds – mechanics of writing – nominal compounds – common errors – vocabulary building strategies – business vocabulary – foreign words and phrases – common idioms and phrases.

10 Hours

Unit II

Listening

Listening practice – Active Listening - Listening to Short speeches/interviews -Comprehension tasks - listening to speech segments (pronunciation, accent & intonation) – listening to recorded telephonic conversation, TV / radio news in English (both American and British) – listening to short and long conversations in different domains of activity - discussing new inventions, products etc.

10 Hours

Unit III

Speaking

Discourse Management – Interactive Communication (turn taking & sustaining the interaction by initiating and responding) - Giving personal information and expressing opinions - Giving information and expressing and justifying opinions - speculating, comparing and contrasting - agreeing and disagreeing - Fielding /asking questions/question starters - Asking /giving directions - Essential Telephoning English - Giving logical reasons/ explanations - debates, extempore speeches - Tips on developing fluency.

10 Hours

Unit IV

Reading

Reading for structure and detail (Understanding general points and specific details; vocabulary and structure; structure and discourse features; understanding sentence structure) Error identification – Cloze - Reading strategies

10 Hours

Unit V

Writing

Describing or comparing figures from graphic input – making inferences – Report (describing, summarising) – Correspondence (explaining, apologising, reassuring, complaining) – Project proposal (describing, summarising, recommending, persuading) – format, organization & register - Business letters – notices – agenda – minutes – memoranda.

10 Hours
Total: 50 Hours

Textbook:

Raman, Meenakshi and Sangeetha Sharma, "Technical Communication – Principles and Practice", Oxford University Press, New Delhi, 2004.

References:

1. Huckin N. Thomas and Leslie A. Olsen, "Technical Writing and Professional Communication for Nonnative Speakers of English", 2nd Ed., McGraw-Hill, Singapore, 1991.
2. Herbert A.J., "The Structure of Technical English", Longman, UK, 1965.
3. Pfeiffer, William Sanborn, "Technical Communication – A Practical Approach", 6th Ed., Pearson Prentice Hall, New Jersey, 2006.
4. Guffey, Mary Ellen, "Business Communication – Process and Product", 3rd Edition, Thamson South-Western, Bangalore, 2004.
5. Eisenberg, Anne. "Effective Technical Communication", Singapore: McGraw-Hill, 1993.

07G208 OBJECT ORIENTED PROGRAMMING LABORATORY
(Common to all branches)

0 0 3 2

List of Experiments:

1. Write a program to define a class to represent a BANKACCOUNT. Including the following members:
   Date members:
   Name of the depositor, Account Number, Type of account, Balance Amount in the account
   Member functions:
   To assign initial values (Use constructors to initialize the data)
   To deposit an amount
   To withdraw an account after checking the balance
   To display the name and the balance
   Note: Try to use all types of constructors
2. Write a program to add the two, three, four numbers of different data types using function overloading
3. Write a program to print a character string of a specified length using default argumented function
4. Write a program to computer tax using default arguments. A tax compute function takes two arguments amount and tax percentage. Default tax percent is 15% of income
5. Write a program to sort a set of numbers of generic data type using template function
6. Implement the above class with dynamic objects and use constructors and destructors
7. Implement the class STUDENT with necessary data members and member function to print the mark sheet of a student using array of object
8. Design three classes student exam and result the student class has data members such as those representing roll number name etc. Create a class exam by inheriting the student class. The exams add a subject marks as the data member. Derive the class result from the exam class and it has its data member as a total mark. Write an interactive program to implement this.
9. Consider an example of book shop which sells and books and video tapes. These two class books and tapes are inherited from the base class called media. The media class has data members for storing title and publication the book class has data members such as number of pages in a book and tape class has the playing time of a tape each class will have member function read( ) and show( ). In the base class these members have to be defined as virtual functions. Write a program which models the class hierarchy for book shop and processing objects for these classes using pointers to the base class.
10. Write a program to define the class STRING and overload the following operators:
    i. » to read the string
    ii. « to print the string
    iii. + to combine two strings
    iv. = to assign a string to another string
    v. - to search the substring within a string and to remove the same
11. Write a program to keep track of number of instances created and alive for the class using static data member and static member functions.
12. Write a program to add the private data member of two different classes using friend function and friend class.
13. Write a custom manipulator to print "Rs.". Using this manipulator print the amount which is read as input.
14. Write a program to copy the content of one file to a new file by removing unnecessary spaces between words.
15. Write an exception handler to handle the exception of underflow.

ENGINEERING CHEMISTRY LABORATORY

(07C110, 07M110, 07T110, 07F110, 07Z110 & 07B110) / (07I210, 07E210, 07L210 & 07N210)

0 0 2 1

1. **Weighing and preparation of standard solutions**
   Preparation of molar and normal solutions of the following substances - oxalic acid, sodium carbonate, sodium hydroxide, hydrochloric acid.

2. **Water Analysis**
   i. Determination of total hardness, temporary & permanent hardness of water by EDTA method.
   ii. Determination of alkalinity in a water sample.

3. **pH**
   To find out the strength of given hydrochloric acid by sodium hydroxide.

4. **Conductometry**
   Conductometric titration of mixture of acids.

5. **Potentiometry**
   Redox titration – Iron Vs. dichromate.

6. **Spectrophotometry**
   To determine the iron content of an unknown solution by thiocyanate method

7. **Flame photometry**
   To determine sodium and potassium in water

8. **Viscometry**
   Determination of molecular weight of a polymer.

9. **Corrosion**
   Determination of corrosion rate by weight loss measurements.

Total: 20 Hours

References:

1. Vogel A.I., "A Text of Quantitative Inorganic Analysis", Seventh Edition, ELBS, London, 2004.
2. Shoemaker D.P., and Garland C.W., "Experiments in Physical Chemistry", First Edition, Mc-Graw Hill, London, 1988.
3. Sivakumar R., and Jayaprakasam R., "A Concise Laboratory Manual on Engineering Chemistry", Second Edition, Vijay Nicole, Chennai, 2006.

07G301 ENGINEERING MATHEMATICS – III

(Common to all branches)

3 2 0 4

Unit I

Partial Differential Equations

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

9 Hours

Unit II

Fourier Series

Drichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier series – Parseval's Identity – Harmonic Analysis.

9 Hours

Unit III

Boundary Value Problems

Classification of second order quasi-linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

9 Hours

Unit IV

Fourier Transform

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem.

9 Hours

Unit V

Z -Transform and Difference Equations

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

9 Hours

Total: 60 Hours (L-45+T-15=60)

Textbook:

K.A.Lakshminarayanan and *et al*., Engineering Mathematics, Vol. 3, Vikas Publishing House, New Delhi, 2006.

References:

1. P.Kandasamy *et al*., "Engineering Mathematics", Vol. 1, S.Chand & Co., New Delhi, 2008.
2. S.Narayanan, Manicavachagam Pillai, T.K.Ramaiah, "Advanced Mathematics for Engineering Students", Vol.2, Viswanathan Printers & Publishers, Chennai, 2002.
3. T.Veerarajan, "Engineering Mathematics", Tata McGraw Hill Publications, New Delhi 1999.
4. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publications, New Delhi, 2000.

SOLID STATE CIRCUITS
(07E302 & 07N302)

3 0 0 3

Unit I

Rectifiers and Power Supply Circuits

Half wave and full wave rectifier analysis - Inductor filter – Capacitor filter – Series voltage regulator – Switched mode power supply.

10 Hours

Unit II

Small-Signal and Large Signal Amplifiers

Fixed and self biasing of BJT & FET – Small signal analysis of CE, CC & Common source amplifiers – Cascade and Darlington connections, Transformer coupled class A, B & AB amplifiers – Push-pull amplifiers.

10 Hours

Unit III

Differential and Tuned Amplifiers

Differential amplifiers – Common mode and differential mode analysis – DC and AC analysis – Characteristics of tuned amplifiers – Single and double tuned amplifiers.

10 Hours

Unit IV

Feedback Amplifier and Oscillators

Characteristics of negative feedback amplifiers – Voltage / current, series/shunt feedback – Theory of sinusoidal oscillators – Phase shift and Wien bridge oscillators – Colpitt's, Hartley and crystal oscillators

10 Hours

Unit V

Pulse Circuits

RC wave shaping circuits – Diode clampers and clippers – Multivibrators – Schmitt triggers – UJT based saw tooth oscillators.

10 Hours
Total: 50 Hours

Textbook:

Jacob Millman & Christos.C.Halkias, "Integrated Electronics: Analog and Digital Circuits and System", Tata McGraw Hill, 1991.

References:

1. David A. Bell, "Electronic Devices & Circuits", Prentice Hall of India/Pearson Education, IV Edition, Eighth printing, 2003.
2. Robert. L. Boylestad & Lo Nashelsky, "Electronic Devices & Circuit Theory", Eighth Edition, Pearson Education, Third Indian Reprint, 2002 / PHI.
3. Jacob Millman & Herbert Taub, "Pulse, Digital & Switching Waveforms", Tata McGraw Hill, Edition 2000, 24th Reprint, 2003.
4. Donald L.Schilling and Charles Belove, "Electronic Circuits", 3rd Edition, Tata McGraw Hill, 2003.

07E303 DC MACHINES AND TRANSFORMERS

3 1 0 4

Unit I

Electromechanical Energy conversion

Field energy and mechanical force – Forces and torque – Energy conversion via electric field – Principles of electromechanical energy conversion – Single and multiple excited systems – Types of armature winding – m.m.f of distributed AC windings – Rotating magnetic field – Generated voltage – Torque in electrical machines.

10 Hours

Unit II

DC Generators

Constructional details – Principle – EMF equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Armature reaction and commutation – Parallel operation – Applications.

10 Hours

Unit III

DC Motors

Principle of operation – Back EMF and torque equations – Circuit model – Characteristics – Starting methods – Speed control – Ward Leonard system – Separation of no load losses.

10 Hours

Unit IV

Transformers

Constructional details – Types of windings – Principle of operation – EMF equation – Transformation ratio – Transformer on no-load – Equivalent circuit – Transformer on-load – Regulation – Parallel operation – Auto transformer – Saving of copper – Instrument transformers – Three phase transformers and their connections – Vector group.

10 Hours

Unit V

Testing of DC Machines and Transformers

Losses and efficiency in DC machines and transformers – Condition for maximum efficiency – Testing of DC machines – Brake test, Swinburne's test, Retardation test and Hopkinson's test – Testing of transformers – Polarity test – Phasing out test – Sumpner's test – Separation of losses – All day efficiency.

10 Hours

Total: 50 Hours

Textbook:

Kothari D.P. and Nagrath I.J., "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2007.

References:

1. Bimbhra P.S., "Electrical Machinery", Khanna Publishers, 2007.
2. Fitzgerald A.E., Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill publishing Company Ltd, 2005.
3. Stephen J.Chapman, "Electric Machinery Fundamentals", McGraw Hill Publishing Company Ltd, 2005.
4. Theraja B.L., Theraja A.K., "A Text Book of Electrical Technology – Volume II", S.Chand & Company Ltd, New Delhi, Reprint 2007.

07E304 FIELD THEORY

3 1 0 4

Unit I

Introduction

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

10 Hours

Unit II

Electrostatics

Coulomb's Law – Electric field intensity – Field due to point and continuous charges – Gauss's law and application – 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.

10 Hours

Unit III

Magnetostatics

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.

10 Hours

Unit IV

Electrodynamic Fields

Faraday's laws, induced emf – Static and dynamic EMF, Maxwell's equations (differential and integral forms) – Displacement current – Relation between field theory and circuit theory.

10 Hours

Unit V

Electromagnetic Waves

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 .

10 Hours

Total: 50 Hours

Textbook:

Gangadhar K A, "Field Theory", Khanna Publishers, 2004.

References:

1. William H. Hayt, "Engineering Electromagnetics", Tata McGraw Hill edition, 2001.
2. Joseph. A. Edminister, "Theory and Problems of Electromagnetics", Second Edition, Schaum Series, Tata McGraw Hill, 1993.
3. John D. Kraus, "Electromagnetics", McGraw Hill book Co., New York, Fourth Edition, 1991.
4. Kraus and Fleish, "Electromagnetics with Applications", McGraw Hill International Editions, Fifth Edition, 1999.
5. Sadiku, "Elements of Electromagnetics", Second Edition, Oxford University Press, 1995.

07E305 APPLIED THERMODYNAMICS

3 0 0 3

Unit I

Basic Concepts and Laws of Thermodynamics

Classical approach: Thermodynamic systems – Boundary - Control volume - System and surroundings – Universe – Properties - State-process – Cycle – Equilibrium - Work and heat transfer – Point and path functions - First law of thermodynamics for open and closed systems - First law applied to a control volume - SFEE equations [steady flow energy equation] - Second law of thermodynamics - Heat engines - Refrigerators and heat pumps - Carnot cycle - Carnot theorem - Clausius inequality - Concept of entropy - Principle of increase of entropy.

12 Hours

Unit II

Air Standard Cycles, IC Engines and Gas Turbines

Air standard cycles: Otto, diesel and dual cycles and comparison of efficiency. Working Principle of four stroke and two stroke engines - Working principle of spark ignition and compression ignition engines - Applications of IC engines. Brayton cycle -Open and closed cycle gas turbines – Ideal and actual cycles.

8 Hours

Unit III

Steam Boilers and Turbines

Formation of steam - Properties of steam – Use of steam tables and charts – Steam power cycle (Rankine) - Modern features of high-pressure boilers – Mountings and accessories – Testing of boilers. Steam turbines: Impulse and reaction turbines : working principle and comparisons –Layout diagram and working principle of a steam power plants.

8 Hours

Unit IV

Compressors, Refrigeration and Air Conditioning

Positive displacement compressors – Reciprocating compressors – Indicated power – Clearance volume – Various efficiencies – Clearance ratio - Volume rate - Conditions for perfect and imperfect intercooling - Multi stage with intercooling. Unit of refrigeration - Basic functional difference between refrigeration and air conditioning – Various methods of producing refrigerating effects (RE) – Vapour compression cycle: P-H and T-S diagram - Saturation cycles - Effect of subcooling and super heating - (qualitative treatment only) - Airconditioning systems – Basic psychrometry - Simple psychrometric processes.

12 Hours

Unit V

Heat Transfer

One-dimensional Heat Conduction: Plane wall – Cylinder – Sphere - Composite walls – Critical thickness of insulation Convection: Free convection and forced convection - Internal and external flow -Empirical relations Radiation: Black–Gray bodies - Radiation Shape Factor (RSF).

10 Hours

Total: 50 Hours

Textbook:

Nag P.K., “Basic and Applied Engineering Thermodynamics”, Tata McGraw Hill, New Delhi, 2002.

References:

1. Sachdeva B.K., “Fundamentals of Engineering Heat and Mass Transfer (SI Units)”, New Age International (P) Limited, Chennai, 2003.
2. Rogers and Mayhew, “Engineering Thermodynamics – Work and Heat Transfer”, Addision Wesley, New Delhi, 1999.
3. Eastop and McConkey, “Applied Thermodynamics”, Addison Wesley, New Delhi. 1999.
4. Mathur M.L. and Metha F.S., “Thermal Engineering”, Jain Brothers, New Delhi, 1997.
5. Sankaar B.K., “Thermal Enginerring”, Tata McGraw Hill, New Delhi, 1998.

DATA STRUCTURES

(07E306 & 07N306)

3 0 0 3

Unit I

Problem Solving

Problem solving – Top-down Design – Implementation – Verification – Efficiency – Analysis – Sample algorithms.

10 Hours

Unit II

Lists, Stacks and Queues

Abstract Data Type (ADT) – The List ADT – The Stack ADT – The Queue ADT

10 Hours

Unit III

Trees

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – AVL Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Priority Queues (Heaps) – Model – Simple implementations – Binary Heap

10 Hours

Unit IV

Sorting

Preliminaries – Insertion Sort – Shellsort – Heapsort – Mergesort – Quicksort – External Sorting

10 Hours

Unit V

Graphs

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity – Introduction to NP-Completeness **10 Hours**

Total: 50 Hours

Textbook:

Dromey R.G., "How to Solve it by Computer", Prentice-Hall of India, 2002.

References:

1. Weiss M.A., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education Asia, 2002.
2. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C", Pearson
3. Education Asia, 2004
4. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998.
5. Aho, Hopcroft J.E. and Ullman J.D., "Data Structures and Algorithms", Pearson education Asia, 1983.

07E307 CONCEPTS OF ENGINEERING DESIGN

3 0 0 3

Unit I

Engineering Design and Problem Identification

Engineering design introduction and definition, Design process, Engineering design interfaces, Principles of Engineering Design. Problem Identification - PDS criteria, Content of a PDS, Sample PDS, Principles, Exercises

10 Hours

Unit II

Concept Generation and Selection

Introduction – Creativity Principle, Psychological 'set', Inversion, Analogy, Fantasy, Technological advances, Brainstorming, Morphological analysis, Presentation, Exercises. Concept selection - Subjective decision-making, Criteria ranking, Criteria weighting, Datum method, EVAD (Design Evaluation) method, Concept selection method, Principles of Computer aided decision making, Exercises

10 Hours

Unit III

Design Process

Embodiment design - Introduction, Size and strength, Scheme drawing, Form design, Provisional material and process determination, Design for assembly and manufacture, Industrial design, Principles. Modeling - Introduction, Mathematical modeling, Optimization, Scale models, Simulation, Principles, Exercises

10 Hours

Unit IV

Grounding and Shielding

Safety aspects – Principles of noise coupling – Grounding – Filtering – Shielding – Protection against electrostatic discharge – General rules for design – Fault tolerance high speed design – Low power design

10 Hours

Unit V

Reports and Intellectual Property Rights

Presentation Techniques – Introduction, Concept sketches, Scheme drawing, Design report, Principles, Intellectual property Rights – Introduction, Study prior inventions, description of the invention, pursuing application. **10 Hours**

Total : 50 Hours

Text Book:

1. Engineering Design Principles by Ken Hurst, Elsevier Science and Technology Books, 1999.

Reference Book:

1. Understanding Engineering Design by Richard Birmingham, Graham Cleland, Robert Driver & David Maffin, Prentice Hall of India, 1996.
2. Engineering Design by George E. Dieter, McGraw – Hill International 4th Edition 2009.
3. www.patentoffice.nic.in.
4. ep.espacenet.com/advancedSearch.
5. John W.Webb, Ronald.A.Reis, "Programmable Logic Controller," 5th Edition, Prentice Hall of India, 2008.
6. Kim R.Fowler "Electronic Instrument Design",Oxford University press 2004.

ELECTRIC CIRCUITS LABORATORY
(07E308 & 07N308)

0 0 3 2

1. Verification of Ohm's Law and Kirchhoff's Laws
2. Circuit Analysis using Mesh Current Method
3. Circuit Analysis using Nodal Voltage Method
4. Verification of Superposition and Millman's Theorems
5. Verification of Thevenin's and Norton's Theorems
6. Frequency Response of a Series R-L-C Circuit
7. Frequency Response of Parallel RLC Circuits
8. Study of RL, RC and RLC Transients
9. Single Phase Power Measurement by Three Ammeter and Three Voltmeter Methods
10. Three Phase Power Measurement by Two Wattmeter Method
11. Verification of Ohm's Law and Kirchhoff's Laws - Simulation
12. Circuit analysis using Mesh Current Method - Simulation
13. Simulation of Frequency Response of RLC Series and Parallel Circuits

07E309 DC MACHINES AND TRANSFORMERS LABORATORY

0 0 3 2

1. Load characteristics of DC separately excited generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC compound generator
4. Load characteristics of DC shunt and compound motor
5. Load characteristics of DC series motor
6. Swinburne's test
7. Speed control of DC shunt motor
8. Hopkinson's test on DC motor generator set
9. Load test on single-phase transformer
10. Open circuit and short circuit tests on single phase transformer
11. Sumpner's test on single phase transformers
12. Separation of no-load losses in single phase transformer
13. Study of DC motor starters and three phase transformer connections

DATA STRUCTURES LABORATORY
(07E310 & 07N310)

0 0 3 2

Implement the following exercises using C:

1. Array implementation of List Abstract Data Type (ADT)
2. Linked list implementation of List ADT
3. Cursor implementation of List ADT
4. Array implementations of Stack ADT
5. Linked list implementations of Stack ADT

The following three exercises are to be done by implementing the following source files

(a) Program for 'Balanced Paranthesis'

(b) Array implementation of Stack ADT

(c) Linked list implementation of Stack ADT

(d) Program for 'Evaluating Postfix Expressions'

An appropriate header file for the Stack ADT should be #included in (a) and (d)

6. Implement the application for checking 'Balanced Paranthesis' using array implementation of Stack ADT (by implementing files (a) and (b) given above)
7. Implement the application for checking 'Balanced Paranthesis' using linked list implementation of Stack ADT (by using file (a) from experiment 6 and implementing file (c))
8. Implement the application for 'Evaluating Postfix Expressions' using array and linked list implementations of Stack ADT (by implementing file (d) and using file (b), and then by using files (d) and (c))
9. Queue ADT
10. Search Tree ADT - Binary Search Tree
11. Heap Sort
12. Quick Sort

NUMERICAL METHODS AND OPERATIONS RESEARCH

(07E401 & 07N401)

3 2 0 4

Unit I

Errors and Approximations : Different types of errors

Transcendental and Polynomial Equations

Newton Raphson method – Method of false position – Graffe's root squaring method – Bairstow's method

10 Hours

Unit II

System of Linear Equations and Eigen Values

Gauss elimination – crout's method – Gauss-seidel method – solution of tridiogonal equations – power method for finding dominant eigen value.

10 Hours

Unit III

Finite Differences and Interpolation

Finite difference operators (E , Δ, ∇, δ, μ) – D.Difference table – Newton Gregory forward and backward interpolation – Lagrange' s interpolation formula – Newton divided difference interpolation formula – solution of linear second order difference equations with constant coefficient.

Differentiation and Integration

Numerical differentiation using Newton – Gregory forward and backward interpolation. Numerical integration – Gaussian quatrature –Trapezoidal rule and simpson's one third rule

10 Hours

Unit IV

Ordinary Differential Equations

Taylor series method – Euler and Modified Euler method Heun's method – Runge- Kutta method –Milne's method – Adams - Bashforth method.

10 Hours

Unit V

Linear Programming

Modelling – Graphical method – Central problem of linear programming- Definitions – statement of basic theorems and properties – Simplex method – Transportation and Assignment problems.

10 Hours

Total 50 Hours

Textbook:

Kandasamy, P.Thilakavthy, K and Gunavathy, K ."Numerical Methods" S.Chand and Co. New Delhi, 1999

References:

1. Kanti Swarup , Gupta , Manmohan " Operations Research " Sultan Chand & Sons, New Delhi, 1995
2. Venkatraman M.K., "Numerical Methods" National Pub. Company, Chennai, 1991
3. Gupta and Hira , " Problems in Operations Research" S.Chand & Co , New Delhi, 1991
4. Jain M K , Iyangar S R k, .Jain R.K ; "Numericl Methods For Scientific & Engineering Computation" New Age International (P) Ltd , New Delhi , 2005

DIGITAL LOGIC CIRCUITS

(07E402 & 07N402)

3 0 0 3

Unit I

Number System & Boolean Algebra

Review of number system; Types and conversion codes – Boolean algebra: De-Morgan's theorem – switching functions and simplification using K-maps & Quine McCluskey method**.**

10 Hours

Unit II

Combinational Circuits

Logic Families: TTL, ECL, CMOS - Design using logic gates – Design of adder, subtractor, comparators, code converters, encoders, decoders, multiplexers and demultiplexers – Function realization using multiplexers

10 Hours

Unit III

Synchronous Sequential Circuits

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

10 Hours

Unit IV

Asynchronous Sequential Circuits

Analysis of asynchronous sequential machines – State assignment – Asynchronous design problem.

10 Hours

Unit V

Programmable Logic Devices, Memories and Logic Families

Memories: ROM, PROM, EPROM, Study of memory ICs, Control signals and their programmers.
Programmable Logic Devices: PLA, PAL, PLD, FPGA

10 Hours

Total: 50 Hours

Textbook:

Morris Mano M., "Digital Logic and Computer Design", Prentice Hall of India, 2002.

References:

1. John M.Yarbrough, "Digital Logic, Application & Design", Thomson, 2002.
2. Charles H.Roth, "Fundamentals Logic Design", Jaico Publishing, IV Edition, 2002.
3. Floyd, "Digital Fundamentals", 8th edition, Pearson Education, 2003.
4. John F.Wakerly, "Digital Design Principles and Practice", 3rd Edition, Pearson Education, 2002.

CONTROL ENGINEERING

(07E403 & 07N403)

3 1 0

4

Unit I

Mathematical Model of Physical Systems

Open loop and closed loop systems with examples – Elements of control system – Mathematical representation of systems – Transfer function of mechanical, electrical, thermal, hydraulic, and pneumatic systems - Transfer function of overall systems using block diagram reduction technique – Signal flow graph – System modeling using simulation exercise. **10 Hours**

Unit II

Time Domain Analysis

Standard test signals - Transient response of first and second order systems – Time domain specifications – Steady state errors and error constants – Generalized error series – Dominant poles of transfer functions – P, PI, PID models of feedback control systems – Time domain analysis of systems using simulation exercises.

10 Hours

Unit III

Frequency Domain Analysis

Frequency response of systems - Frequency domain specifications - Polar plot – Bode plot – Constant M and N circles – Nichols chart - Nichols plot using simulation exercises

10 Hours

Unit IV

Stability of Control Systems

Concepts of stability – Characteristic equation – Routh-Hurwitz criterion – Root-Locus technique - Nyquist stability criterion - Simulation exercises

10 Hours

Unit V

Compensator Design

Design Specifications – Lag, lead and lag-lead networks – Cascade compensator design using Bode plot - Simulation exercises

10 Hours

Total: 50 Hours

Textbook:

Nagrath I. J and Gopal M, "Control System Engineering', New Age International Publisher, 2007.

References:

1. Ogatta K., "Modern Control Engineering", 4th Edition, Pearson Education, New Delhi, 2006.
2. Benjamin C. Kuo, "Automatic Control Systems", 7th edition, Prentice-Hall of India Pvt. Ltd. 2003.
3. Gopal M, "Control System Principles and Design", Tata McGraw-Hill, 2005.
4. Bandyopadhyay M.N., "Control Engineering Theory and Practice", Prentice Hall of India, 2005.

07E404 MEASUREMENTS AND INSTRUMENTATION SYSTEMS

3 0 0 3

Unit I

Introduction

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

10 Hours

Unit II

Electrical and Electronics Instruments

Principle and types of analog and digital voltmeters, ammeters, multimeters – Single and three phase wattmeters and energy meters – Magnetic measurements – Determination of B-H curve and measurements of iron loss – Instrument transformers – Instruments for measurement of frequency and phase.

10 Hours

Unit III

Measurements, Storage and Display Devices

DC and AC potentiometers - Self-balancing potentiometer - DC & AC bridges, transformer ratio bridges, Electrostatic and electromagnetic interference – Grounding techniques. Magnetic disk and tape recorders, digital plotters and printers, digital CRO.

10 Hours

Unit IV

Transducers and Data Acquisition Systems

Classification of transducers: Resistive, capacitive & inductive transducers – Piezoelectric, optical and digital transducers – Data acquisition systems

10 Hours

Unit V

Measurement of Physical Quantities

Measurement of Temperature: Thermocouples – Radiation and Optical pyrometer – Low and high pressure measurements – Differential pressure measurement – Flow measurement: Pitot tube, hot wire and hot film anemometer, venturi and orifice meter, ultrasonic and electromagnetic flow meter – Level, viscosity and pH measurement.

10 Hours

Total: 50 Hours

Textbook:

Sawhney A.K, "A Course in Electrical & Electronic Measurements & Instrumentation", Dhanpat Rai and Co, 2004

References:

1. Doebelin E.O, "Measurement Systems – Application and Design", Tata McGraw Hill Publishing Company, 2003.
2. Bouwens A.J, "Digital Instrumentation", Tata McGraw Hill, 1997.
3. Moorthy D.V.S, "Transducers and Instrumentation", Prentice Hall of India Pvt Ltd, 2003.
4. Kalsi H.S, "Electronic Instrumentation", Tata McGraw Hill, 1995.
5. Martin Reissland, "Electrical Measurements", New Age International (P) Ltd., Delhi, 2001.
6. Gupta J.B, "A Course in Electronic and Electrical Measurements", S. K. Kataria & Sons, Delhi, 2003.

07E405 AC MACHINES

3 1 0 4

Unit I

Alternator

Constructional details – Types of rotors, operating characteristics – Emf equation – Synchronous reactance – Armature reaction – Voltage regulation – EMF, MMF, ZPF and ASA methods – Synchronizing and parallel operation – Synchronizing power – Change of excitation and mechanical input – Blondel's theory – Determination of X_d and X_q using slip test

10 Hours

Unit II

Synchronous Motors

Principle of operation – Torque equation – Starting methods – Operation on infinite bus bars – V and inverted V curves – Power/power angle relations – Current loci for constant power input, constant excitation and constant power developed – Hunting and methods of suppression – Synchronous condenser, applications – Introduction to Permanent Magnet Synchronous Motor(PMSM)

10 Hours

Unit III

Three Phase Induction Machines

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Slip-torque characteristics – Condition for maximum torque – Losses and efficiency –No load and blocked rotor tests – Circle diagram – Separation of no load losses – Crawling and cogging – Electrical braking – Double cage rotors – Synchronous induction motor – Induction generator, types

10 Hours

Unit IV

Starting and Speed Control of Three Phase Induction Motors

Need for starting – Types of starters – Stator resistance and reactance, rotor resistance, autotransformer and star-delta starters – Speed control by Changing voltage, frequency, number of poles and slip – Cascaded connections – Slip power recovery scheme –Kramer's system – Scherbius system

10 Hours

Unit V

Single Phase Induction Motors and Special Machines

Constructional details – Two revolving field theory – Equivalent circuit – No load and blocked rotor tests – Performance analysis – Starting methods – Types and applications – Special machines – Shaded pole induction motor, reluctance motor, repulsion motor, hysteresis motor, stepper motor and AC series motor

10 Hours

Total: 50 Hours

Textbook:

Kothari D.P and Nagrath I.J, "Electric Machines", Tata McGraw Hill Publishing Company Ltd, 2007.

References:

1. Fitzgerald A.E, Charles Kingsley, Stephen.D.Umans, "Electric Machinery", Tata McGraw Hill publishing Company Ltd, 2003.
2. Stephen J.Chapman, "Electric Machinery Fundamentals", McGraw Hill Publishing Company Ltd, 1999.
3. Bhimbhra P.S, "Electrical Machinery", Khanna Publishers, 2003.

COMMUNICATION ENGINEERING

(07E406 & 07N503)

3 0 0 3

Unit I

Transmission Medium

Transmission lines – Types, equivalent circuit, losses, standing waves, impedance matching, bandwidth; radio propagation – Ground wave and space wave propagation, critical frequency, maximum usable frequency, path loss, white Gaussian noise.

10 Hours

Unit II

Analog Communication

Amplitude modulation and demodulation circuits – Frequency modulation and demodulation circuits - Super heterodyne radio receiver

10 Hours

Unit III

Digital Communication

Pulse code modulation, time division multiplexing, digital T-carrier system. Digital radio system. Digital modulation, Frequency and phase shift keying – Modulator and demodulator, bit error rate calculation.

10 Hours

Unit IV

Data Communication and Network Protocol

Data Communication codes, error control. Serial and parallel interface, telephone network, data modem, ISDN, LAN, ISO-OSI seven layer architecture for WAN**.**

10 Hours

Unit V

Satellite and Optical Fibre Communications

Orbital satellites, geostationary satellites, look angles, satellite system link models, satellite system link equations; advantages of optical fibre communication - Light propagation through fibre, fibre loss, light sources and detectors.

10 Hours

Total: 50 Hours

Textbook:

Wayne Tomasi, "Electronic Communication Systems", Pearson Education Asia Ltd, 3rd Edition, New Delhi, 2001

References:

1. Roy Blake, "Electronic Communication Systems", Thomson Delmar Ltd, 2nd Edition, New York, 2002
2. William Schweber, "Electronic Communication Systems", Prentice Hall of India Ltd, Indid, New York, 2002
3. Kennedy G, "Electronic Communication Systems", McGraw Hill book Co, 4th Edition, New York, 2002
4. Miller, "Modern Electronic Communication", Prentice Hall of India, New Delhi, 2003

07G003 PROFESSIONAL COMMUNICATION

(Third semester: CSE, ECE, ME; Fourth semester : BT, CE, EEE, EIE, FT, IT, TT)

2 0 2 3

Unit I

Employment Communication & Interview Skills

Formal and Informal English – Common Errors in English – Business Vocabulary – E-mail etiquette- Curriculum Vitae and Job letters – Goals & Types of Interviews – Preparing for the interviews – Dos and Don'ts During an Interview – General Etiquette - Telephonic Interview Cues – Mock Interviews.

10 Hours

Unit II

Group Discussion & Presentation Skills

Definition of Group Discussion – Group Communication Strategies – Personality Development – Mock GDs – Mind Mapping – Presentation Strategies – Developing and Delivering Effective Presentations – Mock Presentations.

10 Hours

Unit III

Soft Skills

Assertiveness – Self Confidence – Intelligent Quotient and Emotional Quotient – Motivation – Self Motivation – Sympathy vs. Empathy – Interpersonal Communication Strategies – Time Management - Managing across cultures – Etiquette Grooming – Interpersonal skills – Body language.

10 Hours

Unit IV

Career Lab

Team Building –Decision Making – Positive Thinking – Manage Stress – Business Success: Planning and Organising – Business Etiquette – Successful Meeting Skills.

10 Hours

Unit V

English Lab

Issues in English – English Pronunciation – Effective Communication – Presentations and Public Speaking – Speak Fluent English – Business Correspondence.

10 Hours

Total: 50 Hours

Textbook:

Koneru Aruna, "Professional Communication", Tata McGraw-Hill Publishing Company Limited, New Delhi, 2008

References:

1. Raman Meenakshi, Sangeeta Sharma, "Technical Communication – Principles and Practice", Oxford University Press, New Delhi, 2004
2. Guffey Mary Ellen, "Business Communication – Process and Product", Thomson South – Western, Bangalore, 2000

Software

1. Effective Communication, Train2success, Zenith Global Consultants Limited, Mumbai
2. Business Etiquette, Train2success, Zenith Global Consultants Limited, Mumbai
3. Business Correspondence, Train2success, Zenith Global Consultants Limited, Mumbai
4. Team Building, Train2success, Zenith Global Consultants Limited, Mumbai
5. Positive Thinking, Train2success, Zenith Global Consultants Limited, Mumbai
6. Decision Making, Train2success, Zenith Global Consultants Limited, Mumbai
7. Speak Fluent English, Auralog, Global Software Publishing, Cambridgeshire

07E408 AC MACHINES LABORATORY

0 0 3 2

1. Regulation of three phase alternator by EMF and MMF methods
2. Regulation of three phase alternator by ZPF method
3. Regulation of three phase alternator by ASA method
4. Regulation of three phase salient pole alternator by slip test
5. V and Inverted V curves of Three Phase Synchronous Motor
6. Load test on three phase induction motor
7. No load and blocked rotor test on three-phase induction motor
8. Separation of no load losses of three phase induction motor
9. Induction motor braking
10. Load test on single phase induction motor
11. No load and blocked rotor test on single phase induction motor
12. Study of AC motor starters

SOLID STATE CIRCUITS AND DEVICES LABORATORY

(07E409 & 07N409)

0 0 3 2

1. Static Characteristics of transistor under CE, CB and determination of hybrid parameters
2. Static characteristics and parameter determination of JFET
3. Static characteristics of semiconductor diode, zener diode and study of simple voltage regulator circuits
4. Static characteristics of UJT and its application as a relaxation oscillator
5. Characteristics of Photodiode, Phototransistor and study of light activated relay circuit
6. Static characteristics of Thermistors
7. Single phase half wave and full wave rectifiers with inductive and capacitive filters
8. Phase shift oscillator and Wien bridge oscillator
9. Frequency response of common emitter amplifier
10. Differential amplifier using FET
11. Simulation of Amplifiers and Rectifiers
12. Simulation of Oscillators

07E410 MEASUREMENTS AND INSTRUMENTATION LABORATORY

0 0 3 2

1. Characteristics of LVDT, I/P Converter and P/I converter
2. Schering Bridge and Maxwell's Inductance Bridge
3. Wheatstone Bridge and Kelvin Double Bridge

4. Instrumentation amplifiers
5. A/D Converter – Flash type and Successive approximation type
6. D/A converters – Weighted resistor and C-2C or R-2R method
7. Calibration of Ammeter and Voltmeter
8. Calibration of single phase and three phase energy meters
9. Temperature measurement using RTD, Thermistor and IC AD590
10. Thermocouple based ON-OFF controller
11. Measurement of Physical quantities – Strain, torque and angle
12. Measurements using CRO

07E501 POWER ELECTRONICS

(07E501 & 07N602)

3 1 0 4

Unit I

Power Semi-Conductor Devices

Construction, Operation, Characterstics of Power Diode – DIAC-TRIAC – Power transistor, MOSFET and IGBT – Ratings of SCR – Series parallel operation of SCR, di/dt & dv/dt protection – Cooling and mounting of thyristors

10 Hours

Unit II

Controlled Rectifiers

Single Phase and Three phase uncontrolled converter with R load – Single Phase and Three phase half and fully controlled converters with R, RL, RLE Load – Single phase dual converter operation – Effect of source inductance.

10 Hours

Unit III

Choppers

Principle of chopper operations-control strategies – Step up down and step down chopper – Multi phase choppers – Operation of voltage, current commutated choppers, switched mode regulators – Buck, boost, buck boost, cuk regulators-SMPS.

10 Hours

Unit IV

Inverters

Single phase and three phase (both 120^0 mode and 180^0 mode) inverters – PWM techniques: Sinusoidal PWM, modified sinusoidal PWM and multiple PWM – Current source inverters – Voltage source inverter – UPS.

10 Hours

Unit V

AC-AC Converters

AC Voltage controllers – Principle of sequence and phase control – Single and Three phase AC voltage controller with R load.– Cycloconverter **–** Single phase Cycloconverter – Step up and step down – Voltage equation – Three phase Cycloconverters.

10 Hours

Total: 50 Hours

Textbook:

Muhammad H. Rashid, "Power Electronics – Circuits, Devices & Applications", Prentice Hall of India, New Delhi, 2004

References:

1. Singh. M.D & Khanchandani. K.B "Power Electronics" Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2004
2. Bhimbra. Dr.P.S., "Power Electronics" Khanna Publishers, New Delhi, 2004
3. Ned Mohan, Tore.M.Undeland, William.P.Robbins, "Power Electronics: Converters, Applications and Design", John Wiley and sons, New Delhi, 2003.

07E502 POWER SYSTEMS –I

3 1 0 4

Unit I

Line Parameters

Resistance, Inductance and capacitance of single phase and three phase line – Stranded and bundled conductor configurations – Symmetrical and unsymmetrical spacing – Transposition of line conductors – Double circuit lines – Application of self and mutual GMD – Skin and proximity effects- Earth effect on capacitance – Inductive interference.

10 Hours

Unit II

Performance of Transmission Lines

Regulations and Efficiency of short – Medium transmission lines by nominal T & π methods, long lines – Rigorous solutions – ABCD constant – Ferranti effect.

10 Hours

Unit III

HVDC and Corona

HVDC – Introduction – Types – Advantages and disadvantages – Phenomenon of corona – Disruptive critical voltage – Visual critical voltage- Corona loss – Radio interference.

10 Hours

Unit IV

Cables Insulators and Mechanical Design of Transmission Lines

Types – Capacitance of cables – Grading of cables – HVDC cables – Insulators – Types and comparison – Voltage distribution in insulator string – String efficiency – Methods of improving string efficiency – Sag calculations – Effect of wind and ice – Supports at different levels.

10 Hours

Unit V

Distribution Systems and Substations

AC distribution – Radial and ring main systems – Ring main distributions with interconnections – Analysis of AC distribution systems, Substation – Types of substation – Sample substation layout.

10 Hours

Total: 50 Hours

Textbook:

Gupta B.R**.,** "Power System Analysis & Design", S. Chand & Co., New Delhi 2003

References:

1. Wadhwa, C.L,. "Electrical Power Systems", New Age International Edition, New Delhi 2005
2. Nagrath I.J., Kothari D.P, "Power System Engineering" Tata McGraw Hill Ltd, New Delhi – 1994
3. Mehta, V.K., Rohit Mehta, "Principles of Power Systems", S. Chand & Co.,New Delhi 2003

LINEAR INTEGRATED CIRCUITS

(07N406 & 07E503)

3 0 0 3

Unit I

IC Fabrication

IC classification, fundamentals of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities - Realisation of monolithic ICs and packaging**.**

10 Hours

Unit II

Characteristics of OpAmp

Ideal OpAmp characteristics, DC characteristics, AC characteristics, offset voltage and current - voltage series feedback and shunt feedback amplifiers, differential amplifier - frequency response of OpAmp.

10 Hours

Unit III

Applications of Opamp

Instrumentation amplifier, first and second order active filters, V/I & I/V converters, comparators, summer, differentiator and integrator – multivibrators, waveform generators, clippers, clampers, peak detector, S/H circuit, D/A converter (R-2R ladder and weighted resistor types), A/D converter – Dual slope, successive approximation and flash types**.**

10 Hours

Unit IV

Special ICs

555 Timer circuit – Functional block, characteristics & applications; 566-voltage controlled oscillator circuit; 565-phase lock loop circuit functioning and applications, Analog multiplier ICs.

10 Hours

Unit V

Application ICs

IC voltage regulators – LM317, 723 regulators, switching regulator, MA 7840, LM 380 power amplifier, ICL 8038 function generator IC, isolation amplifiers, opto coupler, opto electronic ICs.

10 Hours

Total: 50 Hours

Textbook:

Ramakant A. Gayakward, “Op-amps and Linear Integrated Circuits”, , Pearson Education, Asia Ltd, 4th Edition, 2003

References:

1. Roy Choudhary D., Sheil B.Jani, “Linear Integrated Circuits”, New Age Publishing Co, 2nd Edition, 2003
2. Jacob Millman, Christos C.Halkias, “Integrated Electronics - Analog and Digital Circuits System”, Tata McGraw Hill, 2003
3. Robert F.Coughlin, Fredrick F.Driscoll, “Op-amp and Linear ICs”, Pearson Education, 4th Edition, 2002
4. David A.Bell, “Op-amp & Linear ICs”, Prentice Hall of India, 2nd Edition,New Delhi 1997

ADVANCED CONTROL ENGINEERING

(07E504 & 07N502)

3 1 0 4

Unit I

Controller Design

System performance and specifications – Feedback compensators – Proportional Derivative(PD), Proportional Integral (PI) and PID controllers – Characteristics, Design – Manual and automatic tuning.

10 Hours

Unit II

State Space System Theory

Concept of State, state variable and state model – State model of linear system – State space representation using physical variables, phase variables, canonical variables – Decomposition of transfer functions - Direct decomposition, cascade decomposition and parallel decomposition - Transforming general state model into canonical model – Derivation of transfer function matrix.

10 Hours

Unit III

Solution of State Equation

State transition matrix and its properties – Computation using Laplace transform method, canonical transformation method, Cayley Hamilton method – Controllability and Observability of systems – Pole placement by state feed back – Observer systems.

10 Hours

Unit IV

Nonlinear Systems

Introduction – Properties of nonlinear systems – Describing function for nonlinearities, on-off relay,dead zone, saturation and relay with hysteresis – Phase plane analysis – Concept of singular points – Construction of phase plane trajectory, using isocline method, Lienard construction and Delta method.

10 Hours

Unit V

Computer control of systems

Introduction to - Programmable Logic Controllers SCADA – Distributed Control Systems – Applications

10 Hours

Total: 50 Hours

Textbook:

Ogata K, "Modern Control Engineering", 4th Edition, Pearson Education, New Delhi, 2005

References:

1. Nagrath I J and Gopal M, "Control System Engineering", New Age International Publishers, New Delhi, 5th Edition 2007
2. Richard C Dorf and Rober H Bishop, "Modern Control Systems", Pearson Education, 8th Edition, First Indian Reprint, New Delhi, 2004
3. Benjamin C Kuo, "Automatic Control Systems", 7th Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2003
4. John W Webb and Ronald A Resis, "Programmable Logic Controller", Prentice Hall of India Pvt. Ltd., New Delhi, 1995
5. Michael P Lukas, "Distributed Control Systems", Van Nostrand Reinhold Company, New York 1995

07E505 POWER SYSTEM PROTECTION AND SWITCHGEARS

3 0 0 3

Unit I

Introduction

Principles and need for protective schemes – Nature and causes of faults – Types of faults – Symmetrical components and its applications to fault analysis– Power system earthing - Zones of protection.

10 Hours

Unit II

Protective Relays

Definition – Requirement of relays – Universal torque equation – Non directional and directional over current relays – Distance relays – Impedance, mho and reactance relays – Differential, pilot and negative sequence relays – Under frequency relays – Static relays.

10 Hours

Unit III

Apparatus Protection

Alternator, transformer, motor, busbar and feeder protection - CTs and PTs and their applications in protection schemes – Microprocessor based protective schemes.

10 Hours

Unit IV

Theory of Circuit Interruption

Physics of arc phenomena and arc interruption. Restriking voltage & Recovery voltage, rate of rise of recovery voltage, resistance switching, current chopping, interruption of capacitive current – DC circuit breaking.

10 Hours

Unit V

Circuit Breakers

Types of Circuit Breakers – Air blast, Air break, oil, SF_6 and Vacuum circuit breakers –merits and demerits – HVDC breakers - Testing of circuit breakers.

10 Hours

Total: 50 Hours

Textbook:

Sunil S. Rao, "Switchgear and Protection", Khanna publishers, New Delhi, 1999

References:

1. Wadhwa C L, "Electrical Power Systems", Newage International (P) Ltd., 2000.
2. Ravindranath B, and Chander N, "Power System Protection & Switchgear", Wiley Eastern Ltd., 1977.
3. Soni M L, Gupta P V, Bhatnagar V S, Chakrabarti A, "A Text Book on Power System Engineering", Dhanpat Rai & Co., 1998.
4. Badri Ram, Vishwakarma, "Power System Protection and Switchgear", Tata McGraw hill, 2001.
5. Paithankar Y G and Bhide S R, "Fundamentals of Power System Protection", Prentice Hall of India Pvt. Ltd., New Delhi 2002.

SIGNALS AND SYSTEMS

(07N404 & 07E506)

3 1 0 4

Unit 1

Introduction to Signals and Systems

Basic continuous time signals – Basic discrete time signals – Representation of signals in terms of impulses – Continuous time systems – Discrete time signals – Properties of systems – Linear time invariant systems: discrete and continuous – Continuous time system representation by differential equation – Discrete time system representation by difference equation – Block diagram representation.

10 Hours

Unit II

Laplace Transform and Z Transform

Laplace and inverse Laplace transforms – Analysis and characterization of LTI system using Laplace transform – The Z transform and the inverse Z transform – Properties of Z transform – analysis and characterization of LTI system using Z transform.

10 Hours

Unit III

Sampling

Representation of continuous time signals by samples – Sampling theorem – Reconstruction from samples using interpolation – Effect of undersampling – Aliasing error – Discrete time processing of continuous time signals – Sampling of discrete time systems.

10 Hours

Unit 1V

Fourier Analysis of Discrete Time Signals and Systems

Representation of periodic signals by discrete time Fourier series – Representation of periodic and aperiodic signals by discrete time Fourier transforms – Properties of discrete time Fourier transforms – Parsevals's relation – Convolution property – Response of discrete time systems to complex exponentials frequency response of systems characterized by difference equations.

10 Hours

Unit V

Fourier Analysis of Continuous Time Signals and Systems

Fourier series representation of periodic signals – Approximation of periodic signals using Fourier series and convergence of Fourier series – Representation of aperiodic signals – Continuous time Fourier transform – Properties Fourier transform – Response of continuous time systems to complex exponentials – Frequency response of systems characterized by differential equations.

10 Hours

Total: 50 Hours

Textbook:

Oppenheim A. V, Willsky A. S and Nawab S. H, "Signals and Systems", Pearson Education Asia, 2nd Edition, New Delhi, 2007.

References:

1. Ronald E. Ziemer, William H. Transter and Ronald. D. Fanmin, "Signals and System – Continuous and Discrete", Pearson Education Asia, 4th Edition, New Delhi 1998
2. Roberts. M.J, "Signals and Systems – Analysis using Transform Method and Matlab", McGraw Hill Book Company, New Delhi 2004
3. Haykin. S and Barry Van Veen, "Signals and Systems", John Wiley and Sons,New York 2002
4. Lathi.B.P, "Linear Systems and Signals", Oxford University Press, Oxford 2003
5. Chi Tsong Chen, "Signals and Systems", Oxford University Press, 3rd Edition, Oxford 2004

07G005 ENGINEERING ECONOMICS
(Common to all branches)

3 0 0 3

Unit I

Introduction

Economic Activities – Nature of economics – Significance of economics – Managerial economics and other disciplines – Micro economics and macro economics – Normative and positive economics, objectives of the firm– Methods of managerial economics.

10 Hours

Unit II

Demand Utility Analysis and Forecasting

Concept of demand – Types of demand factors determining demand – Law of demand – Elasticity of demand – Point elasticity and arc elasticity – Demand forecasting – Fore casting Methods.

10 Hours

Unit III

Production and Cost Analysis

Production function – Least cost combination of inputs – Returns to scale and factor productivities – Statistical Production – Laws of production – Concept and nature of cost – Accounting costs and economic costs – Determination of cost – Cost output relation and cost curves.

10 Hours

Unit IV

Pricing

Determinants of price – Objective of Pricing – Market conduct, performance and structure – Types of Competition – Pricing under different market structure price discrimination – Pricing methods in practice.

10 Hours

Unit V

Financial Accounting System

Significance of accounting – Branches of accounting terminology – Double entry book keeping Journals and ledgers – Mechanics of accounting – Trial balance, balance sheet – Project and loss account – Financial ratio analysis – Fund flow analysis – Cash flow analysis – Capital Budgeting and its limitations.

10 Hours

Total: 50 Hours

Textbooks:

1. Ramachandra Aryasri A and Ramana Murthy V V, “Engineering Economics and Financial Accounting”, Tata McGraw Hill Publishing Company Limited , New Delhi, 2006.
2. Kesavan R, Elanchezhian C and Sunder Selwyn T, Engineering Economics and Financial Accounting” Laxmi Publication (P) Ltd , New Delhi, 2005.

References:

1. Mote V L Samuel Paul and Gupta G S, “Managerial Economics – Concepts and Cases” Tata McGraw Hill Publishing Company Limited , New Delhi, 1981.
2. Maheswari S N, “Financial and Management Accounting”, Sultan Chand & Sons New Delhi, 1999.

07E508 POWER ELECTRONICS LABORATORY

0 0 3 2

1. Characteristics of SCR, MOSFET,TRIAC, IGBT
2. Design of Firing Circuits-UJT,R,RC
3. Single phase half and fully controlled Converters
4. Three phase half and fully controlled Converters
5. Single phase Cycloconverter
6. Series Inverter
7. Current Commutated Chopper
8. Voltage Commutated Chopper
9. Single phase AC voltage controller
10. MOSFET, IGBT based Chopper circuit.
11. Static Circuit Breakers
12. IGBT based single-phase PWM inverter

07E509 CONTROL ENGINEERING LABORATORY

0 0 3 2

1. Determination of transfer function of armature controlled DC servo motor
2. Determination of transfer function of field controlled DC servo motor
3. Determination of transfer function of AC servo motor
1. Digital simulation of systems with nonlinearity
2. Analog and Digital simulation of Type-0 and Type-1 system
3. Time response analysis simulation
4. Frequency response analysis simulation
5. Performance evaluation of P, PI and PID controllers
6. Stability analysis of linear systems simulation
7. a) Characteristics of synchros

   b) Study of stepper motor
8. Compensator design simulation
9. Mini-project

LINEAR AND DIGITAL IC LABORATORY

(07N410 & 07E510)

0 0 3 2

4. Study of Basic Digital ICs.
   (Verification of truth table for AND, OR, EXOR, NOT, NOR, NAND, JK FF, RS FF, D FF)

2. Implementation of Boolean Functions, Adder/ Subtractor circuits.

3. a) Code converters, Parity generator and parity checking, Excess 3, 2s Complement, Binary to grey code using suitable ICs .

   b) Encoders and Decoders:

4. Counters: Design and implementation of 4-bit modulo counters as synchronous and asynchronous types using FF ICs and specific counter IC.

5 Shift Registers:
Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable ICs.

6. 4:1; 8:1 multiplexer and 1:4; 1:8 demultiplexer

7. NE/SE 555 Timer in Astable and Monostable operation

8. Application of OpAmp
   OpAmp as Inverting and Non-inverting amplifier,
   Adder, Comparator, Integrater and Differentiator.

9 Analog to Digital Converter and Digital to Analog Converter:

10 i. Voltage to frequency characteristics of NE/ SE 566 IC.
ii. Frequency multiplication using NE/SE 565 PLL IC.

07E601 SOLID STATE DRIVES

3 1 0 4

Unit I

Review of Electric Drives

Electric Drives – Drive classifications – Advantage of Electric Drives – Equations governing motor load dynamics – Equilibrium operating point and its steady state stability – Mathematical condition for steady state stability and problems- Selection of drives – Determination of motor rating – Multiquadrant operation

10 Hours

Unit II

Solid State Control of DC Drives

DC motor and their performance-Braking – Steady state analysis – Ward Leonard drives – Controlled rectifier fed DC drives – Chopper controlled DC drives – Time ratio control and current limit control – Four quadrant operation – Effect of ripples on the DC motor performance

10 Hours

Unit III

Solid State Control of Induction Motor Drives

Stator control- Steady state analysis - Stator voltage and frequency control –V/F control – Closed loop control of Voltage Source Inverter, Current Source Inverter and cycloconverter fed induction motor drives – Rotor control – Rotor resistance control and slip power recovery schemes- Subsynchronous and super synchronous operation – Closed loop speed control

10 Hours

Unit IV

Solid State Control of Synchronous Motor Drives

Types of synchronous Motors – Adjustable frequency and controlled current operation **–** Open loop v/f control **–** Self controlled synchronous motor – Closed loop control of Voltage Source Inverter, Current Source Inverter and cycloconverter fed synchronous motor drives – Margin angle control and power factor control – Brushless excitation

10 Hours

Unit V

Digital Technique in Speed Control

Digital Control and Drive Applications – Digital technique in speed control – Advantages and limitations-microcomputer based control of drives – PLL and PID controller based control of drives – Selection of drives and control schemes for steel rolling mills, paper mills, lifts and crans.

10 Hours

Total: 50 Hours

Textbook:

Dubey.G.K., "Fundamental of Electrical Drives", Narosa publishing House , New Delhi 1995

References:

1. Murphy, J.M.D and Turnbull.F.G. , "Thyristor control of AC Motors", Pergamon Press, New Delhi 1988
2. Vedam Subramanyan, "Thyristor control of Electrical Drives", Tata McGraw Hill Publishing Combany, New Delhi 1996
3. Krishan.R, "Electtric Motor & Drives Modelling, Analysis and Control", Prentice hall of India,New Delhi, 2001
4. Gaekward, "Analog and Digital control systems", Wiley Eastern Ltd, New Delhi 1989

07E602 POWER SYSTEMS - II

3 1 0 3

Unit I

Introduction to Power Systems

Present and future trends – Typical power station and substation layouts – Computers in Power System Engineering – Single line diagrams – Per unit system – Per unit impedance/ reactance diagrams – Formation of network matrices – Y bus formation using inspection and singular transformation – Z bus formation using step-by-step building algorithm method.

10 Hours

Unit II

Load Flow Studies

Load flow equations and methods of solution – Slack bus concept – Gauss Seidal, Newton Raphson, Fast decoupled methods for load flow studies – Comparison.

10 Hours

Unit III

Fault Analysis

Types of faults – Balanced three phase fault – Circuit transients and short circuit capacity – Systematic fault analysis using bus impedance matrix – Fundamentals of symmetrical components – Sequence impedances – Sequence networks – Unbalanced faults - Single line to ground fault – Line fault – Double line to ground fault – Unbalanced fault analysis using bus impedance matrix.

10 Hours

Unit IV

Power System Economics

Incremental cost curve, co-ordination equations without loss and with loss, solution by direct method and λ-iteration method, No derivation of loss coefficients. Base point and participation factor.

10 Hours

Unit V

Power System Stability

Steady state and transient stability – Swing equation and its solution by Euler's method and Runge – Kutta method – Equal area criterion – Factors affecting stability and methods of improving stability

10 Hours

Total: 50 Hours

Textbook:

Hadi Saadat, "Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi, 2002

References:

1. Nagarat .I.J, Kothari .D.P, "Power System Engineering", Tata McGraw Hill Publishing Company, New Delhi, 1994
2. Stagg, G.W. and El-Abaid, A. H., "Computer Methods in Power System Analysis", McGraw-Hill International Book Company, New York, 2007
3. John J. Grainger and Stevenson Jr. W.D., "Power System Analysis", McGraw Hill International Book Company, New York 1994
4. P.Kundur, "Power System Stability and Control", Tata McGraw Hill Book Company, New Delhi, 1994
5. M.A. Pai, "Computer Techniques in Power System Analysis", Tata McGraw Hill publishing company, New Delhi, 2003

MICROPROCESSORS AND MICROCONTROLLERS

(07N505 & 07E603)

3 1 0 4

Unit I

Processor And Programming

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

10 Hours

Unit II

Peripheral Interfacing

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.

10 Hours

Unit III

Micro Controller 8051

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

10 Hours

Unit IV

Micro Controller Programming & Applications

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

10 Hours

Unit V

Advanced Intel Processors

Evolution of 16 and 32 bit processors – 8086 – Real and protected mode of operations – 80x86 processors – Functional Block Diagram – Programming Model – Modes Of Operation – Introduction to Pentium – Pentium pro processor.

10 Hours

Total: 50 Hours

Textbook:

Gaonkar R S, “Microprocessor Architecture Programming and Application”, Wiley Eastern Ltd., New Delhi, 1995

References:

1. Muhammad Ali Mazidi & Janice Gilli Mazidi, “The 8051 Micro Controller and Embedded Systems”, Pearson Education, 5th Indian Reprint, New Delhi, 2003
2. Kenneth J Ayala, “The 8086 Microprocessor”, Penram International Publishing Co.,New Delhi, 1996
3. William Kleitz, “Microprocessor and Micro Controller Fundamental of 8085 and 8051 Hardware and Software”, Pearson Education Asia, New Delhi 1998
4. James L.Antonakos, “An Introduction to the Intel family of microprocessors”, Pearson Education Asia, New Delhi 3rd Edition, 2001

DIGITAL SIGNAL PROCESSING

(07E604 & 07N604)

3 1 0 4

Unit I

Fast Fourier Transform (FFT)

Introduction to DFT – Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms –Use of FFT algorithms in Linear Filtering and correlation.

10 Hours

Unit II

Digital Filters Design

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Hamming, Kaiser windows – Frequency sampling techniques – IIR Filters – Magnitude response – Phase response – group delay - Design of Low Pass Butterworth filters (low pass) - Bilinear transformation – Prewarping, impulse invariant transformation.

10 Hours

Unit III

Filter Structures and Finite Word Length Effects

Realization structures – Direct form – I, direct form – II, Transpose, cascade and parallel forms.

Quantization noise – Derivation for quantization noise power – Fixed point and binary floating point number representation – Comparison – Over flow error – Truncation error – Co-efficient quantization error - Limit cycle oscillation – Signal scaling – Analytical model of sample and hold operations.

10 Hours

Unit IV

Digital Signal Processors

Introduction to DSP architecture – Harvard architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of architecture and instruction set of TMS320C24XX, Simple Programs.

10 Hours

Unit V

DSP Applications to Electrical Engineering

Case studies: DSP based Electrical drives – Induction Motors and special Electrical machines – DSP controllers for Non-conventional energy sources – TMS320C24XX Based UPS.

10 Hours

Total: 50 Hours

Textbook:

John G Proakis, Dimtris G Manolakis, "Digital Signal Processing Principles", Algorithms and Application, Prentice Hall of India Ltd, 3rd Edition, New Delhi, 2000

References:

1. Venkataramani B and Bhaskar M, "Digital Signal Processor Architecture", Programming and Application, Prentice Hall of India Ltd, 3rd Edition, New Delhi. 2007
2. Alan V Oppenheim, Ronald W Schafer, John R Back, "Discrete Time Signal Processing", Prentice Hall of India Ltd, 2rd Edition, New Delhi, 2000
3. Avtar singh, Srinivasan S, "DSP Implementation using DSP microprocessor with Examples", from TMS32C54XX -Thamson / Brooks cole Publishers, 2003
4. Salivahanan S, Vallavaraj A and Gnanapriya, "Digital Signal Processing", McGraw Hill, New Delhi, 2000
5. Johny Johnson R, "Introduction to Digital Signal Processing", Prentice Hall of India Ltd, New Delhi, 1994
6. Mitra S K, "Digital Signal Processing- A Computer based approach", Tata McGraw Hill Ltd, New Delhi 1998

07E605 SOFTWARE ENGINEERING

3 0 0 3

Unit I

Planning and Cost Estimations

Software project planning : Importance of software – Introduction – Defining the problem – Developing a solution strategy – Planning and development process – Other planning activities. Software cost estimation : Introduction – Software cost factors – Software cost estimation techniques – Staffing level estimation – Estimating software maintenance costs..

10 Hours

Unit II

Software Requirements Specification

Introduction – The software requirement specifications – Formal specification techniques – Languages and processors for requirements specification : SDAT, SSA, GIST, PSL/PSA, REL/REVS.

10 Hours

Unit III

Software Design Concepts

Abstraction – Modularity – Software architecture – Cohesion, coupling – Various design concepts and notations – Real time and distributed system – Design – Documentation – Data flow oriented design – Jackson system development – Design for reuse – Programming standards.

10 Hours

Unit IV

Implementation Issues And Modern Language Features

Implementation Issues : Introduction – Structured coding techniques – Coding style – Standards and guidelines – Documentation guidelines. Modern Programming Languages Features : The translation process – PL characteristics – PL fundamentals : Type checking – Separate compilation – User defined data types – Data abstraction – Scoping rules – Excepting handling – Concurrency mechanisms.

10 Hours

Unit V

Verification, Validation and Maintenance

Introduction – Quality assurance – Walk through and inspections – Static analysis – Symbolic execution – Unit testing and debugging – System testing – Formal verification.

Software Maintenance : Introduction – Enhancing maintainability during development – Managerial aspects of software maintenance – Configuration management – Source code metrics – Other maintenance tools and techniques. .

10 Hours

Total: 50 Hours

Textbook:

Richard Fairley, "Software Engineering Concepts", McGraw Hill Book Company, New York 1985

References:

1. Roger S. Pressman, "Software Engineering A Practitioner Approach" , McGraw Hill book Co, 5th edition, New York 1999
2. Sommerville I , "Software Engineering", Addison Wesley, 5th edition , New York 1996
3. Shooman, "Software Engineering", McGraw Hill book co, New York 1983.
4. David Gustafson, " Software Engineering", Schaum's outlines series, Tata McGraw Hill book Co, New York 2003

07G006 TOTAL QUALITY MANAGEMENT

(Common to all branches)

3 0 0 3

Unit I

Introduction

Definition of Quality – Dimensions of Quality – Quality Planning – Quality costs – Analysis Techniques for Quality Costs – Basic concepts of Total Quality Management – Historical Review – Quality Statements – Strategic Planning, Deming Philosophy – Juran Trilogy – Crosby philosophy, PDSA Cycle, 5S, Kaizen – Obstacles to TQM Implementation.

10 Hours

Unit II

TQM Principles

Principles of TQM, Leadership – Concepts – Role of Senior Management – Quality Council, Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

10 Hours

Unit III

Statistical Process Control (SPC)

The seven tools of quality – Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables X bar and R chart and attributes P, nP, C, and u charts, Process capability, Concept of six sigma – New seven Management tools.

10 Hours

Unit IV

TQM Tools

Benchmarking – Reasons to Benchmark – Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, and Benefits – Taguchi Quality Loss Function – Total Productive Maintenance (TPM) – Concept, Improvement Needs, and FMEA – Stages of FMEA.

10 Hours

Unit V

Quality Systems

Need for ISO 9000 and Other Quality Systems – ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

10 Hours

Total: 50 Hours

Textbook:

Dale H.Besterfiled, et al., "Total Quality Management", Pearson Education, Inc. 2003 (Indian reprint 2004).

References:

1. James R.Evans & William M.Lidsay, "The Management and Control of Quality", (5th Edition), South-Western (Thomson Learning), 2002.
2. Feigenbaum A.V., "Total Quality Management", McGraw Hill, 1991.
3. Oakland J.S., "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S., "Quality Management – Concepts and Tasks", New Age International, 1996.
5. Zeiri, "Total Quality Management for Engineers", Wood Head Publishers, 1991.

MICROPROCESSORS AND MICROCONTROLLERS LABORATORY
(07N509 & 07E608)

0 0 3 2

8-bit Microprocessor

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. Programming practice on assembler and simulator tools.

8-bit Micro controller

6. Demonstration of basic instructions with 8051 Micro controller execution, including:
   - Conditional jumps, looping
   - Calling subroutines.
   - Stack parameter testing

7. Parallel port programming with 8051 using port 1 facility:
   - Stepper motor and D / A converter.

8. Programming Exercise on
   - RAM direct addressing
   - Bit addressing

9. Programming practice using simulation tools and C - compiler
   - Initialize timer
   - Enable interrupts.

10. Study of micro controllers with flash memory.

References:

1. R.S. Gaonkar, “Microprocessor Architecture Programming and Applications”, Wiley Eastern Ltd., New Delhi, 1995

2. 2Myke Predko, “Programming and Customizing the 8051 Microcontroller”, Tata McGraw Hill book Co, 1999

07E609 ELECTRICAL WORKSHOP

0 0 3 2

1. Study of Electrical Accessories, Indian Electricity Rules, Tools, Materials and Safety Precautions used in Domestic Wiring.
2. Design, Construction and Testing of Stair case and Godown Wiring.
3. a) Implementation of Fluorescent Tube Wiring.
   b) Study of Energy Saving Lamps.
4. Transformer Oil Testing.
5. Design, Fabrication and Testing of Two Winding Transformer.
6. Study and Testing of Pole Changing Induction Motor.
7. Measurement of Earth Resistance using Meggar.
8. Design, Execution and Testing of Residential Wiring using.
9. Study of PCB Fabrication Methods.
10. Design, Fabrication and Testing of Small Electronic Circuits on PCB.
11. Study and Implementation of Cable Joints.
12. Mini Project.

07E701 ELECTRICAL MACHINE DESIGN

3 0 0 3

Unit I

Introduction

Major considerations – Limitations – MMF calculation of various types of electrical machines – Net length of Iron – real and apparent flux density of rotating machines – temperature gradient – heat flow in two dimensions – thermal resistivity of winding – temperature gradient in conductors placed in slots – thermal rating - direct and indirect cooling methods - basic concepts of computer aided design.

10 Hours

Unit II

Dc Machines

Design of rotating machines – D.C machines output equations – main dimensions - choice of specific loadings – Selection of number of poles – Armature design – Design of field poles & field coils - Design of commutator and brushes - Program to design main dimensions of DC Machines.

10 Hours

Unit III

Transformers

KVA output for single and three phase transformers – Window space factor – Overall dimensions – Temperature rise of Transformers – Design of Tank with & without cooling tubes – Optimum design of transformers – Design of chokes – Design of CTs & PTs - Program to design main dimensions of Transformers.

10 Hours

Unit IV

Induction Motors

Magnetic leakage calculations – Leakage reactance of polyphase machines- Magnetizing current – Output equation of Induction motor – Main dimensions –Length of air gap- Rules for selecting rotor slots of squirrel cage machines – Design of rotor bars & slots – Design of end rings – Design of wound rotor - relation between D & L for best power factor- - Program to design main dimensions of Induction Motors.

10 Hours

Unit V

Synchronous Machines

Runaway speed – output equations – choice of loadings – Design of salient pole machines – Short circuit ratio – shape of pole face – Armature design – Armature parameters – Estimation of air gap length – Design of rotor – Design of damper winding – Determination of full load field mmf – Design of field winding – Design of turbo alternators – Rotor design- Program to design main dimensions of Alternators.

10 Hours

Total: 50 Hours

Textbook:

Sawhney, A.K., "A Course in Electrical Machine Design", Dhanpat Rai & Sons, New Delhi, 1984

References:

1. Sen, S.K., "Principles of Electrical Machine Designs with Computer Programmes", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 1987
2. Agarwal R K, "Principles of Electrical Machine Design", Kataria S K and Sons, New Delhi, 2002
3. Mittle V N and Mittle A, "Design of Electrical Machines",Standard Publications and Distributors, New Delhi, 2002

07E702 COMPUTER NETWORKS

3 0 0 3

Unit I

Data Communication – An Overview

Introduction: Networks – Protocols and Standards – Line configurations – Topology – Transmission mode – Categories of networks – OSI model & DoD Model: Functions of the layers – Transmission media: Guided media – Unguided media – Transmission impairment – Performance.

10 Hours

Unit II

Medium Access Sub Layer & Data Link Layer

Data link control: Service primitives – Flow control mechanisms – Stop and wait – Sliding window protocols – Error detection and correction: Types of errors – Error detection – Vertical Redundancy Check (VRC) – Longitudinal Redundancy Check (LRC) – Cyclic Redundancy Check (CRC) – Check sum – Error correction – Single bit error correction –Hamming Code formation – Medium Access Control Protocols: Conventional channel allocation methods, pure ALOHA, S-ALOHA, IEEE Standards for LAN – Ethernet, Token Bus, Token Ring, FDDI.

10 Hours

Unit III

Network & Transport Layers

Networking and internetworking devices: Repeaters, Bridges, Gateways – Switching – Circuit and packet switching – Network layer design issues – Routing Algorithms – Congestion control algorithms – Principles of internetworking – Internet addresses – TCP / IP protocol suite.

10 Hours

Unit IV

Presentation & Application Layers

Domain Name System (DNS) – Telnet – File Transfer Protocol (FTP) – Simple Mail Transfer Protocol (SMTP) – Electronic Mail – Overview of ISDN – ISDN protocols.

10 Hours

Unit V

Network Management

Architecture of network management protocols - Information extraction - Configuration Management – Fault Management – Performance management – Security Management – Cryptography.

10 Hours

Total: 50 Hours

Textbook:

William Stallings, "Data and Computer Communication", Pearson Education, Asia Ltd, 8th Edition, Ne2w Delhi, 2003

References:

1. Kernel Explain A.S., "Communication Network Management", Prentice Hall of India Ltd, New Delhi 2005
2. Andrew Tannenbaum.S. "Computer Networks", 4th Edition, Pearson Education, Asia Ltd, New Delhi, 2003
3. Behrouz A.Forouzan, "Data Communication and Networking", 3rd Edition, Tata McGraw Hill Ltd, New Delhi, 2005
4. Uylers Black, "Network Management Standards", McGraw Hill book Co, New York 1995

VLSI DESIGN

(07E703 & 07N704) **3 0 0 3**

Unit I

Overview Of VLSI Design Technology

The VLSI design process – Architectural design – Logical design – physical design –Layout styles – Full custom – Semi custom approaches. Basic electrical propertiesof MOS and CMOS circuits- I_{ds} versus V_{ds} relationships – Transconductance – pass transistor – nMOS inverter – Determination of pull up to pull down ratio for an nMOS inverter – CMOS inverter – MOS transistor circuit model.

10 Hours

Unit II

VLSI Fabrication Technology

Overview of wafer fabrication – wafer processing – oxidation – patterning – Diffusion – Ion implantation – Deposition – Silicon gate nMOS process – nwell CMOS process– pwell CMOS process – Twintub process – Silicon on insulator

10 Hours

Unit III

MOS And CMOS Circuit Design Process

MOS layers – Stick diagrams – nMOS design style – CMOS design style – Design rules and layout – Lambda based design rules – Contact cuts – Double metal MOS process rules – CMOS lambda based design rules – Sheet resistance – Inverter delay – Driving large capacitive loads – Wiring capacitance.

10 Hours

Unit IV

Subsystem Design

Switch logic – pass transistor and transmission gates – Gate logic – inverter – Two input NAND gate – NOR gate – other forms of CMOS logic – Dynamic CMOS logic –Clocked CMOS logic – CMOS domain logic – simple combinational logic design examples – Parity generator – Multiplexers.

10 Hours

Unit V

VHDL Programming

RTL Design – Combinational logic – Types – Operators – Packages – Sequential circuit – Sub-programs – Test benches. (Examples: address, counters, flipflops, FSM, Multiplexers / Demultiplexers).

10 Hours

Total: 50 Hours

Textbook:

Eshranghian E, Pucknell D A and Eshraghian S, "Essentials of VLSI circuits and systems", PHI, New Delhi, 2003

References:

1. Charles H.Roth, "Fundamentals of Logic Design", Jaico Publishing House, 1992
2. Weste N H, "Principles of CMOS VLSI Design", Pearson Eduction, India, 2002
3. Eugene D.Fabricius, "Introduction to VLSI Design", Tata McGraw Hill, 1990
4. Zainalatsedin Navabi, "VHDL Analysis and Modelling of Digital Systems", 2nd Edition, Tata McGraw Hill, 1998
5. Douglas Perry, "VHDL Programming by example", Tata McGraw Hill, 3rd Edition, 2003

07E704 RENEWABLE ENERGY SOURCES

3 0 0 3

Unit I

Introduction

Trends in energy consumption - World and Indian energy scenario – Energy sources and their availability, Economics and Efficiency – Energy consumption pattern and growth rate in India – Need to develop new energy technologies.

10 Hours

Unit II

Solar Energy and Applications

Solar Thermal Electric Conversion: Principle of solar thermal power generation – Low and medium temperature systems – Stirling cycle – Brayton cycle. Photo-Voltaic Energy Conversion: Solar Radiation and measurement – Solar cells and their characterization – influence of insulation and temperature – PV arrays – Electrical storage with batteries. Power Conditioning Schemes: DC power conditioning converters – Maximum power point tracking algorithms – AC power conditioners – Line commutated Thyristor Inverters – Synchronised operation with grid supply – Stand-alone Inverter.

10 Hours

Unit III

Wind Energy Systems

Basic principle of wind energy conversion – Nature of wind – Power and Energy from the wind - Components of wind turbine generator (WTG) – Types of WTG – Squirrel cage and doubly fed induction generators – Field excited and permanent magnet synchronous generators - Generator control – Load control – performance measures – Efficiency.

10 Hours

Unit IV

Bio Energy & MHD Energy Conversion Systems

Energy from Bio-mass – Biogas plants – Various types – Industrial wastes – Municipal waste – Burning plants – Types of Co-generation processes. Principle of magneto Hydro Dynamic (MHD) power generation – Types.

10 Hours

Unit V

Miscellaneous Sources

Energy from Tides and Waves – Working principles of tidal power plants – Geothermal energy – Working principle of geothermal power plants – Principle of operation of solar ponds – Fuel cells

10 Hours

Total: 50 Hours

Textbook:

Rao. S and Parulekar, "Energy Technology – Non Conventional, Renewable and Conventional", Khanna Publishers, New Delhi, 2005

References:

1. Mukund R. Patel, "Wind and Solar Power Systems", CRC Press LLC, New York, 1999
2. Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 2005
3. Garg H.P. and Prakash J., "Solar Energy – Fundamentals & Applications", Tata McGraw Hill book Co, New Delhi, 2003

07G007 CREATIVITY AND INNOVATION
(Common to all branches)

3 0 0 3

Unit I
Creativity
Concept and history of creativity, need for creativity, creative environment, stages of creativity process, creativity and intelligence, creativity in various contexts, economic view of creativity, measuring creativity, fostering creativity, creative problem solving – brain storming and various techniques, lateral thinking.

10 Hours

Unit II
Innovation
Definition, creativity vis-à-vis innovation, conceptualizing innovation, types of innovation, sources of innovation, goals of innovation, process of technological innovation, diffusion of innovation, factors contributing to successful technological innovation, failure of innovations, innovation management, measures of innovation.

10 Hours
Unit III
Project Planning and Evaluation

Definition and purpose of project, collection of ideas, screening ideas, selection criteria for new projects, development of project plan, project evaluation – purpose, kinds of evaluation, stages of evaluation process, techniques of project evaluation, project analysis, benefits and risks of new projects.

10 Hours

Unit IV
Product Development and Evaluation
Research and new product development – process and types of new products, creative design, design of prototype – purpose, process, and types, model preparation, testing and quality evaluation; marketing research – purpose and process, types and methods; introducing new products, cost evaluation.

10 Hours

Unit V
Protection of Innovation
Intellectual property (IP), classes of IP – industrial property and copyrights; Intellectual Property Rights (IPR); Patents, patentability, patent acts, governing laws, history of patent laws and acts, patent administration; patenting process – patent application, patent search, prosecution, publication, examination, opposition, grant, renewal, patent rights; international code for patents, patents vis-à-vis economics.

10 Hours
Total : 50 Hours

Textbooks:

1. Tom Kelly, The Art of Innovation, Doubleday, Random House Inc. USA, 2001.
2. Managing Creativity and Innovation (Harvard Business Essentials), Harvard Business School, 2003.

References:

1. Brain Twiss, "Managing Technological Innovation", Pitman Publishing Ltd., 1992.
2. Harry B. Watton, "New Product Planning", Prentice Hall Inc., 1992.
3. Paul Birch and Brian Clegg, Business Creativity – A Guide for Managers, Kogan Page, London, 1995.
4. Leigh L. Thompson, Hoon-Seok Choi, Creativity and Innovation in Organizational Teams, Lawrence Erlbaum Associates, USA, 2006.
5. Paul E. Plsek, Creativity, Innovations and Quality, Irwin Professional, USA, 1997.
6. Alan G. Robinson, Sam Stern, Corporate Creativity: How Innovation and Improvement Actually Happen, Berrett-Koehler Publishers, USA, 1998.

07E708 POWER SYSTEMS LABORATORY

0 0 3 2

1. Formation of Bus Admittance matrix
2. Formation of Bus impedance matrix
3. Formation of Bus incidence matrix and loop incidence matrix
4. Formation of Branch path incidence matrix and Basic cutest matrix
5. Solution of Network equation
6. Study of Power House and Study of Indian Power Scenario
7. Power Flow Analysis - I : Solution of Power Flow and Related Problems Using Gauss-Seidel Method.
8. Power Flow Analysis II: Solution of Power Flow and Related Problems Using Newton-Raphson Method.
9. Power Flow Analysis II: Solution of Power Flow and Related Problems Using Fast-Decoupled Methods.
10. Short Circuit Analysis
11. Transient Stability Analysis of Multi machine Power Systems
12. Economic Dispatch in Power Systems

07E709 ELECTRICAL DRIVES & POWER QUALITY LABORATORY

0 0 3 2

1. CSI Fed IM Drive
2. VSI Fed IM Drive
3. Four Quadrant operation of Chopper Fed Drive
4. Current Commutated Chopper
5. Voltage Commutated Chopper
6. Three Phase Half and Fully Controlled Converter
7. Power Harmonic Analyzer with Three phase R,RL load
8. Simulation of single phase converter fed DC drive
9. Simulation of three phase converter fed DC Drive
10. Generation of Firing Pulses for Single phase Inverter and single phase converter with R load using ATMEL89C51
11. Generation of Firing Pulses for Single phase Inverter and single phase converter with R load using TMS320f2407/TMS320f2812

EMBEDDED SYSTEMS

(07E801 & 07N801)

3 0 0 3

Unit I

Introduction to Embedded Systems

Embedded System - Processor in the System - Other Hardware Units - Software Embedded into a System - Exemplary Embedded Systems - Embedded System-On-Chip (SOC) and in VLSI Circuit.

10 Hours

Unit II

Processor and Memory Organization

Structural Units in a Processor Selection for an Embedded System - Memory Devices - Memory Selection for an Embedded System - Allocation of Memory to Program Segments and Blocks and Memory Map of a System - Direct Memory Access - Interfacing Processor - Memories and I/O Devices.

10 Hours

Unit III

Devices and Buses for Device Network

I/O Devices - Timer and Counting Devices - Serial Communication Using the 'I2C, 'CAN' - Advanced I/O Buses between the Networked Multiple Devices - Host System or Computer Parallel Communication between the Networked I/O - Multiple Devices Using the ISA, PCI, PCI-X and Advanced Buses.

10 Hours

Unit IV

Device Drivers and Interrupts Servicing Mechanism

Device Drivers - Parallel Port Device Drivers in a System - Serial Port Device Drivers in a System - Device Drivers for Internal Programmable Timing Devices - Context and the Periods for Context-Switching - Deadline and Interrupt Latency.

10 Hours

Unit V

Embedded System Design Using Micro Controllers

Intel's series of micro-controllers - Internal architecture of 8051 - Instruction set - Instruction organization - Timing and hardware capabilities - Assembly language programs - Stack, subroutines, interrupts, interrupt vector, and interrupt service routines - Design case study using 8051, A/D converters & other peripherals devices.

10 Hours

Total 50 Hours

Textbook:

Rajkamal A, "Embedded Systems Architecture, Programming and Design", Tata McGraw Hill book Co, New Delhi, 2000

References:

1. David E Simon, "An Embedded Software Primer," Addison Wesley Publishing Co, New Delhi, 2001
2. Michael predko, Myke Predho, "PICmicro Micro controller Pocket Reference," McGraw Hill book Co, New Delhi, 2000
3. John B Peatman, "Design with PIC Micro controllers," Prentice Hall of India book Co, New Delhi, 1997
4. Muhammad Ali Mazidietal, "8051 Micro controller and Embedded System", Prentice Hall of India, book Co, New Delhi, 1999
5. Jonathan W.Valvano, "Embedded Microcomputer Systems, Real Time Interfacing," Brooks cole, 2004

07G004 PROFESSIONAL ETHICS

3 0 0 3

Unit I

Human Values

Morals, Values and Ethics – Integrity – Work Ethic – Service Learning – Civic Virtue – Respect for Others – Living Peacefully – Caring – Sharing – Honesty – Courage – Valuing Time – Co-operation – Commitment – Empathy – Self-Confidence – Character – Spirituality.

10 Hours

Unit II

Engineering Ethics

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral autonomy – Kohlberg's theory – Gilligan's theory – Consensus and controversy – Models of Professional Roles – Theories about right action – Self-interest – Customs and religion – Uses of ethical theories.

10 Hours

Unit III

Engineering as Social Experimentation

Engineering as experimentation – Engineers as responsible experimenters – Codes of ethics – A balanced outlook on law – The Challenger case study – Experimentations by case studies.

10 Hours

Unit IV

Safety, Responsibilities and Rights

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk – The Three Mile Island and Chernobyl case studies – Fundamental Rights, Responsibilities and Duties of Indian Citizens – Collegiality and loyalty – Respect for authority – Collective bargaining – Confidentiality – Conflicts of interest – Occupational crime – Professional rights – Employee rights – Discrimination

10 Hours

Unit V

Global Issues

Multinational corporations – Environmental ethics and Environmental Protection Act – Computer ethics – Weapons development – Engineers as managers – Consulting engineers – Engineers as expert witnesses and advisors – Moral leadership – Sample code of ethics like IETE, ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management.

10 Hours

Total: 50 Hours

Textbook:

Mike W. Matrin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw-Hill, 3rd edition, New Delhi, 2003.

References:

1. Charles D. Fleddermann, "Engineering Ethics", Pearson Education/ Prentice Hall, New Jersey, 2004 (Indian Reprint).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
3. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

07E001 INSULATION TECHNOLOGY

3 0 0 3

Unit I

Over Voltages in Electrical Power Systems

Causes of over voltages and its effect on power system – Lightning, switching surges and temporary over voltages

10 Hours

Unit II

Electrical Breakdown in Gases, Solids and Liquids

Gaseous breakdown in uniform and non-uniform fields – Corona discharges – Vacuum breakdown – Conduction and breakdown in pure and commercial liquids – Breakdown mechanisms in solid and composite dielectrics.

10 Hours

Unit III

Generation of High Voltages and High Currents. Generation of high dc, ac, impulse voltages and currents. tripping and control of impulse generators.

10 Hours

Unit IV

Measurement of High Voltages and High Currents. Measurement of high voltages and high currents – Digital techniques in high voltage measurement.

10 Hours

Unit V

High Voltage Testing & Insulation Coordination, High voltage testing of electrical power apparatus – Power frequency, impulse voltage and dc testing – International and indian standards – Insulation coordination.

10 Hours

Total: 50 Hours

Textbook:

Naidu M S and Kamaraju V, "High Voltage Engineering", Tata McGraw Hill book Co, New Delhi 3rd Edition, 2004

References:

1. Kuffel Eand Zaengl W S, "High Voltage Engineering Fundamentals", Pergamon press, Oxford, London, 1986
2. Kuffel E and Abdullah M, "High Voltage Engineering", Pergamon press, Oxford, 1970

07E002 SPECIAL ELECTRICAL MACHINES

3 0 0 3

Unit I

Synchronous Reluctance Motors

Constructional features – Types – Axial and radial air gap motors – Operating principle – Reluctance – Phasor diagram - Characteristics – Electronic controller Vernier motor- Applications.

10 Hours

Unit II

Stepping Motors

Constructional features – Principle of operation – Variable reluctance motor – Hybrid motor – Single and multi stack configurations – Theory of torque predictions – Linear and non-linear analysis – Characteristics – Power and Drive circuits.

10 Hours

Unit III

Switched Reluctance Motors

Constructional features – Principle of operation – Torque prediction – Power controllers – Non-linear analysis - Characteristics – Computer control- Applications

10 Hours

Unit IV

Permanent Magnet Machines

Permanent magnet materials and their characteristics-Principle of operation – Generator action –Motor action-EMF and torque equations – Reactance – Phasor diagram – Power controllers - Converter - Volt-ampere requirements – Torque speed characteristics.

10 Hours

Unit V

Permanent Magnet Brushless DC Motors

Principle of operation – Types – Magnetic circuit analysis – EMF and torque equations – Power controllers – Electronic Commutator – Motor characteristics and control.

10 Hours

Total: 50 Hours

Textbook:

Miller T J E, “Brushless Permanent Magnet and Reluctance Motor Drives”, Clarendon Press, Oxford, 1989

References:

1. Aearnley P P, “Stepping Motors – A Guide to Motor Theory and Practice”, Peter Perengrinus, London, 1982
2. Kenjo T, “Stepping Motors and Their Microprocessor Controls”, Clarendon Press London, 1984.
3. Kenjo T and Nagamori S, “Permanent Magnet and Brushless DC Motors”, Clarendon Press, London, 1988.

VIRTUAL INSTRUMENTATION

(07E003 & 07N003)

3 0 0 3

Unit I

Introduction

General functional description of a digital instrument – Block diagram of a Virtual Instrument – Physical quantities and analog interfaces – Hardware and software – User Interfaces – Advantages of Virtual Instruments over conventional instruments – Architecture of a Virtual Instrument and a its relation to the operating system.

10 Hours

Unit II

Software Overview

LabVIEW – Graphical user interfaces – Controls and indicators – 'G' programming – Labels and Text – Shape, size and color – Owned and free labels – Data type, Format, Precision and representation – Data types – Data flow programming – Editing – Debugging and Running a Virtual Instrument – Graphical programming palettes and tools – Front panel objects – Functions and libraries.

10 Hours

Unit III

Programming Structure

FOR Loops, WHILE Loops, CASE Structure, Formula nodes, Sequence structures – Arrays and Clusters – Array Operations – Bundle – Bundle/Unbundle by name, graphs and charts – String and file I/O – High level and Low level file I/O's – Attribute modes Local and Global variables.

10 Hours

Unit IV

Operating System And Hardware Aspects

PC architecture, Current trends Operating system requirements, Drivers – Interface buses – PCI bus – Interface cards – Specification – Analog and Digital interfaces – Power, Speed and timing considerations. Installing Hardware, Installing drivers – Configuring the hardware – Addressing the hardware in LabVIEW – Digital and Analog I/O function – Data Acquisition – Buffered I/O – Real time Data Acquisition.

10 Hours

Unit V

Labview Applications

IMAQ - Motion Control: General Applications – Feedback devices, Motor drives – Instrument connectivity – GPIB, Serial Communication – General, GPIB hardware & Software specifications – PX1 / PC1: Controller and Chassis Configuration and Installation.

10 Hours

Total: 50 Hours

Textbook:

Garry M Johnson, "Labview Graphical Programming", Tata McGraw Hill book Co, New Delhi, 2nd Edition, 1996

References:

1. Labview : Basics I & II Manual , National Instruments, Bangalore, 2005
2. Lisa K Wells, "Labview for Everyone", New Delhi, 1996

07E004 POWER SEMI-CONDUCTOR DEVICES

3 0 0 3

Unit I

Introduction

Power switching devices overview – Attributes of an ideal switch, application requirements, circuit symbols – Power handling capability – (SOA); Device selection strategy – On-state and switching losses – EMI due to switching – Power diodes – Types, forward and reverse characteristics, switching characteristics – Rating.

10 Hours

Unit II

Power Transistor

BJTs – Construction, static characteristics, switching characteristics- Negative temperature coefficient and secondary breakdown – Power Darlington - Thermal protection.

10 Hours

Unit III

Thyristor

Thyristors – Physical and electrical principle underlying operating mode – Two transistor analogy– concept of latching – Gate and switching characteristics –Converter grade and inverter grade and other types; series and parallel operation –Comparison of BJT and Thyristor – Steady state and dynamic models of BJT and Thyristor-thermal protection - Mounting types.

10 Hours

Unit IV

Voltage Controlled Devices

Power MOSFETs and IGBTs – Principle of voltage controlled devices, construction, types, static and switching characteristics – Steady state and dynamic models of MOSFET and IGBTs; Basics of GTO, MCT, FCT, RCT and IGCT.

10 Hours

Unit V

Firing and Protecting Circuits

Necessity of isolation – Pulse transformer – Opto-coupler; Gate drive circuit for SCR,MOSFET, IGBTs and base driving for power BJT – Overvoltage, over current and gate protections, Design of snubbers.

10 Hours

Total: 50 Hours

Textbook:

Timothy L.Skvarenina, “The power electronics handbook”, CRC press, New Delhi, 2005

References:

1. Rashid M.H., “Power Electronics circuits, Devices and Applications”, Prentice Hall of India, New Delhi, 3rd Edition, 2004
2. Baliga, B. Jayant, “Fundamentals of Power Semiconductor Devices” springer, 2008
3. Bimal K. Bose, “Modern Power electronics and AC drives”, Pearson Education, Asia Ltd, New Delhi 2003
4. Singh M D and Khanchandani K B, “Power Electronics”, Tata McGraw Hill book Co,New Delhi 2001
5. Ned Mohan, Undeland and Robins, “Power Electronics – Concepts, applications and design”, John Wiley and sons, Singapore, 2000

07E0A1 PROCESS CONTROL INSTRUMENTATION

4 0 04

Unit I

Introduction

Need for process control – mathematical model of first – order level, pressure and thermal processes – higher order process – interacting and non-interacting systems – continuous and batch process – self-regulation – servo and regulator operation. **10**

Hours

Unit II

Controller Characteristics

Basic control actions - characteristics of On-Off, proportional, single speed floating, integral and derivative control modes - composite control modes – P/I, P/D and P/I/D control modes - response of controller for different types of test inputs - integral windup - automanual transfer – Electronic controllers to realize various control actions - selection of control mode for different processes - typical control schemes for level, flow, pressure and temperature. Simulation study of control modes in simple systems using.

10

Hours

Unit III

Tuning of Controllers

Optimum controller settings - Evaluation criteria-IAE, ISE and ITAE - ¼ decay ratio – Tuning of controllers by process reaction curve method - damped oscillation method - Ziegler-Nichol's tuning – Cohencoon method-Feed forward control - ratio control - cascaded control - averaging control - multivariable control – Selective control systems – split range control – Adaptive and inferential control. Simulation study of controller-tuning using SIMULINK.

10 Hours

Unit IV

Final Control Element

I/P and P/I converters - pneumatic and electric actuators - valve positioner - control valve - characteristics of control valves - valve body - globe, butterfly, diaphargm, ball valves - control valve sizing - cavitation, flashing in control valves. Response of pneumatic transmission lines and valves- Selection of control valves.

10

Hours

Unit V

Selected Unit Operations

Distillation column - control of top and bottom product compositions - reflux ratio - control of chemical reactor - control of heat exchanger. Steam boiler - drum level control and combustion control. Piping and Instrumentation Diagram of control loops.

10 Hours

Total: 50

Hours

Textbook:

1. Stephanopoulos, G., “Chemical Process Control”, Prentice Hall of India, New Delhi, 1990

References:

1. Eckman. D.P., “Automatic Process Control”, Wiley Eastern Ltd., New Delhi, 4th Edition, 1993.
2. Pollard A., “Process Control”, Heinemann educational books, London, 1971
3. Harriott. P., “Process Control”, Tata McGraw-Hill Publishing Co., New Delhi, 1991

07E005 POWER SYSTEM OPERATION AND CONTROL

3 0 0 3

Unit I

Introduction

System load variation: System load characteristics, load curves – Load-duration curve, load factor and diversity factor. Reserve requirements: Installed reserves, spinning reserves, cold reserves and hot reserves. Overview of system operation: Load forecasting, unit commitment and load dispatching. Overview of system control – Need for voltage and frequency regulation in power system – Plant level and System level controls

10 Hours

Unit II

Real Power - Frequency Control

Fundamentals of speed governing mechanism and modeling: Speed-load characteristics – Load sharing between two synchronous machines in parallel; concept of control area, LFC control of a single-area system: Static and dynamic analysis of uncontrolled and controlled cases, Economic dispatch control. Multi-area systems: Two-area system modeling; static analysis, uncontrolled case; tie line with frequency bias control of two-area system derivation, state variable model.

10 Hours

Unit III

Reactive Power–Voltage Control

Typical excitation system, modeling, static and dynamic analysis, stability compensation; generation and absorption of reactive power: Relation between voltage, power and reactive power at a node; method of voltage control: Injection of reactive power. Tap-changing transformer, tap setting of OLTC transformer, static VAR system, System level control using generator voltage magnitude setting and MVAR injection of switched capacitors to maintain acceptable voltage profile and to minimize transmission loss.

10 Hours

Unit IV

Unit Commitment

Statement of Unit Commitment (UC) problem; constraints in UC: spinning reserve, thermal unit constraints, hydro constraints, fuel constraints and other constraints; UC solution methods: Priority-list methods, forward dynamic programming approach, numerical problems only in priority-list method using full-load average production cost.

10 Hours

Unit V

Computer Control Of Power Systems

Energy control centre: Functions – Monitoring, data acquisition and control. System hardware configuration – SCADA and EMS functions: Network topology determination, state estimation, security analysis and control. Various operating states: Normal, alert, emergency, in extremis and restorative. State transition diagram showing various state transitions and control strategies.

10 Hours

Total: 50 Hours

Textbook:

Olle. I. Elgerd, "Electric Energy Systems Theory", Tata McGraw Hill Publishing Company Ltd, New Delhi, Second Edition, 2003

References:

1. Allen.J.Wood and Bruce F.Wollenberg "Power Generation, Operation and Control", John Wiley & Sons Inc., New York 2003
2. Kundur P, "Power System Stability and Control", McGraw Hill Publishing Co, New York, 1994
3. Kothari D P and Nagrath I J, "Modern Power System Analysis", Tata McGraw Hill Publishing Co, New Delhi, 3rd Edition, 2003
4. Grigsby L L, "The Electric Power Engineering Hand Book", CRC Press & IEEE Press, 2001

07E006 POWER SYSTEM STABILITY

3 0 0 3

Unit I

Introduction

Concept of power system stability – Steady state stability – Transient stability – Importance of stability s tudies.

10 Hours

Unit II

Steady State Stability

Two machine system and Clarke diagram – Multi machine systems and stability criteria – Method of small oscillations – Voltage regulators and their effect on stability.

10 Hours

Unit III

Transient Stability

Single and two machines systems – Swing equation and its solution by modified Euler's and fourth order Runge-Kutta method – Equal area criterion and its application – Combining machines – Stability of multi machine system.

10 Hours

Unit IV

Stability Improvement

Factors affecting stability and methods of improving stability – Effect of excitation and speed governing system on transient stability – Effect of inertia and damping.

10 Hours

Unit V

Digital Simulation

Application of analog computers for stability studies – Digital simulation methods for transient stability studies.

10 Hours

Total: 50 Hours

Textbook:

E.W. Kimbark, "Power System Stability", Vol. I & III, John Wiley, 1950.

References:

1. Prabha Kundur, "Power System Stability and Control", McGraw Hill, 1993.
2. Olle. I. Elgerd, "Electric Energy Systems Theory – An Introduction", Tata McGraw Hill Publishing Company Ltd, New Delhi, Second Edition, 2003.
3. Nagrath I.J. and Kothari D.P., "Modern Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi, 1990.
4. Pai M.A., "Computer Techniques in Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi, 2003.

07E007 POWER ELECTRONIC INTERFACES FOR RENEWABLE ENERGY SOURCES OF POWER GENERATION

3 0 0 3

Unit I

Introduction

Trends in energy consumption – World and Indian energy scenario – Energy sources and their availability, Economics and Efficiency – Energy consumption pattern and growth rate in India – Need to develop new energy technologies.

10 Hours

Unit II

Solar Energy Conversion Systems

Solar radiation and measurements- solar cells – Panels and their characteristics – Influence of insulation and temperature – PV arrays – Electrical storage with batteries – Solar availability in India – Switching devices for solar energy conversion – Maximum power point tracking – DC power conditioning converters – maximum power point tracking algorithms – AC power conditioners – Line commutated inverters- Synchronized operation with grid supply- Harmonic problem – Applications – Water pumping – Street lighting – Analysis of PV systems.

10 Hours

Unit III

Wind Energy Conversion Systems

Basic principle of wind energy conversion – Nature of wind – Power and energy from the wind - Components of wind turbine generator (WTG) – Types of WTG – Squirrel cage and double output induction generators – Field excited and permanent magnet synchronous generators - Fixed and variable speed drives – System performance.

10 Hours

Unit IV

Grid Connected Wind Energy Conversion Systems

Grid connectors – Wind farm and its accessories – Grid related problems – Generator control – Performance improvements – Different schemes – AC voltage controllers – Harmonics and power factor improvement.

10 Hours

Unit V

Stand-Alone Power Supply Systems

Self excited induction generator for isolated wind power generation – Theory of self excitation – Capacitance requirements – Power conditioning schemes – Controllable DC power from SEIGs - Solar – PV – Hybrid systems – Selection of power conversion ratio – Optimization of system components – Storage.

10 Hours

Total: 50 Hours

Textbook:

Rao. S and Parulekar, "Energy Technology – Non Conventional, Renewable and Conventional", Khanna Publishers, New Delhi, 1999

References:

1. Mukund R. Patel, "Wind and Solar Power Systems", CRC Press LLC, New York, 1999
2. Rai. G.D., "Non Conventional Energy Sources", Khanna Publishers, New Delhi, 1993
3. Garg H.P. and Prakash J., "Solar Energy – Fundamentals & Applications", Tata McGraw Hill book Co, New Delhi, 1997
4. Sukhatme S.P., "Solar Energy; (Principles of thermal collection and storage)", Tata McGraw Hill book Co, New Delhi, 1998

07E008 POWER QUALITY MANAGEMENT

3 0 0 3

Unit I

Introduction

Definition of power quality – Power quality, Voltage quality – Power quality issues: Short duration voltage variations, Long duration voltage variations, Transients, Waveform distortion, Voltage imbalance, Voltage fluctuation and Power frequency variations – Sources and Effects of power quality problems – Power quality terms – Power quality and Electro Magnetic Compatibility (EMC) standards.

10 Hours

Unit II

Short Interruptions

Introduction – Origin of short interruptions: Voltage magnitude events due to reclosing, Voltage during the interruption – Monitoring of short interruptions – End user issues: Influence on Induction motors, Synchronous motors, Adjustable speed drives, Electronic equipment – Utility system fault clearing issues – Single phase tripping: Voltage during fault and post fault period, Current during fault period – Prediction of short Interruptions.

10 Hours

Unit III

Long Interruptions

Definition – Terminology: Failure, Outage, Interruption – Origin of interruptions – Causes of long interruptions – Principles of regulating the voltage – Voltage regulating devices, Applications: Utility side, End-User side – Limits for the interruption frequency, Interruption duration – Reliability evaluation –Cost of interruptions.

10 Hours

Unit IV

Waveform Distortion

Introduction – Definitions and terms – Harmonics, Harmonics indices, Inter harmonics, Notching – Voltage vs Current distortion – Harmonics vs Transients – Sources and effects of harmonic distortion – System response characteristics – Principles of controlling harmonics – Standards and limitation – Mitigation and control techniques.

10 Hours

Unit V

Power Quality Solutions

Introduction – Power quality monitoring: Need for power quality monitoring, evolution of power quality monitoring, Deregulation effect on power quality monitoring – Brief introduction to power quality measurement equipments and power conditioning equipment – Planning, conducting and analyzing power quality survey.

10 Hours

Total: 50 Hours

Textbook:

Roger C. Dugan, Mark F. McGranaghan and H.Wayne Beaty, "Electrical Power Systems Quality", McGraw-Hill book Co, NewYork, 2nd Edition, 2002

References:

1. Barry W.Kennedy, "Power Quality Primer", McGraw-Hill book Co, New York, 2000.
2. Sankaran.C, "Power Quality", CRC Press, Washington, D.C., 2002
3. Math H.J.Bollen, "Understanding Power Quality Problems: Voltage Sags and Interruptions", IEEE Press, New York, 2000
4. Arriliaga.J, Watson.N.R and Chen.S, "Power System Quality Assessment", John Wiley & Sons Ltd., New York, 2000

07E009 DIGITAL CONTROL SYSTEM

3 0 0 3

Unit I

Digital Control System

Digital control system – Sample and hold – Analog to digital converter – Digital to analog converter – Quantizing and quantizing error – Sampling process – Frequency response of zero order hold – First order hold – PI, PD Controllers – Digital PID controllers **10 Hours**

Unit II

Response of Discrete System

Pulse transfer function of cascaded elements, closed loop systems – Characteristic equation – Relationship between s-plane and z-plane poles – Unit step response of digital control system – Stability of discrete system – jury's stability test – Root locus technique for digital system.

10 Hours

Unit III

State Space Representation

State variable formulation of discrete system – Decomposition of discrete transfer function – Direct decomposition – Cascade decomposition and parallel decomposition – Solution of state equation by recursive method – state transition matrix and its properties

10 Hours

Unit IV

Solution of State Equation

Solution of discrete time state equation – Evaluation of state transition matrix – Transfer function matrix – Discretisation of continuous time system

10 Hours

Unit V

Compensation Techniques

Compensation by continuous network – Compensation by digital computer – Frequency domain technique of designing D(z)

10 Hours

Total: 50 Hours

Textbook:

Gopal M, "Digital Control and State Variable Methods" Tata McGraw Hill Publishing Company Ltd, New Delhi, 2003.

References:

1. Ogata K, "Discrete time control system" Pearson Education Asia, New Delhi 1995.
2. Nagarath I J and Gopal M, "Control System Engineering" New age Internatioal P.Ltd, New Delhi 2007.

07E010 COMPUTER AIDED ANALYSIS & DESIGN OF SYSTEMS

(common to 07N011)

3 0 0 3

Unit I

Introduction

Conventional design procedures – Limitations – Need for field analysis based design.

10 Hours

Unit II

Mathematical Formulation of Field Problems

Electromagnetic Field Equations – Magnetic Vector/Scalar potential – Electrical vector /Scalar potential – Stored energy in field problems – Inductance- Development of torque/force- Laplace and Poisson's Equations – Energy functional - Principle of energy conversion.

10 Hours

Unit III

CAD Packages

Elements of a CAD System – Pre-processing – Modelling – Meshing – Material properties- Boundary Conditions – Setting up solution – Post processing.

10 Hours

Unit IV

Design Applications

Computer Aided design of Induction Motor: Squirrel cage motors – Slip ring motors - Dc Motor: series and shunt motors – Synchronous motors: cylindrical and wound rotors types – Insulators – Power transformer – CTs – PTs

10 Hours

Unit V

System Design and Analysis Using MATLab :

Component of systems – Continuous and discrete systems – Models of systems-modeling approach, steady state and transient analysis of systems subjected to different environment conditions.

10 Hours

Total: 50 Hours

Textbook:

Ramamoorthy M., "Computer Aided Design of Electrical Equipment", Affiliated East-west Press Pvt Ltd, New Delhi 1987

References:

1. Hoole S R H, "Computer Aided, Analysis and Design of Electromagnetic Devices", El Sevier Publishing Co, New York, 1989
2. Lowther D A and Silvester P P, "Computer Aided Design in Magnetics", Springer verlag Publishing Co, New York, 1986
3. Sawhny A K, "A course in Electrical Machine Design" Khanna Puplications, New Delhi 2007

07E011 COMPUTER GRAPHICS

3 0 0 3

Unit I

Introduction & Overview of Graphics Systems

Introduction - Computer Aided Design – Presentation Graphics – Computer Art – Entertainment – Education and Training – Visualization – Image processing – Graphical User Interface – Video display Devices – Raster Scan Systems – Random Scan Systems – Graphics monitors and workstations – Input Devices – Hard copy devices – Graphics software

10 Hours

Unit II

Output Primitives & Attributes of Output Primitives

Points and Lines – Line Drawing Algorithms – Loading the frame buffer – Line function – Circle generating algorithms – Ellipse generating algorithms – Filled area primitives – Line attributes – Curve Attributes – Color and Grayscale Levels – Area-fill attributes – Character attributes – Inquiry functions – Antialiasing

10 Hours

Unit III

Two Dimensional Geometric Transformations

Basic transformations – Matrix representations – Composite transformations – other transformations - Affine transformations – Transformation functions – Raster Methods for transformations – Viewing Pipeline – Window–to-Viewport coordinate transformation – Two Dimensional viewing functions – Clipping operations – Point clipping – Line Clipping – Polygon Clipping – Curve Clipping – Text Clipping – Exterior Clipping.

10 Hours

Unit IV

Graphical User Interfaces & Interactive Input Methods

The user Dialogue – Input of Graphical Data – Input functions – Interactive picture construction techniques – Virtual reality environments – Three dimensional object representation: polygon surfaces-curved line and surfaces – Quadric surface-super Quadrics - Blobby objects - Bezier curves and surfaces - Constructive solid geometry methods – Octrees - BSP trees.

10 Hours

Unit V

Three Dimensional Concepts & Applications

Three dimensional geometric and modeling transformations - Visible-surface Detection methods-Polygon rendering methods – color models and color applications – Computer animation.

10 Hours

Total 50 Hours

Textbook:

Donald Hearn and Pauline Baker, “Computr Graphics C version”, Pearson Education, 2003.

Reference

Foley, Vandam, Feiner, Huges, “Computer Graphics: Principles & Practice”, Pearson Education 2003.

07E012 EVOLUTIONARY COMPUTATION

3 0 0 3

Unit I

Introduction to Evolutionary Computation

Biological and Artificial evolution – Evolutionary computation' and AI different historical branches of EC, e.g., GAs, EP, ES, GP, etc. – A simple evolutionary algorithm. Representation techniques, The importance of representation – Coding methods – Binary, gray, binary Vs gray, integer, real valued coding, structured coding – Representation of combinatorial problems – Adaptive representations.

10 Hours

Unit II

Selection Schemes

Fitness proportional selection and fitness scaling – Ranking, including linear, power, exponential and other ranking methods – Tournament selection – Selection pressure and its impact on evolutionary search.

10 Hours

Unit III

Search Operators

Recombination/Crossover for strings (e.g., binary strings) – One-point. multi-point, and uniform crossover operators – Mutation for strings - bit-flipping – Recombination / crossover and mutation rates – Recombination for real-valued representations – Discrete and intermediate recombination – Mutation for real-valued representations – Gaussian and Cauchy mutations. Self-adaptive mutations – Mixing different search operators - – An anomaly of self-adaptive mutations.

10 Hours

Unit IV

Theoretical Analysis Of Evolutioary Algorithms

Schema theorems – Co-evolution – Cooperative co-evolution, Competitive co-evolution – Niching and speciation – Fitness sharing – Crowding and mating restriction – Convergence of EAS

10 Hours

Unit V

Applications And Additional Features Of Eas

Evolutionary algorithms for traveling salesman problem, scheduling problem. inventory problem – Hybrid evolutionary and local search algorithms – Constraint handling – Penalty methods, repair methods – EAS for multi-objective problems – Weighted objectives, pareto optimality

10 Hours

Total: 50

Hours

Textbook:

Baeck T, Fogel.O. Band Michalewicz .Z., "Handbook on Evolutionary Computation", IOP Press, New Delhi, 1997

References:

1. Michalewicz Z, "Genetic Algorithms + Data Structures = Evolution Programs", Third Edition, Springer-Verlag, Berlin, 1996
2. Banzhaf W, Nordin P, Keller R E and Frank D Francone, "Genetic Programming: An Introduction", Morgan Kaufmann, 1999
3. Yao X, "Evolutionary Computation: Theory and Applications", World Scientific Pub Co., Singapore, 1999
4. Goldberg D E, "Genetic Algorithms in Search, Optimisation and Machine Learning", Addison-Wesley, 1989

07E019VALUE ENGINEERING

4 0 04

Unit I

Introduction to value engineering & value analysis

Historical perspective of Value Engineering ; Aims and objectives of Value Engineering ; Concept of Value; Value Engineering concerned with Economic Value ; VE Job plan ; Problem identification and selection of projects. **10 Hours**

Unit II

Functional Analysis

Function-Cost-Worth analysis: Function Analysis System Technique (FAST); Review of principles of engineering economics. **10 Hours**

Unit III

Meaning of Creativity

Creativity Techniques and Innovation; Idea judgment and evaluation- Six thinking, SIS

10 Hours

Unit IV

Human Aspects in Value Engineering

Team building; Life cycle costing; Managing VE Study; VE Report writing; Presentation Skill -Individual and Team Presentations; Implementation and follow-up. **10 Hours**

Unit V

Benefits of Value Engineering

VE Case studies in the Industries like Manufacturing; Construction; Health Care; Process; Information Technology. **10 Hours**

Text Books:

1. Anil Kumar Mukhopadhyaya, "Value Engineering –Concepts, Techniques and Applications", Response Books, A Division of SAGE Publications, New Delhi / Thousand Oaks / London, 2003.
2. Midge Arthur E, "Value Engineering -A Systematic Approach", McGraw Hill Book Co., New York, 2000.
3. Zimmerman, "Value Engineering - A Practical Approach", CBS Publishers & Distributors, New Delhi, 2000.

References:

1. Anil Kumar Mukhopadhyaya, "Value Engineering Mastermind – From Concepts to Certification, Response". Business Books from SAGE, Los Angeles / London / New Delhi / Singapore / Washington DC, 2009.
2. Miles R D, "Techniques of Value analysis & Engineering", McGraw Hill, 2000.

07E013 BIO-MEDICAL INSTRUMENTATION

(07E013 & 07N701)

3 0 0 3

Unit I

Human Physiology, Bio Potential Electrodes and Transducers

Brief review of human physiology and anatomy – Cell and their structures – Electrical mechanical and chemical activities – Action and resting potential – Different types of electrodes – Sensors used in biomedicine – Selection criteria for transducers and electrodes – Necessity for low noise pre- amplifiers – Difference amplifiers – Chopper amplifiers – Electrical safety – Grounding and isolation.

10 Hours

Unit II

Electro – Physiological and Blood Flow Measurement

ECG – EEG – EMG – ERG – Lead system and recording methods – Typical waveforms –Electromagnetic and Ultrasonic Blood flow meters.

10 Hours

Unit III

Non – Electrical Parameter Measurement

Measurement of blood pressure – Blood flow cardiac output – Cardiac rate – Heart sound – Measurement of gas volume – Flow rate of CO_2 and O_2 in exhaust air – pH of blood – ESR and GSR measurements

10 Hours

Unit IV

Medical Imaging Parameter Measurements and Blood Cell Counting

X- RAY machine – Computer tomography – Magnetic resonance imaging system – Ultra sonography – Endoscopy – Bio-telemetry – Manual and automatic counting of RBC, WBC and Platelets.

10 Hours

Unit V

Assisting and Therapeutic Devices

Cardiac pacemakers – Defibrillators ventilators – Muscle stimulators – Diathermy – Introduction to artificial kidney – Artificial heart – Heart lung machine – Limb prosthetics – Orthotics – Elements of audio and visual aids. **10 Hours**

Total 50 Hours

Textbook:

Leslie Cromwell, "Biomedical Instrumentation and measurement", Prentice Hall of India, New Delhi, 1997

References:

1. Khandpur R.S., "Biomedical Instrumentation and Measurements", Tata McGraw-Hill book Co, New Delhi 1997
2. Webster J.G., "Medical Instrumentation: Application and Design", John Wiley and Sons,New York, 3rd Edition, 1999
3. Well G, "Biomedical Instrumentation and Measurements", Prentice Hall of India, New Delhi, 1980
4. Wise D. L., "Applied Bio- sensors", Butterworth Press, New york 1989.
5. Jackson and Webster, "Medicine and Clinical Engineering", Prentice Hall of India Ltd, New Delhi, 1979

07E014 BIO-MEDICAL SIGNAL PROCESSING

(07E014 & 07N018)

3 0 0 3

Unit I

Signals and Systems Basics

Essentials of continuous time signals and systems – convolutions – Fourier transforms – Systems transfer functions – Sampling and Quantization – Discrete time signals and systems – Frequency analysis of discrete systems – Discrete transforms – Examples of physiological signals and systems including feedback systems.

10 Hours

Unit II

Bio – Electric Potentials

Genesis and significance of bio – electric potentials – ECG, EEG, EMG and their monitoring and measurement – Spectral analysis – Digital and analog filter.

10 Hours

Unit III

Correlation and Estimation Techniques

ECG, Pre-processing – Waveform recognition – Morphological studies and rhythm analysis – Automated diagnosis on decision theory – ECG compression – Evoked potential estimation.

10 Hours

Unit IV

ECG and EEG Signal Processing

ECG – Evoked responses – Averaging Techniques – Pattern recognition of alpha, beta, theta, and delta waves in ECG - EEG - Analysis of EEG – Sleeping stages – Epilepsy detection.

10 Hours

Unit V

EMG Signal Processing

EMG – Motor potentials – Stimulation pulse characteristics – Wave pattern studies – Biofeedback – Psycho – Neuro immunology – Motor nerves – Signal processing – Neuro muscular delay.

10 Hours

Total 50 Hours

Textbook:

Taub H & Schilling D, “Digital Integrated Electronics”, McGraw Hill book Co, New York 1997.

References:

1. Devasahayam S R, “Biomedical signal processing”, Prentice Hall India, New Delhi, 2001
2. Chelling R E and Kithey R I, “Bio medical signal processing in IV parts, medical & biological engineering and computing”, 1990-1991
3. Oppenheim A V, Willsky A S & Narvals H S, “Signals and Systems”, Prentice Hall India, New Delhi, 1997
4. Gabel R.A. and Robert R.A, “Signals and linear systems”, John Wiley and sons, New York, 1987
5. Chen C T, “Systems and signal analysis”, Saunder’s college Publications, New Delhi 1996

07E015 ROBOTICS AND AUTOMATION

(07E015 & 07N013)

3 0 0 3

Unit I

Basic Concepts

Definition and origin of robotics – Different types of robotics – Various generation of robots – Degrees of freedom – Asimov's laws of robotics – Dynamic stabilization of robots.

10 Hours

Unit II

Power Sources and Sensors

Hydraulic, pneumatic and electric drives – Determination of HP of motor and gearing ratio – Variable speed arrangements – Path determination – Micro machines in robotics – Machine vision – Ranging – Laser – Acoustic – Magnetic, fiber optic and tactile sensors.

10 Hours

Unit III

Manipulatros, Actuators And Grippers

Construction of manipulators – Manipulator dynamics and force control – Electronic and pneumatic manipulator control circuits – End effectors – Û various types of grippers – Design considerations.

10 Hours

Unit IV

Kinematics And Path Planning

Solution of inverse kinematics problem – Multiple solution jacobian work envelope – Hill climbing techniques – Robot programming languages.

10 Hours

Unit V

Case Studies

Multiple robots – Machine interface – Robots in manufacturing and not-manufacturing application – Robot cell design – Selection of a robot.

10 Hours

Total 10 Hours

Textbook:

Mikell P. Weiss G.M., Nagel R.N., Odraj N.G.,"Industrial Robotics", McGraw Hill Singapore, 1996

References:

1. Ghosh, "Control in Robotics and Automation: Sensor Based Integration", Allied Publishers, Chennai, 1998
2. Deb.S.R., "Robotics technology and flexible Automation", John Wiley, USA 1992
3. Asfahl C.R., "Robots and manufacturing Automation", John Wiley, USA 1992
4. Klafter R.D., Chimielewski T.A., Negin M., "Robotic Engineering – An integrated approach", Prentice Hall of India, New Delhi, 1994
5. Mc Kerrow P.J. "Introduction to Robotics", Addison Wesley, USA, 1991
6. Issac Asimov I Robot, Ballantine Books, New York, 1986

10E0A3 SWITCHED MODE POWER CONVERTERS

4 0 0 4

Unit I

Converter Topologies

Buck, Boost, Buck – Boost SMPS Topologies. Basic Operation – Waveforms – modes of operation – switching stresses – switching and conduction losses – optimum switching frequency – practical voltage, current and power limits – design relations – voltage mode control principles- Data sheets. **10 Hours**

Unit II

Carrier Modulation

Switch-Mode dc-ac Inverters - Basic Concepts - Single Phase Inverters - Push Pull - Half Bridge and Full Bridge Square Inverters - Blanking Time - Single Pulse Modulation of Single Phase Square Wave Inverters - Multi pulse modulation - PWM Principles - Sinusoidal Pulse Width Modulation in Single Phase Inverters - Choice of carrier frequency in SPWM - Bipolar and Unipolar Switching in SPWM.

10 Hours

Unit III

Current Control Schemes

Current Regulated Inverter - Current Regulated PWM Voltage Source Inverters - Methods of Current Control - Hysteresis Control - Variable Band Hysteresis Control - Fixed Switching Frequency Current Control Methods - Switching Frequency Vs accuracy of Current Regulation - Areas of application of Current Regulated VSI.

10 Hours

Unit IV

Closed Loop Control

Switched Mode Rectifier - Operation of Single/Three Phase Bridges in Rectifier Mode - Control Principles - Control of the DC Side Voltage - Voltage Control Loop - The inner Current Control Loop.

10 Hours

Unit V

Power Factor Control

Shunt Reactive Power Compensators - Switched Capacitors - Static Reactor Compensators based on thyristor - Static Reactive VAr Generators using PWM Current Regulated VSIs - Principles - Control Strategies - Series Compensation by PWM-VSI based Voltage Injection Scheme - Principles - Control Strategies. **10 Hours**

Total: 50 Hours

Textbooks:

1. Apraham I Pressman:Switching Power Supply Design. McGraw Hill Publishing Company.
2. Daniel M Mitchell : DC – DC Switching Regulator Analysis. Mc Graw Hill publishing Company
3. Ned Mohan et.al: Power Electronics. John Wiley and Sons.

References:

1. Otmar Kilgenstein : Switched Mode Powe Supplies in practice. John Wiley and Sons.
2. Keith H Billings: Handbook of Switched Moder Power Supplies. McGraw Hill Publishing Conpany.
3. Mark J Nave: Power Line Filter Design for Switched – Mode Power Supplies, Van Nostrand Reinhold, New York.

07E016 DIGITAL IMAGE PROCESSING

(07E016 & 07N017)

3 0 0 3

Unit I

Digital Image Fundamentals

Elements of a Digital Image Processing System – Structure of the human eye – Image formation and contrast sensitivity – Sampling and Quantization – Neighbors of a pixel – Distance measures – Photographic film structure and exposure – Linear scanner – Video camera – Image processing applications.

10 Hours

Unit II

Image Transforms

Introduction to Fourier Transform – DFT – Properties of two dimensional FT – Separability, Translation, Periodicity, Rotation, Average value – FFT Algorithm – Walish Transform – Hadamard transform – Discrete Cosine Transform.

10 Hours

Unit III

Image Enhancement

Definition – Spatial Domain Methods – Frequency Domain methods – Histogram modification Techniques – Neighborhood averaging – Media filtering – Low Pass Filtering – Averaging of Multiple Images – Image shapering by differentiation and high pass filtering.

10 Hours

Unit IV

Image Restoration

Definition **–** Degradation model – Discrete formulation – Circulant matrices – Block Circulant matrices – Effect of diagnolization of circulant matrices – Unconstrained and constrained restorations – Inverse Filtering – Wiener Filter – Restoration in Spatial Domain.

10 Hours

Unit V

Image Encoding

Objective and subjective fidelity criteria – Basic encoding process – Mapping – Quantizer – Coder – Differential encoding – Runlength encoding – Image encoding relative to fidelity criterion – Differential Pulse Code Modulation.

10 Hours

Total: 50 Hours

Textbook:

Rafael C Gonzalez and Paul Wintz, “Digital Image Processing”, Pearson Education New Delhi 2002

References:

1. Rafael C Gonzalez and Richard E.Woods, “Digital Image Processing”, using Matlab Pearson Education New Delhi 2004
2. Anil K Jain, “Fundamentals of Digital Image Processing”, PHI / Pearson Education New Delhi 2003
3. Pratt, “Digital Image Processing”, John Wiley and Sons. USA 2000.

07E017 ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

(07E017 & 07N009)

3 0 0 3

Unit I

Intel 8085

8085 Microprocessor Architecture, Instruction format - addressing modes-instruction set of 8085 CPU - Instruction cycle-timing diagrams-different machine cycles-fetch and execute operations-estimation of execution time-estimation of execution time. Assembly format of 8085-assembly directions-multiple precision arithmetic operations-binary to BCD and BCD to binary code conversion – ALU programming using look up table – stack and subroutines.

10 Hours

Unit II

Advanced Intel Microprocessors

Architecture, Salient features, Addressing Modes, Interrupts and Pin Details of 80286, 80386, 80486, Pentium-II, Pentium-III, Pentium Pro

10 Hours

Unit III

Peripherals and Their Interfacing

Memory Interfacing, Static RAM, Dynamic RAM Interfacing, Interfacing I/O Ports, PIO 8255, Stepper Motor Interfacing- Programmable Interval Timer 8253- Programmable Interrupt Controller 8259A , Keyboard and Display Interfacing 8279- Programmable Communication Interface USART 8251- DMA Controller 8257, CRT Controller 8275.

10 Hours

Unit IV

Micro Controller 8051

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

10 Hours

Unit V

Micro Controller Programming & Applications

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

10 Hours

Total: 50 Hours

Textbook:

Gaonkar R S, "Microprocessor Architecture Programming and Application", Wiley Eastern Ltd., New Delhi, 1995

References:

1. Muhammad Ali Mazidi & Janice Gilli Mazidi, "The 8051 Micro Controller and Embedded Systems", Pearson Education Asia Ltd, 5th Edition , 2003
2. William Kleitz, 'Microprocessor and Micro Controller Fundamental of 8085 and 8051 Hardware and Software', Pearson Education Asia Ltd, New Delhi 1998
3. Mohamed Rafiquzzaman ,"Microprocessors and Microcomputer Based system design", Universal Bookstall, Bangalore 2002
4. K. Ray and K. M. Bhurchandi, "Advanced Microprocessors and Peripherals-Architecture, Programming and Interfacing", Tata McGraw Hill Publishing Company Ltd , 2000
5. Kenneth Hint, and Daniel Tabak, "Micro controllers, Architecture, Implementation and Programming", McGraw Hill International book Co, New York, 1992
6. Dougles V.Hall, "Microprocessors and Intef-Programming and Hardware",Tata McGraw Hill book Co, New Delhi 2002.

07E018 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

3 0 0 3

Unit I

Introduction

Introduction to AI: Intelligent agents – Perception – Natural language processing – Problems solving agents – Searching for solutions: Un informed search strategies – Informed search strategies.

10 Hours

Unit II

Knowledge and Reasoning

Adversarial search – Optimal and imperfect decisions – Alpha, Beta pruning – Logical agents: Propositional logic – First order logic – Syntax and semantics – Using first order logic – Inference in first order logic**.**

10 Hours

Unit III

Uncertain Knowledge and Reasoning

Uncertainty – Acting under uncertainty – Basic probability notation – Axioms of probability – Baye's rule – Probabilistic reasoning – Making simple decisions.

10 Hours

Unit IV

Planning and Learning

Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – Reinforcement learning – Passive and active.

10 Hours

Unit V

Expert Systems

Definition – Features of an expert system – Organization – Characteristics – Prospector – Knowledge Representation in expert systems – Expert system tools – MYCIN – EMYCIN.

10 Hours

Total: 50 Hours

Textbook:

Stuart Russel and Peter Norvig, "Artificial Intelligence - A Modern Approach", Pearson Education Asia Ltd, New Delhi 2nd Edition 2003

References:

1. Donald A.Waterman, "A Guide to Expert Systems", Pearson Education Asia Ltd, New Delhi 2007
2. George F.Luger, "Artificial Intelligence – Structures and Strategies for Complex Problem Solving", Pearson Education Asia Ltd, New Delhi 2002
3. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw Hill book Co Ltd, New Delhi, 2nd Edition 1995
4. Janakiraman, K.Sarukesi, "Foundations of Artificial Intelligence and Expert Systems", Macmillan Series in Computer Science
5. Patterson W, "Introduction to Artificial Intelligence and Expert Systems", Prentice Hall of India, 2003.

07E0A4 INDUSTRIAL SAFETY

4 0 04

Unit I

Safety in Process Plants

Hazards analysis - Energy source – Release of hazardous materials – Fires – Types of fires – Fire extinguishers – types and handling. Personal protective equipments – Types – Helmets – Respirator – Air purification – Chemical protective clothing – gloves for heat – electricity and chemical – Eye stakes – Ear marks – Industrial Hygiene – Principles – Health and safety Ergonomics. **10 Hours**

Unit II

High Pressure Operations

Pressure vessels – Storage – Handling – Transportation – Storage of liquids and gases under high pressure – Materials of construction – safety precautions. Explosive chemicals – handling and storage – Testing of such chemicals. **10 Hours**

Unit III

Hazards in Industries

Engineering control of hazards and accidents due to fire explosion and natural causes in the Industries – Thermal power plant – Atomic power plant – mining industries – Fertilizers – petroleum refinery – Guide lines for setting standards for safe equipments and safe operation in the above industries.

10 Hours

Unit IV

Safety Education

Types of organization – Safety committee – Safety councils – Safety education – First aid – Principles and methods – Training. **10 Hours**

Unit V

Industrial Safety Acts

Legal aspects of Industrial safety – Safety measures in factories act – Mines act – pollution control acts for water – air and land – child labour and women employee acts. **10 Hours**

Total: 50 Hours

Textbooks

1. Rolland P. Blake, “Industrial safety” , II Edn.., Prentice Hall Inc . New york, Latest Edition.
2. Willaim Handley Mc, “Industrial Safety Hand book” , II Edn.., – Graw Hill Book Co., U. K. (1977)

References:

1. “Techniques of safety Management” , Dan paterson , II Edn . Mc Graw Hill - Kogakusha , New Delhi (1978)
2. “Occupational Accident Prevention Judson & Brown “, john Wiley , london (1944).
3. “Controling air In-plant Air Borne contaminants” John D . Constancs , Marcel Dekker Inc .New york (1983)

07E020 ENERGY AUDITING CONSERVATION AND MANAGEMENT

4 0

04

Unit I

Energy Scenario

Commercial Energy Production, Final Energy Consumption, Energy Needs of Growing Economy, Long Term Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy and Environment: Air Pollution, Climate Change, Energy Security, Energy Conservation and its Importance, Energy Strategy for the Future, Energy Conservation Act-2001 and its Features. **10 Hours**

Unit II

Energy Management & Audit

Definition, Energy audit- need, Types of energy audit,Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies,Optimizing the input energy requirements, Fuel and energy substitution, Energy audit instruments- Energy management in illumination and driver – case study – Energy Efficient motors. **10 Hours**

Unit III

Material and Energy balance

Facility as an energy system, Methods for preparing process flow, Material and energy balance diagrams.

10 Hours

Unit IV

Energy Action Planning:

Key elements, Force field analysis, Energy policy purpose, perspective, Contents, Formulation, Ratification, Organizing - location of energy management, Top management support, Managerial function, Roles and responsibilities of energy manager, Accountability. Motivating-motivation of employees: Information system designing barriers, Strategies; Marketing and communicating-training and planning. **10 Hours**

Unit V

Financial Management

Investment-need, Appraisal and criteria, Financial analysis techniques-Simple pay back period, Return on investment, Net present value, Internal rate of return, Free cash flows, Risk and sensitivity analysis; Financing options, Energy performance contracts and role of ESCOs-Simulation of systems on line tracking offincwcial – EVA modeling – cost of capital calculation**.** **10 Hours**

Total : 50 Hours

Reference

1. H. Partab, ‘Art and Science of Utilisation of Electrical Energy’, Dhanpat Rai and Co, New Delhi, 2004.
2. BEE website .

07E0A6 MANAGEMENT INFORMATION SYSTEMS

4 0 04

Unit I

Introduction to Information Systems

Overview of Information Systems -Manager's View of Information Systems - Introduction to Systems and Organizations - Strategic Uses of Information Technology - Business Process Reengineering and Information Technology. **10 Hours**

Unit II

Computer System Resources

Introduction - Computer Hardware- Computer Software- File and Database Management Systems-Basics of Communication Systems- Distributed Systems, Internet and Office Communications. **10 Hours**

Unit III

Applications of Information Systems

Applications of Operational Information Systems: Accounting and Financial Information Systems- Marketing Information Systems- Operational Production Information Systems- Human Resource Information Systems- Applications of Tactical and Strategic Information Systems. **10 Hours**

Unit IV

Decision Support Systems (DSS) and Expert Systems

Introduction - Characteristics of Decision-Making Process- Important Features of Decision Support Systems - Components of a DSS-Tools of DSS-DSS Lifecycle- Group Decision Support System(GDSS)-Benefits of DSS-Case Studies. Expert Systems - Characteristics- Applications of Expert Systems in Business- Advantages - Tools in Expert Systems. **10 Hours**

Unit V

Management of Information Systems

Organization of Information and End User Computing - Organization of Data Processing- Future of Information Systems in Organizations.

Security and Ethical issues of Information Systems:

Information Systems- Security, Risks, Common Controls, Common Threats, Protection of Information Systems, Ethical Issues. **10 Hours**

Total : 50 Hours

Textbook

1. Management Information Systems- The Manager's View- Robert Schultheis, Mary Sumner, Tata McGraw-Hill Edition.

References:

1. Laudon, K. C., Laudon, J. P., & Brabston, M. E. (2007). *Management information systems: Managing the digital firm* (3rd Cdn. ed.). Toronto, ON: Pearson Education Canada Inc.
2. Turban.E, McLean.E & Wetherbe.J , Information Technology for Management – Transforming the Business in the Digital Economy (3rd Ed.) John Wiley & Sons, 2002.

07E0A7 POWER SYSTEM STABILITY STUDIES

4 0 04

Unit 1

Small-signal stability

Fundamental concepts of stability – Eigen properties of state matrix – Small signal stability of SMIB system – Effects of excitation system – Power system stabilizer – Small signal stability of multimachine system.

10 Hours

Unit II

Transient stability

Fundamental concepts of transient stability – Analysis of unbalanced faults – Performance of protective relaying.

10 Hours

Unit III

Voltage stability

Basic concepts of voltage stability – Voltage collapse – Voltage stability analysis – Prevention of voltage collapse. **10 Hours**

Unit IV

Subsynchronous oscillations

Turbine-generator torsional characteristics – subsynchronous resonance – Impact of network switching disturbances. **10 Hours**

Unit V

Mid-term and long-term stabilities

Power plant response during severe upsets for thermal and hydro power plants. **10 Hours**

References:

1. IEEE/CIGRE Joint Task Force on Stability Terms and Definitions, "Definition and classification of Power system stability", IEEE transactions on Power systems, vol19, no.2, May 2004
2. De Mello F.P. and Concordia C., "Concepts of synchronous machine stability as affected by excitation control", IEEE transactions on Power Apparatus and Systems, vol. PAS-88, pp. 316–327, April 1969
3. Kundur P., Klein M., Rogers G.J., and Zwyno M.S., "Application of power system stabilizers for enhancement of overall system stability", IEEE transactions on Power Systems, vol. 4, pp. 382–388, 1992.
4. Hui Ni, Gerald Thomas Heydt and Lamine Mili, "Power system stability agents using robust wide area control", IEEE transactions on Power System, vol. 17, no. 4, pp. 1123-1131, 2002.
5. Maria G., Tang C., and Kim J., "Hybrid transient stability analysis", IEEE transactions on PWRS-5, no. 2, pp. 384-393, May 1990.
6. Taylor C.W., "Concepts of undervoltage load shedding for voltage stability", IEEE transactions on Power delivery, vol.7, no.2, pp.480-488, April 1992.

07G008 ORGANIZATIONAL BEHAVIOUR AND MANAGEMENT
(Common to all branches)

3 0 0 3

Unit I

Management and its Environment

Management – definition – functions, evolution of modern management scientific management movement, development of management thoughts, different schools of management, forms of organization – individual ownership – partnership – joint stock companies – cooperative enterprises – public sector undertakings – corporate frame work – share holders – Board of directors – committees – chief executive – line and functional managers – constraints – environmental – financial – legal – trade unions – technology.

10 Hours

Unit II

Management of Organisation

Planning – nature and purpose – objectives – strategies – policies and planning premises – decision making, organizing – nature and process – premises departmentalisation – line and staff – decentralization – organizational culture, staffing – selection and training – placement – performance appraisal – career strategy – organizational development, leading – managing human factor – motivation, leadership – communication, controlling – system and process of controlling – controlling techniques , productivity and operations management – preventive control, industrial safety.

10 Hours

Unit III

Individual Behaviour

Organizational behaviour – definition – organization – managerial role and functions – organizational approaches, individual behaviour – causes – environmental effect – behaviour and performance, perception – organizational implications, personality – contributing factors – dimension, motivation – need theories – process theories – job satisfaction, learning and behaviour – learning curves, work design and approaches.

10 Hours

Unit IV

Group Dynamics

Group behaviour – groups contributing factors – group norms, communication – process – barriers to communication – effective communication, Leadership – formal and informal characteristics – managerial grid – leadership styles – group decision making – leadership role in group decision, group conflict – types – causes – conflict resolution – inter group relations and conflict, organization centralization – formal and informal – organizational structures, organizational change and development – change process – resistance to change – O.D.programme – culture and ethics.

10 Hours

Unit V

Modern Management Concepts

Management by objectives (MBO) – principles and steps – advantages and disadvantages, management by exception (MBE), strategic management, planning for future direction – SWOT analysis – evolving development strategies, information technology in management – decision support systems – corporate models – business management games – electronic commerce/business, newer concepts – business process reengineering (BPR) – enterprise resource planning (ERP) – supply chain management (SCM) – activity based management (ABM).

10 Hours

Total: 50 Hours

Textbook:

Herold Koontz and Heinz Weihrich, "Essentials of Management", McGraw Hill, New Delhi, 5th edition, 1990.

References:

1. Ernest Dale, "Management Theory and Practice", McGraw Hill Books, 1973.
2. Richard Pettinger, "Mastering Organizational Behaviour", Macmillan Publishers Ltd., 2002.