NOOURL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER I

(Common for All B.E/B.Tech. Programmes Except Marine Engineering)

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	EG1101	Technical English – I	3	1	0	4
2.	MA1101	Engineering Mathematics – I	3	1	0	4
3.	PH1101	Engineering Physics – I	3	0	0	3
4.	CH1101	Engineering Chemistry - I	3	0	0	3
5.	ME1101	Engineering Graphics	3	0	0	3
6.	CS1101	Fundamentals of Computing and Programming	3	0	0	3
PRACTICAL						
7.	CS1171	Computer Practice Lab - I	0	1	2	2
8.	ME1171	Computer Aided Drafting and Modeling Lab	0	1	2	2
9.	PH1171	Physics Lab – I	0	0	2	1
10.	CH1171	Chemistry Lab - I	0	0	2	1
TOTAL			18	4	8	26

*** Those who have admitted from the Academic Year 2013-2014 onwards**

EG1101 TECHNICAL ENGLISH – I 3 1 0 4

UNIT-I 9

Verb-Tenses -12 Tenses-8 Passive Forms- Word formation with prefixes and suffixes

UNIT-II 9

Expansion of Compound Nouns – Punctuation - Definitions of Technical Terms - Changing words from one form to another - Imperatives and Instructions - Conditional clauses.

UNIT-III 9

Interrogatives and Question Tags - Asking Questions - Comprehension – Discourse Markers

UNIT –IV 9

Concord - Identifying Common Errors - Cause and Effect Expressions – Paragraph Writing – Copy Writing: Slogans and Captions - Writing Instructions - Letter Writing (Formal Letters)

UNIT –V 9

Creative Writing – Transcoding: Bar Chart, Flow Chart - Pie Chart - Tree Diagram - Tabular Column

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Combined Edition (Volumes 1 @ 2), Chennai: Orient Black Swan Pvt.Ltd.,2006 Themes 1-4 (Resources, Energy, Computer, Transport)

EXTENSIVE READING:

A.P.J.Abdul Kalam with Arun Tiwari, Wings of Fire: An Autobiography, University Press (India) Pvt.Ltd, 1999, 30 Impression 2007

***NOTE*:**

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA1101 ENGINEERING MATHEMATICS - I 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the students in order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

The course objective is to develop the required skill of the students in the area of

Engineering Mathematics with special emphasis on the characteristic equation of matrices, differential calculus, Beta and Gamma functions and to develop basic knowledge to the students in double and triple integration.

UNIT I MATRICES 9

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen vectors(without proof)– Cayley Hamilton theorem (statement only), verification and its applications – Orthogonal and Symmetric matrices and their properties(excluding proof)- Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT II DIFFERENTIAL CALCULUS 9

Curvature – Cartesian co-ordinates and parametric form -Centre and radius of curvature, Circle of curvature – Evolutes.

UNIT III FUNCTIONS OF SEVERAL VARIABLES 9

Partial derivatives – Total derivatives – Jacobians – Properties – Maxima and minima for functions of two variables–Lagrange Multiplier method- Taylor's expansion.

UNIT IV BETA AND GAMMA INTEGRALS 9

Evaluation of improper integrals- Beta and Gamma functions – Properties – Relation between Beta and Gamma functions - Evaluation of integrals using Beta and Gamma functions.

UNIT V MULTIPLE INTEGRALS 9

Evaluation of double and triple integrals – Area as double integral in cartesian and polar co-ordinates– Change of order of integration- Transformation of Cartesian coordinates into polar coordinates.

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

Grewal B.S., "Higher Engineering Mathematics"- 40th Edition , Khanna Publishers, Delhi 2007.

REFERENCES:

1 Veerarajan T, " Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi , 2007
2 Erwin Kreyszig, " Advanced Engineering Mathematics", 7th Edition, Wiley India, 2007.
3 P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" Vol,1 S.Chand & Company Ltd.2002
4. B.V. Ramana,"Higher Engineering Mathematics" Tata McGraw- Hill, Publishing Company Ltd.,New Delhi, 2006

PH1101 ENGINEERING PHYSICS – I 3 0 0 3

AIM:

To provide a sound knowledge on the principles of Physics and its practical applications in various areas of Engineering and Technology.

OBJECTIVE:

At the end of the course students would be exposed to

- The mechanical properties of matter and its engineering applications
- Application of ultrasonics in Industry and Medical field
- The important properties of light and their application
- Application of laser and fiber optics in communication and technology
- The fundamentals of heat- energy conversion and its application.

UNIT I Properties of matter 9

Elasticity – Poisson's ratio – Stress-strain diagram – factors affecting elasticity – bending of beams – cantilever – bending moment – theory and experiment of Young's modulus determination – Uniform and non-uniform bending – I shaped girders – twisting couple – hollow cylinder – shaft – torsion pendulum – determination of rigidity modulus

UNIT - II Ultrasonics 9

Introduction-production of ultrasonic waves- magnetostriction effect- magnetostriction generator-piezoelectric effect-piezoelectric generator-detection of ultrasonic waves-properties - velocity measurement - acoustic grating-industrial applications-drilling, welding, soldering and cleaning- SONAR- non destructive testing pulse echo system-medical applications-sonograms.

UNIT –II Optics 9

Interference: air wedge- theory and experiment-testing of flat surfaces- Michelson's Interferometer-types of fringes- applications (determination of wavelength and thickness of thin transparent medium).

Polarization: Introduction- double refraction, quarter and half wave plates- production of plane, circularly and elliptically polarized light-detection of plane, circularly & elliptically polarized light.

Photoelasticity- Stress-optic law- photoelastic bench

UNIT- IV Lasers & Fiber Optics 9

Introduction- principle of spontaneous emission and stimulated emission, Einsteins A and B coefficients-derivation- population inversion, pumping, types of lasers- Nd-YAG, CO_2-applications.

Principle and propagation of light in optical fibre- numerical aperture and acceptance angle- types of optical fibres (material, refractive index, mode)- double crucible technique of fibre drawing, fibre optic communication system (Block diagram)-fibreoptic sensors.

UNIT – V Heat and Thermodynamics **9**

Thermal conductivity- Forbe's and Lee's disc methods-radial flow of heat- thermal conductivity of rubber and glass-thermal insulation in buildings - Laws of thermodynamics- Carnot's cycle as heat engine – efficiency, Otto engine & Diesel engine (qualitative).

TOTAL: 45 PERIODS

TEXT BOOKS:

1. R.K. Gaur and S.L.Gupta, 'Engineering Physics' Dhanpat Rai publications, New Delhi.
2. Marikani A, 'Engineering Physics' PHI learning pvt ltd, III Edition, New Delhi.
3. Palanisamy.P.K., 'Engineering Physics' Scitech publications, Chennai.
4. M.N. Avadhanulu and PG Kshirsagar. ' A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi.

REFERENCES:

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics', 6th Edition, Thomson Brooks/Cole, Indian reprint.
2. Brijlal and Subrahmanyam 'Heat and Thermodynamics' S. Chand , Limited.
3. Ajoy Ghatak, ' Optics' Tata McGraw Hill Publications, New Delhi.
4. Brijlal and Subrahmanyam 'Properties of Matter' S. Chand , Limited.

CH1101 ENGINEERING CHEMISTRY-I 3 0 0 3

AIM

To have a thorough knowledge of the basics of chemistry particularly engineering oriented topics to engineering students.

OBJECTIVES

To make the students conversant with the principles of the following topics: (i) Water Technology, (ii) Engineering Materials and Polymers,(iii) Surface Chemistry and Nanomaterials,(iv) Analytical Techniques and (v) Chemical Kinetics

UNIT I WATER TECHNOLOGY 9

Water as a universal solvent – hard and soft water – reasons for hardness – disadvantages of hard water in washing and industrial purposes - estimation of hardness by EDTA method, problems; boiler feed water – characteristics- softening methods - external conditioning – demineralization (ion exchange) process, desalination by reverse osmosis method- internal conditioning (phosphate, calgon and carbonate conditioning methods); stages in domestic water treatment – disinfection by chlorination, ozone and UV treatments.

UNIT-II ENGINEERING MATERIALS AND POLYMERS 9

Abrasives – Natural & synthetic – Moh's scale, diamond, carborundum – Refractories – classification and properties – Cement – Manufacture. Lubricants- Types – properties of lubricants – oiliness, fire & flash points, pour & cloud point (definition only) – solid lubricants – Graphite and MoS_2.

Polymer and polymerization (definition only)- examples for natural & synthetic polymers, Preparation, properties and uses of Kevlar, Nomex, Rubber – natural and synthetic – neoprene, butyl rubber- vulcanization of rubber,Introduction to Conducting polymers and Liquid crystal polymers.

UNIT III SURFACE CHEMISTRY AND NANOMATERIALS 9

Adsorption – classification- adsorption of gases on solids- adsorption isotherms- Freundlich and Langmuir adsorption isotherms- adsorption of solutes from solution- application of adsorption-catalysis and pollution control-Nanomaterials – introduction – carbon nanotubes (CNT) and their applications.

UNIT IV ANALYTICAL TECHNIQUES 9

Importance of spectroscopic techniques- Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (block diagram only) – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy. Thermal Analysis- TGA and DTA- principles- thermogram of calcium oxalate monohydrate.

UNIT-V CHEMICAL KINETICS 9

Introduction – rate, rate constant, order & molecularity of reactions –First order reaction – Derivation of rate constant – Second order reactions – rate constant (no derivation, equation and problem only) - activation energy – concept-Arrhenius equation-derivation- steady state approximation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. P.C. Jain and Monica Jain, Engineering Chemistry DhanpatRai Pub, Co., New Delhi (2002)
2. S.S. Dara, A text book of engineering chemistry S. Chand & C. Ltd., New Delhi (2006)
3. B. Sivasankar Engineering Chemistry Tate McGraw- Hill Pub. Co. Ltd, New Delhi (2008)

REFERENCES:

1. B. K. Sharma Engineering Chemistry Krishna Prakasan Media (P) Ltd., Meerut (2001)
2. R. Gopalan, D. Venkappayya, Sulochana Nagarajan, Engineering Chemistry Vikas Pub, Co., New Delhi (2006)
3. Principles of physical chemistry by Samuel Glasstone,Van Nostrand pub.comp, Newyork.
4. Principles of physical chemistry by Puri & Sharma,Vikas pub.comp,2008

ME1101 ENGINEERING GRAPHICS 3 0 0 3

OBJECTIVE

- To know the fundamental principles of geometrical drawing
- To visualize the various machine components

Unit I - Introduction 9

Introduction to Engineering Drawing, Drawing Standard, ISI code of practice, Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;

Unit II - Orthographic Projection (Points, Lines & Planes) 9

Principles of orthographic projection-projection of points, straight lines, traces and projection of planes inclined to both planes Orthographic projection of simple engineering components-missing view exercises.

Unit III - Orthographic Projection (Solids) 9

Projection of solids – Inclined to one plane - Sections and Sectional Views of Right Angular Solids covering - Prism, Cylinder, Pyramid, Cone – Auxiliary Views

Unit IV - Pictorial Projections 9

Principles of pictorial views, isometric view of simple solids. Free hand sketching of orthographic views from pictorial views. Free hand sketching of isometric views from given two or three views.

Unit V - Development Of Surfaces & Perspective Projection 9

Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Perspective Projection of Planes and Solids

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS:

1. Venugopal K and Prabhu Raja V, “Engineering Graphics”, New Age International Publishers, 2007.
2. . Luzadder W J, “Fundamentals of Engineering Drawing”, Prentice Hall Book Co., New York, 1998
3. Bhat, N.D.& M. Panchal , *Engineering Drawing*, Charotar Publishing House,2008

REFERENCES:

1. Kumar M S, “Engineering Graphics”, Ninth Edition, DD Publications, Chennai, 2007.
2. Bureau of Indian Standards, “Engineering Drawing Practices for Schools and Colleges SP 46-2003”, BIS, New Delhi, 2003.
3. Shah, M.B. & B.C. Rana , *Engineering Drawing and Computer Graphics*, Pearson *Education,2008*

CS1101 FUNDAMENTALS OF COMPUTING AND PROGRAMMING 3 0 0 3

AIM:

To provide an awareness to Computing and Programming

OBJECTIVES:

- To enable the student to learn the major components of a computer system
- To know the correct and efficient ways of solving problems
- To learn to use office automation tools
- To learn to program in C

UNIT - I Introduction to Computers 9

Introduction – Characteristics of Computers – Evolution of Computers - Computer Generations – Classification of Computers – Basic Computer organization – Number Systems

UNIT -II Computer Software 9

Computer Software –Types of Software – Software Development Steps – Internet Evolution - Basic Internet Terminology – Getting connected to Internet Applications.

UNIT – III Problem Solving and Office Application Software 9

Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudocode - Application Software Packages- Introduction to Office Packages (not detailed commands for examination).

UNIT – IV Introduction to C 9

Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.

UNIT – V Functions and Pointers 9

Handling of Character Strings – User-defined Functions – Definitions – Declarations - Call by reference – Call by value – Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a C Program : Some Guidelines

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ashok.N.Kamthane,“ Computer Programming”, Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, “A Structured Programming Approach Using C”, II Edition, Brooks-Cole Thomson Learning Publications, (2007).

REFERENCES:

1. Pradip Dey, Manas Ghoush, “Programming in C”, Oxford University Press. (2007).
2. Byron Gottfried, “Programming with C”, 2nd Edition, (Indian Adapted Edition), TMH publications, (2006).
3. Stephen G.Kochan, “Programming in C”, Third Edition, Pearson Education

India, (2005).
4. Brian W.Kernighan and Dennis M.Ritchie, “The C Programming Language”, Pearson Education Inc., (2005).
5. E.Balagurusamy, “Computing fundamentals and C Programming”, Tata McGraw-Hill Publishing Company Limited, (2008).
6. S.Thamarai Selvi and R.Murugan, “C for All”, Anuradha Publishers, (2008).

CS1171 COMPUTER PRACTICE LAB - I 0 1 2 2

LIST OF EXERCISES

a) Word Processing **15**

1. Document creation, Text manipulation with Scientific notations.
2. Table creation, Table formatting and Conversion.
3. Mail merge and Letter preparation.
4. Drawing - flow Chart

b) Spread Sheet **15**

5. Chart - Line, XY, Bar and Pie.
6. Formula - formula editor.
7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.
8. Sorting and Import / Export features.

c) Simple C Programming * **15**

9. Data types, Expression Evaluation, Condition Statements.
10. Arrays
11. Structures and Unions
12. Functions

*** For programming exercises flow chart and pseudo code are mandatory.**

TOTAL: 45 PERIODS

Hardware / Software required for a batch of 30 Students

Hardware

LAN System with 33 nodes (OR) Standalone PCs– 33 Nos.
Printers– 3 Nos.

Software

OS– Windows / UNIX Clone
Application Package– Office suite
Compiler– C

ME1171 COMPUTER AIDED DRAFTING AND MODELING LAB

L-T-D: 0-0-2 Credits: 2

(i) Introduction to computer aided drafting and solid modeling: software and hardware.

(ii) Understand basic 2D geometric construction techniques.
a. Cartesian and polar coordinate systems: locating points, coordinate entry methods, units and limits.
b. Object generation: lines, arcs, polylines, and multilines; rectangles, circles, polygons, and ellipses.
c. Transformations: move, copy, rotate, scale, mirror, offset and array; trim, extend, fillet, chamfer
d. Layers: creation, naming, properties manager.
e. Blocks: create, edit, import and explode.
f. Text: creating and editing, formatting, text styles.
g. Dimensions: creating and editing, dimension styles.

(iii) Exercise on basic drafting principles to create technical drawings.
a. Create orthographic views of machine parts from pictorial views.
b. Create isometric views of machine parts from orthographic views
c. Create hatched sectional views of machine parts.

(iv) Understanding basic solid modeling techniques
a. Creation of solid primitives
b. Boolean operations
c. Extrude, Revolve operations
d. 3D Views

(v) Exercise on basic modeling to create machine parts Create solid models from pictorial views

TOTAL: 45 PERIODS

University Examination:

Question paper may contain two parts. Part A shall contain 2D drafting which carries 40% marks, Part B shall contain 3D drafting which carries 40% marks and 20% marks is for viva voce conducted during the exam.

PH1171 **PHYSICS LAB- I** **0 0 2 1**

LIST OF EXPERIMENTS

(Any five experiments)

1. (a) Particle size determination using Diode Laser
   (b) Determination of Laser parameters- Wavelength and Numerical aperture
2. Determination of velocity of sound and compressibility of liquid- Ultrasonic Interferometer.
3. Determination of thermal conductivity of a bad conductor- Lee's Disc method
4. Determination of thickness of a thin wire- Airwedge
5. Torsional Pendulum- Determination of rigidity modulus
6. Compound pendulum- Determination of acceleration due to gravity
7. Determination of Young's Modulus- Non-Uniform bending

Reference: Physics lab manual- Department of Physics

CH1171 **CHEMISTRY LAB - I** **0 0 2 1**

List of Experiments

1. Determination of total hardness of water by EDTA method.
2. Determination of alkalinity (titrimetry method)
3. Determination of percentage purity of washing soda
4. Conductometric titration of a strong acid with a strong base
5. Determination of strength of hydrochloric acid (p^Hmetry)
6. Determination of the amount of Na^+ in water sample (Flame photometry)
7. Determination of molecular weight and degree of polymerization of a polymer
8. Determination of the amount of Ca^{2+} in water sample .
9. Determination of iron in rust by Permanganometry.

Minimum five experiments shall be offered.

References:

1. J. Bassette, R. B. Deanen& G. H. Jeffery & J. Mendham, Text book of Vogel Quantitative Inorganic Analysis, ELBS, England.

TOTAL: 45 PERIODS

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B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER II

(Common for All B.E/B.Tech Programmes Except Marine Engineering)

Sl. No	Course Code	Course Title	L	T	P	C
Theory						
1.	EG1102	Technical English – II	3	0	0	3
2.	MA1102	Engineering Mathematics – II	3	1	0	4
3.	PH1102	Engineering Physics – II	3	0	0	3
4.	CH1102	Engineering Chemistry – II	3	0	0	3
5.	ME1102	Engineering Mechanics	3	0	0	3
6.	BE1101	Basic Engineering - I (Basic Electrical and Electronics Engineering)	3	1	0	4
7.	BE1102	Basic Engineering – II (Basic Mechanical and Civil Engineering)	3	1	0	4
Practical						
8.	CS1172	Computer Practice Lab - II	0	1	2	2
9.	PH1172	Physics Lab – II	0	0	2	1
10	CH1172	Chemistry Lab - II	0	0	2	1
11.	BE1171	Basic Engineering Lab – I (Basic Electrical and Electronics Engineering Lab)	0	0	4	2
12.	BE1172	Basic Engineering Lab – II (Basic Mechanical and Civil Engineering Lab)	0	0	4	2
TOTAL			21	4	14	32

***Those who have admitted from the Academic Year 2013-2014 onwards.**

EG1102 TECHNICAL ENGLISH - II 3 0 0 3

UNIT-I **9**

Technical Vocabulary - Active and Passive Vocabulary – Articles - Prepositions – Expansion of Abbreviations and Acronyms

UNIT-II **9**

Phrases- Adverbs –Different grammatical forms of the same word –Active Voice-Passive Voice

UNIT-III **9**

Phonemes - Vowels, Consonants and Diphthongs – Word Stress and Intonation

UNIT-IV **9**

Writing Recommendations – Checklists - Essay Writing - Business Letters: - Letter Calling for quotation, Letter Placing Order, Letter of Complaint, Letter Seeking Clarification - Business Proposal Writing

UNIT-V **9**

Numerical Adjectives – CV/Resume Writing – One Word Substitutes – Virtual Communication: E-Mail Writing

TOTAL: 45 PERIODS

TEXT BOOK:

Department of Humanities and Social Sciences, Anna University, English for Engineers and Technologists, Combined Edition (Volumes 1 @ 2), Chennai: Orient Black Swan Pvt.Ltd. 2006 Themes 5-8 (Technology, Communication, Environment, Industry)

EXTENSIVE READING:

Shiv Khera, You Can Win, Milan, Delhi, 2004

OR

CanField Jack, Chicken Soup for the Soul, Westland, Chennai, 1999.

***NOTE*:**

The book given under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA1102 ENGINEERING MATHEMATICS II 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the studentsin order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

To develop basic knowledge to the students in differential equations and vector calculus. This subject is further broadened to the functions of complex variables and complex integration. A thorough knowledge about Laplace transforms is also covered to aid the students solve the differential equations.

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 9

Linear differential equations of second order with constant and variable coefficients- Cauchy's and Legendre's linear equations – Method of variation of parameters

UNIT II COMPLEX VARIABLES 9

Functions of a complex variable – Analytic function – Necessary conditions- Cauchy-Riemann equations in cartesian and polar co-ordinates - Sufficient conditions(excluding proof) –Properties of analytic function – Harmonic and its conjugate – Construction of analytic function by Milne Thomson method – Conformal mappings
$w = z + c$, cz , $1/z$ and Bilinear transformation.

UNIT III COMPLEX INTEGRATION 9

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Laurent's expansion – Singular points – Residues – Cauchy's Residue theorem – Evaluation of real definite integral using contour integration(excluding poles on the real axis) - $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ and $\int_{-\infty}^{\infty} \frac{f(x)}{g(x)}dx$

UNIT IV VECTOR CALCULUS 9

Gradient, Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT V LAPLACE TRANSFORMS 9

Laplace transform –Existence condition– Transforms of elementary functions – Basic properties – Transforms of derivatives and integrals – Transform of Periodic functions. Inverse Laplace transform – Convolution, Initial and Final value theorems (statement only) – Solutions of linear ordinary differential equation of second order with constant coefficients using Laplace transform techniques.

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOK:

Grewal B.S., "Higher Engineering Mathematics"- 40th Edition , Khanna Publishers, Delhi 2007.

REFERENCES:

1. Erwin Kreyszig, " Advanced engineering Mathematics", 7th Edition, Wiley India, 2007
2. Veerarajan T, " Engineering Mathematics (for first year)", Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2007.
3. P.Kandasamy , K.Thilagavathy , K.Gunavathy" Engineering Mathematics" S.Chand & Company Ltd.2002.
4. B.V. Ramana,"Higher Engineering Mathematics" Tata McGraw- Hill Publishing Company Ltd.,New Delhi,2006.

PH1102 ENGINEERING PHYSICS – II 3 0 0 3

AIM:

To enable the students' understand the Physics behind various engineering materials and correlate it to technological applications.

OBJECTIVE:

At the end of the course students would be exposed to

- Fundamentals of quantum mechanics and its application to electron microscopy
- Various crystal structures and their defects
- The synthesis, properties and applications of various engineering materials

UNIT –1 Quantum Mechanics 9

Matter waves- de-Broglie wavelength - Schrodinger's wave equation-time independent and time dependent equations- physical significance of wave function- particle in a one dimensional box- electron microscope- scanning electron microscope- transmission electron microscope.

UNIT II Elementary crystal physics 9

Lattice – Unit cell, Bravais lattice ,lattice planes-Miller indices ,d-spacing in cubic lattice. Calculation of number of atoms per unit cell,atomic radius, coordination number and packing
factor for SC,BCC,FCC and HCP structures- diamond cubic, NaCl and ZnS structures. Crystal defects.

UNIT- III Conducting & Semiconducting Materials 9

Conducting materials – Drawbacks of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states Semiconducting materials: intrinsic semiconductor-carrier concentration derivation

- fermi level - electrical conductivity- band gap determination, extrinsic semiconductors, compound semiconductors (qualitative), Hall effect -determination of hall coefficient - applications.

UNIT- IV Magnetic, Superconducting and Dielectric Materials 9

Magnetic Materials: Origin of magnetic moment-Bohr magneton - ferromagnetism – magnetic domains- hysteresis-soft and hard magnetic materials- applications.

Superconductivity: Properties-types of super conductors - BCS theory of superconductivity (qualitative) - applications of superconductors.

Dielectric materials - active and passive dielectrics - types of polarization- dielectric loss- dielectric breakdown – uses of dielectric materials.

UNIT- V New Engineering Materials 9

Metallic glasses: preparation, properties and applications. Shape Memory Alloys (SMA): characteristics, properties and applications.

Nanomaterials -synthesis-top-down approach (Ball milling), bottom-up approach (CVD)- properties and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Rajendran, V, and Marikani A, 'Materials science' TMH publications, New Delhi
2. Palanisamy P.K "Materials Science", Scitech publications Pvt Ltd, Chennai
3. Arumugam M, "Materials Science", Anuradha publications, Kumbakonam
4. R.K. Gaur and S.L.Gupta, 'Engineering Physics' Dhanpat Rai publications, New Delhi

REFERENCES:

1. Charles Kittel ," Introduction to solid state physics ", John Wiley & sons, 8ed.
2. Charles P.Poole and Frank J. Owner, " Introduction to Nanotechnology, Wiley India.
3. Pillai, S.O. 'Solid state physics' NewAge international pubishers, Chennai.

CH1102 ENGINEERING CHEMISTRY-II 3 0 0 3

AIM

To have a thorough knowledge of the basics of chemistry particularly engineering oriented topics to engineering students

OBJECTIVES

To make the students conversant with the principles of the following topics: (i) Fuels And Combustion,(ii) Electrochemistry And Corrosion, (iii) Energy Sources And Batteries, (iv) Phase Rule And Alloys And (v) Thermodynamics.

UNIT I FUELS AND COMBUSTION 9

Classification of fuels with examples– characteristics of a good fuel- fossil fuels- Coal – proximate and ultimate analysis- metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and refining – cracking (definition only) - knocking – octane number and cetane number – synthetic petrol – Bergius process- Calorific value –GCV, LCV (problems)- Gaseous fuels- water gas and producer gas, Flue gas analysis – Orsat apparatus – theoretical air for combustion (problems).

UNIT-II ELECTROCHEMISTRY AND CORROSION 9

Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – single electrode potential – Nernst equation– reference electrodes – Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance- Electrochemical corrosion – protective coatings – paints – constituents and functions.

UNIT –III ENERGY SOURCES AND BATTERIES 9

Renewable & non-renewable energy sources- wind energy, solar energy and solar cell- Nuclear reactions – Fission and fusion – nuclear reactors – light water and breeder nuclear reactors (elementary ideas only) – Nuclear power plants in India.

Batteries- primary and secondary cells- alkaline battery- lead acid battery- nickel cadmium battery- lithium battery (Li-TiS_2)- H_2-O_2 fuel cell.

UNITV PHASE RULE AND ALLOYS 9

Statement and explanation of terms involved – one component system – water system – condensed phase rule – simple eutectic system (lead-silver system only) – alloys – importance, ferrous alloys – nichrome, invar and stainless steel – heat treatment of steel, non-ferrous alloys – brass, bronze and solder.

UNIT-V THERMODYNAMICS 9

Introduction- I law of thermodynamics (statement only)- Relation between ΔE & ΔH -II law of thermodynamics (statement only)- concept of entropy – Clausius-Clapeyron equation (no derivation)- Importance, terms involved (problem) -Free energy changes- ΔG – Gibbs Helmoltz equation (derivation) - III law of thermodynamics- concept of absolute entropy- zeroth law of thermodynamics (statement only).

TOTAL: 45 PERIODS

TEXT BOOKS:

1 P.C. Jain and Monica Jain, Engineering Chemistry DhanpatRai Pub, Co., New Delhi (2002)

2 S.S. Dara, A text book of engineering chemistry S. Chand & C. Ltd., New Delhi (2006)

3. B. Sivasankar Engineering Chemistry Tate McGraw- Hill Pub. Co. Ltd, New Delhi (2008).

REFERENCES:

1 B. K. Sharma Engineering Chemistry Krishna Prakasan Media (P) Ltd., Meerut (2001)
2 Principles of physical chemistry by Samuel Glasstone,Van Nostrand pub.comp, Newyork.
3 Principles of physical chemistry by Puri & Sharma,Vikas pub.comp,2008.

ME1102 ENGINEERING MECHANICS 3 0 0 3

OBJECTIVE

This is a basic engineering course common to all branches to inculcate in the students, problem
solving abilities and to enhance their analytical abilities.

Unit I - Statics of Particles 10

Statics –Basics Concepts, Fundamental principles & concepts: Vector algebra, Newton‟s laws, gravitation, force (external and internal, transmissibility), couple, moment (about point and about axis), Varignon‟s theorem, resultant of concurrent and non-concurrent coplanar forces, static equilibrium, free body diagram, reactions. Problem formulation concept; 2-D statics, two and three force members, alternate equilibrium equations, constraints and static determinacy; 3-D statics.

Unit II - Application of Statics & Friction 9

Analysis of Structures- Trusses: Assumptions, rigid and non-rigid trusses; Simple truss (plane and space), analysis by method of joints. Analysis of simple truss by method of sections;

FRICTION: Friction- Coulomb dry friction laws, simple surface contact problems, friction angles, types of problems, wedges. Sliding friction and rolling resistance

Unit III - Centroid, Centre of Gravity and Moment of Inertia 8

Moment of Inertia- First moment of mass and center of mass, centroids of lines, areas, volumes, composite bodies. Area moments- and products- of inertia, radius of gyration, transfer of axes, composite areas. Rotation of axes, principal area-moments-of-inertia,. Second moment of mass, Mass moments- and products- of inertia, radius of gyration, transfer of axes, flat plates (relation between area- and mass- moments- and products- of inertia), composite bodies. Rotation of axes, principal mass-moments-of-inertia.

Unit IV - Particle Dynamics 8

Rectilinear motion; Plane curvilinear motion (rectangular, path, and polar coordinates). 3-D curvilinear motion; Relative and constrained motion; Newton’ s 2nd law (rectangular, path, and polar coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Impact (Direct and oblique).

Unit V Kinematics & Kinetics of Rigid Bodies: 10

Plane kinematics of rigid bodies- Rotation; Parametric motion. Relative velocity,

instantaneous center of rotation. Relative acceleration, rotating reference frames. Rotating reference frames, 3-part velocity and 5-part acceleration relations, Coriolis acceleration. Plane kinetics of rigid bodies- Kinetics of system of particles and derivation of moment equation. Translation. Fixed axis rotation; General planar motion.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Beer F P and Johnson E R, "Vector Mechanics for Engineers, Statics and Dynamics", Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi, 2006.
2. Tayal A K, "*Engineering Mechanics- Statics and Dynamics*" , Umesh Publications, Delhi,2004
3. Irving H. Shames, Engineering Mechanics, Prentice Hall, New Delhi 1997.

REFERENCES:

1. Bansal R K, "Engineering Mechanics", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2. Bhavikatti S S, "Engineering Mechanics", New Age International Pvt. Ltd., New Delhi, 2003.
3. Young D H and Timashenko S, "Engineering Mechanics", Tata Mcgraw-Hill, Fourth Edition, 2006.
4. Jivan Khachane, Ruchi Shrivastava, "Engineering Mechanics: Statics and Dynamics", ANE Books, 2006.
5. Rajasekaran S and Sankarasubramanian G, "Engineering Mechanics-Statics and Dynamics", Vikas Publishing House Pvt. Ltd., New Delhi, 2006.
6. NPTEL courses: *http://nptel.iitm.ac.in/courses.php*, web and video resources on *Engineering Mechanics*.

BE1101 BASIC ENGINEERING - I 3 1 0 4

(Basic Electrical and Electronics Engineering)

Objectives:

- To understand the basic solutions of AC and DC circuits.
- To study the basic principle and operation of AC and DC machines.
- To study the fundamental operations of measuring instruments.
- To study the layout of power system.

Unit: 1 – Electrical circuits 9

Ohms Law, Kirchhoff's laws, Mesh and Nodal Analysis for DC Circuits.
Introduction to AC Circuits, Faraday's Law of Electromagnetic Induction, Lenz law, Inductor, Capacitor, Power factor, Waveforms and RMS value, Average Value, Peak factor and Form factor, Single phase circuits- Series and Parallel, Three phase balanced circuits. Fundamentals of wiring and earthing.

Unit: II – Electrical Measurements, Machines and Power system 9

Operating principles of Moving coil and Moving iron instruments (Ammeter and voltmeter), Dynamometer type watt meter and Energy meter, Errors in Measurements. Construction, Principle of operation and Applications of DC Generators, DC Motors, Single phase transformers. Structure of power system

UNIT- III Semiconductor devices and applications 9

Characteristics of PN Junction diode-Zener Effect-Zener diode and its characteristics-Half wave and Full wave Rectifiers-Voltage regulation,Bipolar Junction transmitter-CB,CE,CC Configuration and characteristics.

UNIT-IV Digital Electronics 9

Binary number system-logic gates-Boolean algebra-Combinational Circuit-half and Full adder,Sequential Circuit-Flip flops-Shift Registers(SIPO,SISO,PIPO,PISO) – Counters: Synchronous and Asynchronous –A/D conversion-Successive approximation,D/A conversion-Weighted Resistor

UNIT – V Fundamentals of Communication Engineering 9

Types of Signals: Analog and Digital Signals – Modulation and Demodulation – Principles of Amplitude and Frequency modulation – Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fiber (Block Diagram)

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS:

1. V.N. Mittle “Basic Electrical Engineering”, Tata McGraw Hill Edition, New Delhi, 1990.
2. V.K.Mehta “Principles of Power System”, S.Chand & Company Ltd, New Delhi, 2001.
3. R.S.Sedha,”Applied electronics”S.Chand&Co.,2006.

REFERENCES:

1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basic Electrical, Electronics and Computer Engineering”, Tata McGraw Hill, Second Edition, (2006).
2. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford press (2005).
3. Chakrabarti A, Soni M.L, Gupta P.V, Bhatnagar U.S , “ A Text book on Power System Engineering,” Dhanpat Rai & Co, New Delhi,2010.
4. Muthusubramanian R, Salivahanan S and Muraleedharan K A, “Basc Electrical Electronics and Computer engineering”,Tata McGraw Hill, Second edition(2006).
5. Nagsarkar T K and Sukhija M S, “Basics of Electrical Engineering”, Oxford Press(2005).
6. Mehta V K, “Principles of Electronics”,S.Chand&Company Ltd(1994).
7. Mahmood Nahvi and Joseph A. Edminister, “Electric Circuits”, Schaum’ Outline Series McGraw Hill,(2002).
8. Premkumar N, “Basic Electrical Engineering”, Anuradha Publishers,(2003)

BE1102 **BASIC ENGINEERING – II** **3 1 0 4**

(Basic Mechanical and Civil Engineering)

Aim:

To introduce students to the profession of Mechanical and Civil Engineering and involve them in small-scale projects which would allow them to develop teamwork skills.

Objective:

- To understand the basic knowledge about the Mechanical components used in various application
- To be aware of the different fields of Civil Engineering, such as Surveying, Structural and Transportation Engineering.

Unit I – IC Engine and Boilers **9**

IC Engines: Working and comparison of two stroke and four stroke petrol and diesel engines - general description of various systems using block diagrams – air system, fuel system and ignition system. A brief description of CRDI, MPFI, GDI and Hybrid Vehicles.

Steam boilers: Classification – Cochran boiler, Babcock and Wilcox boiler, High pressure Boilers - Lamont, Benson boiler

Unit II – Compressor, Blower, Pumps, Power plants, Refrigeration and Air Conditioning **9**

Principles and fields of application of compressors - reciprocating and centrifugal, blower principle, pumps- reciprocating, and centrifugal pumps steam

Elementary ideas of hydroelectric, thermal and nuclear power plants

Refrigeration & Air Conditioning: Refrigerants, Vapor compression system, Vapor absorbtion system window air conditioning unit -types (general description only).

Unit III – Manufacturing Processes **9**

Basic Principles of Manufacturing processes – casting, metal forming - forging, rolling, Metal joining - soldering, Welding Machining processes- Lathe construction, operation - turning, taper turning, thread cutting

UNIT - IV Civil Engineering and Materials **9**

Introduction: Civil Engineering, branches of Civil Engineering, contribution to society, Scope,

Civil Engineering Materials: Bricks – stones – sand – cement – concrete – steel sections, glass, wood, FRP

Surveying: Objects – types – classification – principles – measurements of distances – angles – leveling – determination of areas – illustrative examples.

Sub Structure: Types, Bearing capacity – Requirement of good foundations.

Superstructure: Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering– Types of Bridges and Dams

UNIT- V Civil Engineering structures

Building planning **9**

Residential, Institutional and industrial – functional requirements. – Basics of Interior Design and Landscaping.

Roads- benefits- classifications- traffic signs

Bridges-components od bridges-Dam-Purpose of reservoir.

Environmental Engineering: Protected water supply, water treatment methods-sewage treatment- Pollution-Types-causes-remedial measures

L: 45 + T: 15, TOTAL: 60 PERIODS

TEXT BOOKS

1) Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kr. Jain, "Basic Civil Engineering", Laxmi Pulications,
2) Roy and Choudhary, "*Elements of Mechanical Engineering*"
3) J Benjamin, "*Basic Mechanical Engineering*"

References

1. K.Venugopal and v prabu raja "*Basic Mechanical Engineering*" Anuradha Agencies
2. Shanmugam G and Palanichamy M.S "*Basic Mechanical Engineering*" Tata MC Graw Hill.
3. Shanmugam G and Palanichamy M S, "Basic Civil and Mechanical Engineering",Tata McGraw Hill Publishing Co., New Delhi, (1996).
4. Ramamrutham. S, "Basic Civil Engineering", Dhanpat Rai Publishing Co. (P) Ltd. (1999).
5. Seetharaman S. "Basic Civil Engineering", Anuradha Agencies, (2005).

CS1172 COMPUTER PRACTICE LAB – II 0 1 2 2

Prerequisite: None

List of Experiments

1. Unix Commands **15**

Study of Unix OS - Basic Shell Commands - Unix Editor

2. Shell Programming **15**

Simple Shell program - Conditional Statements - Testing and Loops

3. C Programming on Unix **15**

Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL: 45 PERIODS

Hardware / software requirements for a batch of 30 students

Hardware

1 UNIX Clone Server
33 Nodes (thin client or PCs)
Printer– 3 Nos.

Software

OS– UNIX Clone (33 user license or License free Linux)
Compiler- C

PH1172 PHYSICS LAB - II 0 0 2 1

LIST OF EXPERIMENTS

(Any five experiments)

1. Determination of focal length of convex lens- Newtons Rings
2. Determination of wavelength of mercury spectrum- Spectrometer grating
3. Determination of Viscosity of a liquid- Poiseuille's method.
4. Determination of hysteresis loss in a ferromagnetic material.
5. Determination of dielectric constant of a material at room temperature.
6. Determination of band gap of a semiconducting material.
7. Determination of Young's modulus- Uniform bending.

REFERENCE: Physics lab manual- Department of Physics

CH1172 CHEMISTRY LAB- II 0 0 2 1

LIST OF EXPERIMENTS

1. Determination of concentration of ferrous ion by potentiometry.
2. Conductometric titration of mixture of acids.
3. Estimation of copper in brass by EDTA method.
4. Determination of chloride content in water sample by argentometry.
5. Determination of acidity by titrimetry.
6. Determination of iron content in a solution by spectrophotometric method.
7. Determination of amount of water of crystallization in hydrated barium chloride.
8. Percentage purity of limestone (permanganometry)

Minimum five experiments shall be offered.

TOTAL: 45 PERIODS

REFERENCES:

1. J. Bassette, R. B. Deanen & G. H. Jeffery & J. Mendham, Text book of Vogel Quantitative Inorganic Analysis, ELBS, England.

BE1171 **BASIC ENGINEERING LAB – I** **0 0 4 2**

(Basic Electrical and Electronics Engineering Lab)

I. Electrical Engineering Lab

1. Study of Symbols, Cables and Earthing.
2. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
3. Fluorescent lamp wiring.
4. Stair case wiring / Lamp control from three different places/ Doctor Room control/ Go down control
5. Measurement of electrical quantities – voltage, current, power & computation of power factor in RLC circuit.
6. Measurement of energy using single phase energy meter.
7. Fan Wiring.

II. Electronics Engineering Lab

1. Study of Electronic components and equipments – Resistor, colour coding, Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EX-OR and NOT, NAND and NOR.
3. Generation of Clock Signal.
4. Soldering practice – Components, Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.
6. Characteristics of PN Junction diode
7. Characteristics of Zener diode
8. Voltage Regulator using Zener diode

TOTAL: 45 PERIODS

BE1172 **BASIC ENGINEERING LAB – II** **0 0 4 2**

(Basic Mechanical and Civil Engineering Lab)

OBJECTIVE:

Introduction to different materials in engineering practices with respect to their workability, formability & machinability with hand tools & power tools and to develop skills through hands on experience.

I. Mechanical Engineering Lab

1. Welding - Metal arc welding tools and equipment, exercises.
2. Fitting - Tools, operations, exercises, types of joints. (*Term work to include one job involving fitting to size, male-female fitting with drilling and tapping*.)

3. Foundry- Tools, preparation of moulding sand, patterns, cores, foundry exercises.
4. Carpentry- Tools, carpentry process, carpentry exercises, types of joints.
5. Assembly and Inspection.(*Assembly and Disassembly of some products, tools used. Videos of advancement in manufacturing technology. Inspection of various components using different measuring instruments.*)
6. Machine Tools I - Demonstration of drilling machine.
7. Machine Tools II - Demonstration of Lathe.
8. Study of Automobile and Power Transmission.
9. Wood working - Demonstration of wood working machinery and furniture manufacturing.(*Term work includes one job involving joint and woodturning*)

II. Civil Engineering Lab

Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

(c) Demonstration of elementary surveying techniques

TOTAL: 45 PERIODS

List of equipment and components
(For a Batch of 30 Students)

1. Assorted components for plumbing consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. **15 Sets.**
2. Carpentry vice (fitted to work bench) **15 Nos.**
3. Standard woodworking tools **15 Sets.**
4. Models of industrial trusses, door joints, furniture joints **5 each**
5. Power Tools:

(a) Rotary Hammer	**2 Nos**
(b) Demolition Hammer	**2 Nos**
(c) Circular Saw	**2 Nos**
(d) Planer	**2 Nos**
(e) Hand Drilling Machine	**2 Nos**
(f) Jigsaw	**2 Nos**

6. Surveying equipment for Demonstration

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER III

SI. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	MA1201	Engineering Mathematics – III	3	1	0	4
2.	EE1201	Electric Circuits Analysis	3	1	0	4
3.	ME1221	Thermal and Fluid Engineering	3	0	0	3
4.	EE1202	Electrical Machines – I	3	1	0	4
5.	EI1203	Electronic Devices & Circuits	3	1	0	4
6.	CS1201	Object Oriented Programming	3	1	0	4
PRACTICAL						
7.	EE1271	Electrical Machines Laboratory – I	0	1	2	2
8.	CS1271	Object Oriented Programming Lab	0	1	2	2
TOTAL			18	7	4	27

MA1201 ENGINEERING MATHEMATICS - III 3 1 0 4

AIM:

To impart the fundamental knowledge of Engineering Mathematics to the students in order to achieve a well founded knowledge about the principles of Mathematics.

OBJECTIVE:

To develop the skill of the students in the areas of boundary value problems and Transform techniques. This will be necessary for their effective studies in a large number of Engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. This course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9

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

UNIT II FOURIER SERIES 9

Dirichlet's conditions – Fourier series – Change of interval - Odd and Even functions – Half range sine and cosine series – Parseval's identity – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 9

Classification of second order linear partial differential equations – One dimensional wave and heat equations – Assumptions – Fourier series solution – Steady state solution of two dimensional heat equation (insulated edges excluded) – Fourier series solution in Cartesian co-ordinates.

UNIT IV FOURIER TRANSFORMS 9

Fourier integral theorem(without proof) – Fourier transform – Sine and Cosine transforms – Properties - Inverse Fourier transform – Inverse sine and cosine transforms – Properties - Transforms of simple functions – Convolution theorem – Parseval's identity

UNIT V Z-TRANSFORMS 9

Z- transform – Elementary properties – convolution theorem-Inverse Z-transform –Partial fraction Method, Inversion integral method and Convolution – Initial and Final value theorems – Formation of difference equations – Solution of difference equations using Z-transform

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

Grewal B.S., "Higher Engineering Mathematics" – 40th Edition , Khanna Publishers, Delhi 2011.

REFERENCES:

1. Kandasamy P, Thilagavathy K, and Gunavathy K., "Engineering Mathematics Volume III",First Edition, S.Chand & Company Ltd., New Delhi, 1996
2. Veerarajan T., "Engineering Mathematics(for Semester III), Third Edition, Tata McGraw – Hill Publishing Company Limited, New Delhi 2007.
3. Bali, N.P. and Manish Goyal, A Text Book of Engineering Mathematics, Seventh Edition, Lakshmi Publications Pvt. Ltd., New Delhi, 2009.

EE1201 ELECTRIC CIRCUIT ANALYSIS 3 1 0 4

AIM

The aim of this course is to familiarize the student with the analysis and design of basic circuits.

OBJECTIVE

On completion of this course the student will understand

- The methods of analysing basic and complex circuits
- Analysis of magnetically coupled circuits and resonance and two port networks
- Analysis of circuits using Laplace and Fourier transforms.

UNIT - I DC CIRCUIT ANALYSIS: 9

Review of Electric Circuits : Charge, Current, Voltage and Power. Ohm's Laws; Kirchhoff's Current Law, Kirchhoff's Voltage Law, Voltage and Current Sources, Independent and Dependent Sources, Resistors in Series and Parallel, Star- Delta Conversion, Voltage and Current Division; Nodal Analysis, Mesh Analysis.

UNIT – II NETWORK THEOREM FOR AC AND DC CIRCUITS: 9

Statement of Network theorem: Superposition, Reciprocity, Thevenin's, Norton's, and Maximum Power Transfer Theorem, Related Problems.

UNIT - III COUPLED AND THREE PHASE CIRCUITS 9

COUPLED CIRCUITS-Co-efficient of coupling – self and mutual inductance- analysis of coupled circuits- single and double tuned circuits- coefficient of critical coupling- frequency response of tuned circuits.

THREE PHASE: Instantaneous Power, Average Power, Apparent Power and Power Factor, Complex Power. Balanced and unbalanced circuits-solution of star and delta connected loads (balanced and unbalanced).

UNIT - IV TRANSIENTS AND RESONANCE CIRCUITS: 9

Transient response of basic RL, RC and RLC series and parallel circuits using Laplace Transform for DC input.

Series and parallel response- their frequency response-bandwidth-Q factor-Solutions.

UNIT - V TWO PORT NETWORK AND DUALITY 9

Two port network: Driving point and transfer impedance/admittance-voltage/current ratio of two port network-Admittance, impedance, Hybrid, transmission parameters for two port network. Duality; An Introduction to Network Topology.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

1. Electric Circuit Analysis by T.Nageswara Rao, AR Publishers Tamil Nadu 2009.
2. Electric Circuit Theory by M.Arumugam and N.Premkumar Khanna Publishers, New Delhi 2002

REFERENCES:

1. David E. Johnson, Johny R. Johnson, John L. Hilburn, "Electric Circuit Analysis", Second Edition, Prentice-Hall International Editions.
2. K.V.V.Murthy, M.S. Kamath, "Basic Circuit Analysis", Jaico Publishing House, 1999.
3. Norman Balabanian, "Electric Circuits", International Edition, McGraw-Hill, 1994.
4. Charles K. Alexander & Mathew N. O. Sadiku, "Fundamentals of Electric Circuits" Second Edition, McGraw-Hill 2003.
5. Fundamentals of R.A. Decarlo and P.M.Lin, "Linear circuit analysis" Oxford press, Reprint Edition 2003.
6. William H. Hayt, Jr, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", Sixth Edition, Tata McGraw-Hill Edition, 2002.

ME1221 THERMAL AND FLUID ENGINEERING 3 0 0 3

OBJECTIVE:

- To understand basic concepts of thermodynamics and apply them to various power producing and power-absorbing devices.
- To understand basic principles of fluid mechanics and fluid machinery
- To understand basic modes of heat transfer and to evaluate performance of heat Exchangers

UNIT I LAWS OF THERMODYNAMICS 9

Thermodynamic properties, processes and cycles. Energy, power, work, heat, Zeroth law of thermodynamics,Continuity equation.First law of thermodynamics, Joule's experiment to show equivalence of work and heat energy. Application of first law to flow and non-flow processes and cycles. Second law of Thermodynamics: Clausius and Kelvin Plank statements and its equivalence, reversible and irreversible processes, Carnot cycle, Carnot theorem and its application to heat engine, refrigerator and heat pump.

UNIT II INTRODUCTION TO IDEAL GAS PROCESSES 9

Otto and Diesel cycles , I. C. Engines : Classification, construction and working of two stroke and four stroke engine Performance of I C Engine : Determination of IP, BP, FP, Mean effective pressure, Fuel consumption (Elementary Numerical Treatment) Gas Turbine: Classification,

Brayton cycle, thermal efficiency and options to increase thermal efficiency (Elementary Numerical Treatment)

UNIT III FLUID MECHANICS AND MACHINERY 9

Definition, properties, Types of Fluid flow, Continuity equation, Euler,s equation, Bernoull,s equation and its application, Flow measurement -Venturi orifice etc. Pumps: Rotary and Reciprocating pumps, Construction and operation, pumps performance. Water Turbines: Types constructional details

UNIT IV STEAM 9

Formation of steam, properties, use of steam tables, Mollier charts, Introduction to steam generators, Steam turbines, efficiency calculation by direct method

UNIT V HEAT TRANSFER 9

Modes of heat transfer, Fourier's law, Thermal conductivity of metals, nonmetals and insulating materials, Newton's law of cooling, Stefan-Boltzmann law,Introduction to heat exchangers, elementary problems on conduction.Fins. Convection and radiation, insulating material, use of shield, heat exchangers- overall heat transfer coefficient,LMTD for parallel and counter flow heat exchangers.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Ballaney P.L., Thermal Engineering, Khanna Publishers, New Delhi, 24th ed.,2003.
2. Robert W Fox, "Introduction to Fluid Mechanics", Fourth Edition, John Wiley and sons, Singapore, 1994.

REFERENCES:

1. Streeter, V. L. and Wylie E. B., "Fluid Mechanics", McGraw Hill Publishing Co. 2010
2. Kumar K. L., "Engineering Fluid Mechanics", Eurasia Publishing House(p) Ltd., New Delhi 2004
3. Cenge Y Al and Boles M A "Thermodynamics, An Engineering Approach" Tata McGraw Hill, 2003
4. Nag.P.K., "Engineering Thermodynamics", Tata McGraw-Hill,New Delhi, 1998.
5. Merala C, Pother, Craig W, Somerton, " Thermodynamics for Engineers", Schaum Outline Series, Tata McGraw-Hill, New Delhi, 2004.

EE1202 ELECTRICAL MACHINES – I 3 1 0 4

AIM

To expose the students to the basic principles of Electro mechanical Energy Conversion in Electrical Apparatus and the operation of Transformers and DC Machines.

UNIT: I ELECTROMECHANICAL ENERGY CONVERSION 9

Magnetic circuits- Hysteresis loop – Inductance – Statically and Dynamically induced EMF – Core losses- Energy in magnetic systems – field energy, co energy and mechanical force – singly and multiply excited systems.

UNIT: II TRANSFORMERS 9

Construction – principle of operation – emf equation- testing: open circuit, short circuit, load, polarity and Sumpner's test- equivalent circuit – losses- efficiency-All-day efficiency and voltage regulation – three phase transformer connections – parallel operation of transformers – autotransformers-tap changing transformers.

UNIT: III CONSTRUCTION OF DC MACHINES 9

Constructional parts – Selection of material – methods of excitation – armature winding: lap, wave winding and their uses.

UNIT: IV DC GENERATORS 9

EMF generation – emf equation- types- characteristics: critical resistance, critical speed - armature reaction – commutation -parallel operation.

UNIT: V DC MOTORS 9

Types - torque equation - characteristics of motors –Applications- Starters - Speed control methods – Testing: Brake test, Swinburne's test, Hopkinson's test.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK

1. Nagrath I. J and Kothari D. P. 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 1990.
2. B.L.Theraja and A.K Theraja,'A text book of Electrical Technology' Volume II, S.Chand & Co. Ltd 2006.
3. K. Murugesh Kumar, 'Electric Machines', Vikas publishing house Pvt Ltd, 2002
4. M.G.Say, 'Direct Current Machines', Wiley Publishers, January 1980

REFERENCES

1. Fitzgerald.A.E. Charles Kingsely Jr, Stephen D.Umans, 'Electric Machinery', McGraw Hill Books Company, 1992.
2. P. C. Sen., 'Principles of Electrical Machines and Power Electronics', John Wiley&Sons, 1997.
3. P.S. Bimbhra, 'Electrical Machinery', Khanna Publishers, 2003.

EI1203 ELECTRONIC DEVICES AND CIRCUITS 3 1 0 4

AIM

To impact knowledge about various electronic devices circuits.

OBJECTIVES

At the end of the course, students' will have the knowledge about functioning of various types of devices and design of various electronic circuits.

1. SEMICONDUCTOR DIODE AND BJT 9

PN Junction – Current components in a PN diode – Junction capacitance – Junction diode switching time – Zener diode – Varactor diode – Tunnel diode – Schottky diode –Transistor Structure – Basic Transistor operation – Transistor characteristics and parameters – The transistor as a switch, as an amplifier – Transistor bias circuits:- Voltage divider bias circuits, base bias circuits, emitter bias circuits, collector feedback bias circuits – DC load line – AC load line- bias stabilization, thermal runaway and thermal stability.

1. FET, UJT and SCR 9

Principles and Characteristics of Uni Junction Transistor(UJT),Principles and Characteristics of Silicon Controlled Rectifier(SCR), Principles and Characteristics of Metal Oxide Semiconductor Field Effect Transistor(FET), Principles and Characteristics of Junction Field effect Transistor(JFET), Principles and Characteristics of IGBT and applications

3. TRANSISTORAMPLIFIERS 9

CE, CC and CB amplifiers - Small signal low frequency transistor amplifier circuits – h parameter representation of a transistor - Analysis of single stage transistor amplifier using parameters voltage gain, current gain, input impedance and output impedance frequency response - RC coupled amplifier, Negative feedback Classification of Power amplifiers:- Class A, B, AB and C Power amplifiers-Push-Pull and Complementary Symmetry, Push-Pull amplifiers - Design of power output, efficiency and cross-over distortion.

4. OSCILLATORS 9

Positive feedback - Condition for oscillators - Phase shift - Wein Bridge – Hartley – Colpitts - crystal and saw tooth oscillators - Modelling of simple RLC circuits.

5. PULSE CIRCUITS AND POWER SUPPLIES 9

RC wave shaping circuits - Diode clampers and clippers – Multivibrators –Schmitt triggers - Single and poly phase rectifiers and analysis of filter circuits - Design of zener and transistor series voltage regulators.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. Millman and Halkias, "Electronic Devices and Circuits", Tata McGraw– Hill, 2007.

2. Floyd, T.L, “Electronic Devices” 6th Edition, Pearson Education, 2003.
3. Millman and Halkias, “Integrated Electronics”, McGraw-Hill, 2004.

REFERENCE BOOKS

1. Mottershead, A., “Electronic Devices and Circuits an Introduction”,Prentice Hall of India, 2003.
2. Boylsted and Nashelsky, “Electronic Devices and Circuit Theory”, Prentice Hall of India, 6th Edition, 1999.
3. Streetman, B. and Sanjay, B., “Solid State Electronic Devices”, Prentice- Hall of India, 5th Edition, 2005.
4. Bell, D.A., “Electronic Devices and Circuits”, Prentice Hall of India, 4th Edition, 1999.
5. Millman, J., Prakash Rao., M.S. and Taub, H., “Pulse Digital and Switching Wave Forms”, McGraw-Hill, 2007.

CS1201 OBJECT ORIENTED PROGRAMMING 3 1 0 4

AIM

To understand the concepts of object-oriented programming and master using C++ and Java.

OBJECTIVES:

- To learn object oriented concepts
- To learn C++ and Java languages.

Unit I OOP BASICS 7

Object oriented programming concepts – Objects-Classes- Methods and Messages, Abstraction and Encapsulation - Inheritance- Abstract classes - Polymorphism. Introduction to C++ - Objects – Classes - Constructors and Destructors.

Unit II Polymorphism 12

Operator Overloading - Friend Functions - Type Conversions - Templates - Inheritance –Virtual functions - Runtime polymorphism-Dynamic Binding.

Unit III I/O Basics 8

Exception handling - Streams and Formatted I/O – String I/O – Character I/O – Object I/O- File Handling – Namespaces – String Objects - standard template library.

Unit IV Java Basics 8

Introduction to JAVA , bytecode, virtual machines – objects – classes -constructors– Methods Overloading-static members- overriding methods- Final variables, methods, classes- visibility control - Javadoc – packages – Arrays – Strings.

Unit V Reusability 10

Inheritance – Multiple inheritance -Interfaces and Inner classes - Exception handling – Multithreaded Programming -lifecycle – Thread Exceptions-Streams and I/O - Applets

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. B. Trivedi, “Programming with ANSI C++”, Oxford University Press, 2007.

2. Cay S. Horstmann, Gary Cornell, “Core JAVA volume 1”, Eighth Edition, Pearson Education, 2008.

REFERENCES

1. ISRD Group, “Introduction to Object-oriented Programming and C++”, Tata McGraw-Hill Publishing Company Ltd., 2007.
2. ISRD Group, “Introduction to Object-oriented programming through Java”, Tata McGraw-Hill Publishing Company Ltd., 2007.
3. S. B. Lippman, Josee Lajoie, Barbara E. Moo, “C++ Premier”, Fourth Edition, Pearson Education, 2005.
4. D. S. Malik, “C++ Programming: From Problem Analysis to Program Design”, Third Edition, Thomson Course Technology, 2007.
5. K. Arnold and J. Gosling, “The JAVA programming language”, Third edition, Pearson Education, 2000.
6. C. Thomas Wu, “An introduction to Object-oriented programming with Java”, Fourth Edition, Tata McGraw-Hill Publishing Company Ltd., 2006.

EE1271 ELECTRICAL MACHINES LABORATORY – I 0 1 2 2

AIM

To expose the students to the operation of D.C. machines and transformers and give them experimental skill.

1. Open circuit and load characteristics of D.C separately and self excited shunt Generator
2. Load characteristics of D.C. compound generator with differential and cumulative connection
3. Load characteristics of D.C. shunt and compound motor
4. Load characteristics of D.C series motor
5. Swinburne’s test
6. Speed control of D.C shunt motor
7. Hopkinson’s test on D.C motor – generator set
8. Load test on single-phase transformer
9. Open circuit and short circuit tests on single phase transformer
10. Sumpner’s test on transformers

TOTAL = 45 PERIODS

Detailed Syllabus

1. Open Circuit and Load Characteristics of DC Separately and self excited shunt Generator

Aim

To conduct no load and load test on self and separately excited generators and obtain the characteristics.

Exercise

1. Obtain the open circuit characteristics of a separately and self excited D.C generator and determine critical resistance.

2. Draw the external and internal characteristics of a separately and self excited D.C generator and compute full load regulation.

2. Load Characteristics of D.C. Compound Generator with differential and cumulative connection

Aim

To conduct load test on DC compound generator and obtain the load characteristic curves

Exercise

1. Obtain the following curves for cumulative, differential and shunt generator
   a. I_L Vs V for DC cumulative compound generator
   b. I_L Vs V for DC differential compound generator

All graphs should be drawn on the same graph sheet

3. Load characteristics of DC Shunt and compound motor

Aim

To conduct load test on DC shunt motor and compound motor and draw the characteristic curves

Exercise

1. Draw the following characteristic curves for DC shunt and compound motor
   a. Output Vs η%
   b. Output Vs T
   c. Output Vs N
   d. Output Vs I_L
   e. Torque Vs N

4. Load characteristics of DC series motor

Aim

To conduct load test on DC series motor and draw the characteristics curves

Exercise

1. Draw the following characteristics curve for DC series motor
   a. Output Vs η%
   b. Output Vs T
   c. Output Vs N
   d. Output Vs I
   e. Torque Vs N

5. Swinburne's Test

Aim

To conduct Swinburne's test and predetermine the performance characteristics of DC machine.

Exercise

1. Predetermine efficiency at various load current while operating as a motor and generator and plot a graph output Vs η%
2. Draw the following curves for
   a. I_f Vs N at $V_a = 0.8\ V_a$ and V_a
   b. V_a Vs N at $0.8\ I_f$ and I_f

6. Speed control of DC shunt motor

Aim

To determine the speed control of DC shunt motor by i) Field Control Method and ii) Armature control Method.

Exercise

Draw the following curves For

1) Field current Vs speed
2) Armature voltage Vs speed

7. Hopkinson's Test on DC motor – Generator set

Aim

To conduct Hopkinson's test on a pair of DC shunt machines and determine their efficiency.

Exercise

1. Determine the stray losses of the machines.
2. Obtain efficiency curves for the motor and generator and draw the curves.

8. Load Test on Single-Phase Transformer

Aim

To conduct load test on the given single phase transformer and determine its Performance.

Exercise

1. Draw the following graph for single phase transformer
   a. Output Vs η%

9. Open Circuit and Short Circuit Tests on Single Phase Transformer

Aim

To conduct O.C and S.C test on a single phase transformer and calculate the performances

Exercise

1. Determine the equivalent circuit of the transformer.

2. Predetermine the efficiency at different load at UPF and 0.8 Power factor lagging.

3. Predetermine the full load regulation at different power factor.

4. Draw the following curves

   a. Output Vs η%

   b. Power factor Vs %Regulation

10. Sumpner's Test on transformers

Aim

To conduct Sumpner's test on a pair of identical single phase transformers and predetermine performance.

Exercise

1. Study the paralleling process for two identical transformers.
2. Determine the equivalent circuit parameters of each transformer.
3. Predetermine the efficiency at different loads at 0.8 and 1.0 power factors.
4. To predetermine the full load regulation for different power factors.
5. Draw the following graph
   a. Output Vs %η
   b. Power factor Vs %Regulation

CS1271 OBJECT ORIENTED PROGRAMMING LAB 0 1 2 2

AIM:

To develop object-oriented programming skills using C++ and Java

LIST OF EXPERIMENTS:

1. Function overloading, default arguments in C++
2. Simple class design in C++, namespaces, objects creations
3. Class design in C++ using dynamic memory allocation, destructor, copy constructor
4. Operator overloading, friend functions
5. Overloading assignment operator, type conversions
6. Inheritance, run-time polymorphism
7. Template design in C++
8. I/O, Throwing and Catching exceptions
9. Program development using STL
10. Simple class designs in Java with Javadoc

11. Designing Packages with Javadoc comments
12. Interfaces and Inheritance in Java
13. Exceptions handling in Java
14. Java I/O
15. Design of multi-threaded programs in Java

TOTAL: 45 PERIODS

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER IV

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	MA1203	Numerical Methods	3	1	0	4
2.	MS1201	Environmental Science	3	0	0	3
3.	EE1203	Electrical Machines – II	3	1	0	4
4.	EE1204	Transmission & Distribution	3	1	0	4
5.	EE1205	Control Systems	3	1	0	4
6.	EE1206	Electromagnetic Theory	3	1	0	4
PRACTICAL						
7.	EE1272	Control Systems Laboratory	0	1	2	2
8.	EE1273	Electrical Machines Laboratory – II	0	1	2	2
TOTAL			18	7	4	27

MA1203 NUMERICAL METHODS 3 1 0 4

AIM:

With the present development of Computer Technology, it is necessary to develop efficient algorithms for solving problems in science, Engineering and Technology. This course gives a complete procedure for solving different kinds of problems in engineering numerically.

OBJECTIVE:

To have the basic concepts in numerical methods and find the solutions of large system of linear equations where analytical methods fail to give solution. To gain the ability to solve engineering problems characterized in the form of non- linear ordinary differential equation or partial differential equation.

UNIT I SOLUTION OF EQUATIONS 9

Solution of non-linear equations-Method of false position, Newton Raphson method , Fixed point iteration method – Solution of linear system of Equations-Direct methods: Gaussian elimination and Gauss-Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods- Inverse of a matrix by Gauss-Jordan method.

UNIT II INTERPOLATION 9

Difference Operators-Forward and Backward – Differences of a polynomial -Missing terms-Interpolation for equal intervals- Newton's forward and Backward formula- Interpolation for unequal intervals-Newton's divided difference and Lagrange's formula – Interpolation with a cubic spline .

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation using Newton's Forward, Backward, Newton's divided difference and Lagrange's formula – Numerical integration by Trapezoidal , Simpson's 1/3 and 3/8 rules , Romberg's method – Gaussian Quadrature -Two and three point formulae – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Solution of first order differential equations -Single step Methods : Taylor Series , Euler ,Modified Euler methods and Fourth order Runge-Kutta method . Multi-step methods : Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS 9

Finite difference solution of the second order ordinary differential equations. Classification of partial differential equation- Finite difference solution of one dimensional heat equation by implicit and explicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOK:

1. Venkatraman M.K, "Numerical Methods" Fifth Edition, National Pub. Company, Chennai 2005.

REFERENCES:

1. Kandasamy, P.Thilakavathy, K and Gunavathy, K. "Numerical Methods" Second Edition, S.Chand and Co. New Delhi. 2008
2. Balagurusamy, E., "Numerical Methods", First Edition Tata McGraw-Hill Pub. Co. Ltd., New Delhi, 2009.
3. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2006

MS1201 ENVIRONMENTAL SCIENCE 3 0 0 3

OBJECTIVES

- To provide the students about general aspirants of environment and ecology, the environment pollution and the current social issues.

UNIT I: NATURE OF ENVIRONMENT STUDIES AND NATURAL RESOURCES 9

Environment studies- definition- multi disciplinary nature – scope and importance- need for public awareness- Natural resources- Forest resources- energy resources- food Resources- water resources – land resources - mineral resources.

UNIT II: ECO SYSTEMS AND BIO-DIVERSITY 9

Concept and component of eco systems- producer, consumer, decomposer- structure and function of eco system- food chain and food web- energy flow model- aquatic eco system- forest eco system- desert eco system- pyramid of biomass- ocean eco system- grass land eco system- Bio diversity in India- value of bio diversity- biodiversity threatens- biodiversity protection- In-situ and Ex-situ conservation.

UNIT III: ENVIRONMENTAL POLLUTION 9

Meaning of environmental pollution- air pollution- acid rain – global warming- water pollution- water pollution control- soil pollution- urban waste and soil pollution- marine pollution- noise pollution- thermal pollution- solid and hazardous waste management- waste disposal methods- solid waste and India- natural disaster and disaster management. Low carbon perspectives, Energy savings, Safety and Security

UNIT IV: SOCIAL ISSUES AND THE ENVIRONMENT 9

Unsustainable to sustainable development- sustainable development in India- water conservation, watershed management and water harvesting- environmental ethics- role of engineer in environmental protection- economic aspects of environment.

UNIT V: HUMAN POPULATION AND ENVIRONMENT 9

Population growth- distribution of population- factors affecting variation in population- theories of population- future of human population- family welfare programme- HIV and AIDS- environment and human health- human rights- value education- women and child welfare.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Cunnigham & saigo: 'Environmental science :A global concern' 4th Ed.W.c. Brown Publishers. USA. 1997
2. Chauhan A.S, 'Environmental studies' 2nd revised ed.2004, Jain Brother publishers, New Delhi

REFERENCE BOOKS

1. Benny Joseph : 'Environmental Science and Engineering', 2006, Tata McGraw-Hill Publication.
2. Siddique K.A. : Elements of Ecology and Environmental Pollution, 1st Ed. 2002, Kushal Publication, Varanasi.

EE1203 ELECTRICAL MACHINES – II 3 1 0 4

AIM

To expose the students to the concepts of synchronous and asynchronous machines and analyse their performance.

UNIT: I THREE PHASE INDUCTION MOTOR 9

Constructional details – Types of rotors – Principle of operation – Slip – Equivalent circuit – Torque-slip characteristics - Condition for maximum torque – Losses and efficiency – Load test - No load and blocked rotor tests - Circle diagram; Introduction to double cage rotors , Deep bar motors– Induction generator .

UNIT: II STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR 9

Need for starting – Types of starters – Stator resistance starter, rotor resistance, autotransformer and star-delta starters ; Speed control – V/F Method, Change of voltage, torque, number of poles and slip – Cascaded connection – Slip power recovery scheme.

UNIT: III SINGLE PHASE INDUCTION MOTORS AND SPECIAL MACHINES 9

Constructional details of single phase induction motor – Double revolving field theory and operation – Equivalent circuit –Starting methods of single-phase induction motors; Principle & operation of reluctance motor, Hysteresis motor, repulsion motor, stepper motor and AC series motor.

UNIT: IV SYNCHRONOUS GENERATOR 9

Types of rotors – emf equation – Synchronous reactance, Armature reaction– Voltage regulation – e.m.f, m.m.f, and z.p.f methods – Synchronizing and parallel operation – Synchronizing torque - Change of excitation and mechanical input –Operating characteristics - Capability curves.

UNIT: V SYNCHRONOUS MOTOR 9

Principle of operation –Starting methods– Torque equation – Operation on infinite bus bars – 'V'& inverted 'V' curves for constant power input and power developed – Hunting-

Synchronous Condenser; Application of Synchronous Motor, Introduction to Synchronous induction motor, Permanent magnet synchronous motor.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS

1. D.P. Kothari and I.J. Nagrath, 'Electric Machines', Tata McGraw Hill Publishing Company Ltd, 2002.
2. J.B. Gupta, 'Theory and Performance of Electrical Machines', S.K.Kataria and Sons, 2002.

REFERENCE BOOKS

1. A.E. Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', Tata McGraw Hill publishing Company Ltd, 2003.
2. P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, 2003.
3. K. Murugesh Kumar, 'Electric Machines', Vikas publishing house Pvt Ltd, 2002.
4. Sheila.C.Haran, 'Synchronous, Induction and Special Machines', Scitech Publications, 2001.

EE1204 TRANSMISSION AND DISTRIBUTION 3 1 0 4

AIM

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

UNIT: I INTRODUCTION 9

Structure of electric power system: generation, transmission and distribution; HVDC and EHV AC transmission: Comparison of economics of transmission - Technical performance and reliability; Applications of HVDC.

UNIT: II TRANSMISSION LINE PARAMETERS 9

Types of conductors: Stranded conductors, Bundled conductors; Parameters of single and three phase transmission lines with single and double circuits - Resistance, inductance and capacitance of single phase and three phase overhead lines - Symmetrical and unsymmetrical spacing and transposition; Application of self and mutual GMD; Skin and Proximity effects; Interference with neighboring communication circuits.

UNIT: III MODELLING AND PERFORMANCE OF TRANSMISSION LINES 9

Classification of lines: Short line, medium line and long line - equivalent circuits, phasor diagrams - Transmission efficiency and voltage regulation; Surge impedance, Surge impedance loading; Power flow through a transmission line, Power-angle diagram; Transmission capability limits based on thermal loading, angle and voltage stability considerations; Ferranti effect and Corona loss.

UNIT: IV INSULATORS AND CABLES 9

Insulators: Types, Voltage distribution in insulator string and grading, Improvement of string efficiency. Underground cables: Construction of cables, Advantages of cables - Insulation of cables - grading of cables: Capacitance grading, Intersheath grading; Capacitance measurement in cables, Thermal characteristics of cables, Types of cable fault - Murray loop test - Varley loop test.

UNIT: V SUBSTATION AND DISTRIBUTION SYSTEM 9

Types of substations; Bus-bar arrangements; Substation bus schemes: single bus scheme, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, breaker-and-a-half with two main buses, double bus bar with bypass isolators.

Resistance of grounding systems: Resistance of driven rods, resistance of grounding point electrode, grounding grids; neutral grounding.

Radial and ring-main distributors; interconnectors; AC distribution; sub-mains; stepped and tapered mains.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS

1. B.R. Gupta, 'Power System Analysis and Design', S. Chand, New Delhi, 2003.
2. S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, 2002.

REFERENCE BOOKS

1. Luces M. Fualkenberry, Walter Coffer, 'Electrical Power Distribution and Transmission', Pearson Education, 1996.
2. Hadi Saadat, 'Power System Analysis,' Tata McGraw Hill Publishing Company 2003.
3. M. Jeraldin Ahila, 'Transmission and Distribution' Lakshmi Publications, Chennai 2011.
4. Central Electricity Authority (CEA), 'Guidelines for Transmission System Planning', New Delhi.
5. 'Tamil Nadu Electricity Board Handbook', 2003.

EE1205 CONTROL SYSTEMS 3 1 0 4

AIM

To provide sound knowledge in the basic concepts of linear control theory and design of control system.

UNIT: I SYSTEMS AND THEIR REPRESENTATION 9

Basic elements in control systems-Introduction to linear and non-linear systems – Open and closed loop systems-Advantages of closed loop operation – Modelling of system-Electrical analogy of mechanical system – Transfer function – Block diagram reduction techniques – Signal flow graphs.

UNIT: II TIME RESPONSE 9

Time response – First order system,Second order system.Transient response-Time domain specifications – Types of test input – I and II order system response. Error coefficients – Generalized error series – Steady state error .

UNIT: III FREQUENCY RESPONSE 9

Frequency domain specifications- Frequency response – Bode plot – Polar plot – M & N Circles-Nichols chart – Determination of closed loop response from open loop response – Correlation between frequency domain and time domain specifications.

UNIT: IV STABILITY OF CONTROL SYSTEM 9

Characteristic equation – Location of roots in S plane for stability – Routh Hurwitz criterion – Root locus construction – Effect of pole, zero addition – Gain margin and phase margin – Nyquist stability criterion.

UNIT: V COMPENSATOR DESIGN 9

Introduction to Lag, lead and lag-lead Compensators, Lag Compensator networks, lead Compensator networks, and lag-lead networks – Lag Compensator design using bode plots,Lead Compensator design using bode plots,Lag-lead Compensator using bode plots.

L = 45 T = 15 Total = 60

TEXT BOOKS

1. K. Ogata, 'Modern Control Engineering', 4th edition, Pearson Education, New Delhi, 2003 / PHI.
2. I.J. Nagrath & M. Gopal, 'Control Systems Engineering', New Age International Publishers, 2003.

REFERENCE BOOKS

1. B.C. Kuo, 'Automatic Control Systems', Prentice Hall of India Ltd., New Delhi, 1995.
2. M. Gopal, 'Control Systems, Principles & Design', Tata McGraw Hill, New Delhi, 2002.
3. M.N. Bandyopadhyay, 'Control Engineering Theory and Practice', Prentice Hall of India, 2003.

EE1206 ELECTROMAGNETIC THEORY 3 1 0 4

AIM

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, Waveguides is possible.

OBJECTIVE

- To analyze fields a potentials due to static changes

- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT - I STATIC ELECTRIC FIELDS 9

Introduction to line, Surface and Volume Integrals – Definition of Curl, Divergence and Gradient –Strokes theorem and Divergence theorem. Coulomb's Law in Vector Form – Definition of Electric Field Intensity – Principle of Superposition – Electric Field due to discrete charges – Electric field due to continuous charge distribution - Electric Field due to charges distributed uniformly on an infinite and finite line – Electric Field on the axis of a uniformly charged circular disc – Electric Field due to an infinite uniformly charged sheet. Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line – Potential due to electrical dipole - Electric Flux Density –

UNIT - II STATIC MAGNETIC FIELD 9

The Biot-Savart Law in vector form – Magnetic Field intensity due to a finite and infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I – Ampere's circuital law and simple applications. Magnetic flux density – Force on a wire carrying a current I placed in a magnetic field – Torque on a loop carrying a current I – Magnetic moment – Magnetic Vector Potential.

UNIT - III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

Poisson's and Laplace's equation - Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law – continuity equation for current. Definition of Inductance – Inductance of loops and solenoids Energy density in magnetic fields –magnetic boundary conditions.

UNIT – IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faraday's law – Maxwell's Second Equation in integral form from Faraday's Law – Equation expressed in point form. Displacement current – Ampere's circuital law in integral form – Modified form of Ampere's circuital law as Maxwell's first equation in integral form – Equation expressed in point form. Maxwell's four equations in integral form and differential form- Poynting Vector and the flow of power,Power flow in a Co-axial cable.

UNIT - V ELECTROMAGNETIC WAVES 9

Derivation of Wave Equation – Uniform Plane Waves – Maxwell's equation in Phasor form – Wave equation in Phasor form – Plane waves in free space and in a homogenous material.

Wave equation for a conducting medium – Plane waves in lossy dielectrics – Propagation in good conductors – Skin effect, Depth of penetration, Application of Electromagnetic wave-communication with spacecraft, Range of TV and Radio transmission, Power transmission.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXTBOOKS:

1. Sandeep Wati "Electromagnetic Theory"Mc millan Edition 2011.
2. M.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, Third edition.

REFERENCES

1. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)
2. .Narayana Rao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.
3. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003.. McGraw-Hill, 9th reprint
4. D.Sathiah,M.Anitha "Electromagnetic fields" Scitech publication Chennai 2007 edition.

EE1272 CONTROL SYSTEMS LABORATORY 0 1 2 2

AIM

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

LIST OF EXPERIMENTS

1. Determination of transfer function parameters of a DC servo motor.
2. Determination of transfer function parameters of AC servo motor.
3. Analog simulation of type-0 and type-1 system.
4. Digital simulation of linear systems.
5. Digital simulation of non-linear systems.
6. Design and implementation of compensators.
7. Design of P, PI and PID controllers.
8. Stability analysis of linear systems.
9. Closed loop control system.
10. Study of synchros.

TOTAL: 45 PERIODS

Detailed Syllabus

1. Determination of Transfer Function Parameters of A DC Servo Motor

Aim

To derive the transfer function of the given D.C Servomotor and experimentally determine the transfer function parameters

Exercise

1. Derive the transfer function from basic principles for a separately excited DC motor.
2. Determine the armature and field parameters by conducting suitable experiments.

3. Determine the mechanical parameter by conducting suitable experiments.
4. Plot the frequency response

Equipment

1.DC servo motor : minimum of 100w – field separately excited – loading facility – variable voltage source - 1 No

2. Tachometer : 1 No

3. Multimeter : 2 Nos

4. Stop watch : 1 No

2. Determination Of Transfer Function Parameters Of Ac Servo Motor

Aim

To derive the transfer function of the given A.C Servo Motor and experimentally determine the transfer function parameters

Exercise

1. Derive the transfer function of the AC Servo Motor from basic Principles.
2. Obtain the D.C gain by operating at rated speed.
3. Determine the time constant (mechanical)
4.Plot the frequency response

Equipment

1. AC Servo Motor : Minimum of 100w – necessary sources for main winding and control winding – 1 No
2. Tachometer : 1 No
3. Stopwatch : 1 No
4. Voltmeter : 1 No

3.Analog Simulation Of Type-0 And Type-1 System

Aim

To simulate the time response characteristics of I order and II order, type 0 and type-1 systems.

Exercise

1. Obtain the time response characteristics of type – 0 and type-1, I order and II order systems mathematically.
2. Simulate practically the time response characteristics using analog rigged up modules.
3. Identify the real time system with similar characteristics.

Equipment

1. Rigged up models of type-0 and type-1 system using analog components.

2 Variable frequency square wave generator and a normal CRO - 1 No

(or)

DC source and storage Oscilloscope - 1 No

4. Digital Simulation Of Linear Systems

Aim

To digitally simulate the time response characteristics of higher-order MIMO linear systems using state – variable formulation

Exercise

1. Obtain the state variable formulation of the given higher–order MIMO systems.
2. Write a program or build the block diagram model using the given software.
3. Obtain the impulse, step and sinusoidal response characteristics.
4. Identify real time systems with similar characteristics.

Equipment

1. System with MATLAB / MATHCAD (or) equivalent software - minimum 3 user license.

5. Digital Simulation Of Non-Linear Systems

Aim

To digitally simulate the time response characteristics of a linear system with simple non-linearities like saturation and dead zone.

Exercise

1. Obtain the time response characteristics of some simple linear systems without non - linearity for step and sinusoidal inputs.
2. Repeat the time response characteristics in the presence of non-linearity
3. Discuss the effect of non-linearity

Equipment

1. System with MATLAB / MATHCAD (or) other equivalent software - 3 user license.

6.Design And Implementation Of Compensators

Aim

To design and implement suitable compensator for a given linear system to improve the performance.

Exercise

1. Study the time response characteristics of the given linear system without compensator.
2. Design a suitable compensator to improve the performance.
3. Implement the compensator using variable R,L and C boxes to the linear system and visually observe the performance improvement.

Equipment

1. Analog Rigged up modules of a linear system (For closed loop operation)

2. Variable R, L and C boxes – each - 2 Nos

3. Square wave generator and a CRO - 1 No

(or)

DC voltage source and storage oscilloscope - 1 No

7. Design Of P, PI And PID Controllers

Aim

To design P, PI and PID controllers for first order systems and implement them practically.

Exercise

1. Study the time response behaviour of first order system without controller
2. Design a P/PI/PID controller to improve the performance
3. Implement the controller using variable R,L and C boxes to linear system and visually observe the performance improvement.

Equipment

1. Rigged up module of P, PI and PID controller using analog components

Rigged up module of I order system (with loop closing facility)

Variable R, L and C boxes – 2 each -1 No

(or)

Process control trainer with all the above features

2. CRO and a square wave generator – 1 No

(or)

DC source and a storage oscilloscope – 1 No

8. Stability Analysis Of Linear System

Aim

To analyse the stability of linear systems using Bode / Root locus / Nyquist plot

Exercise

1. Write a program to obtain the Bode plot / Root locus / Nyquist plot for the given system

2.Access the stability of the given system using the plots obtained

3.Compare the usage of various plots in assessing stability

Equipment

1. System with MATLAB / MATHCAD / equivalent software - 3 user license

9. Closed loop control system

Aim

To study the behaviour of closed loop control system

Exercise

1. Obtain the block diagram representation of the given closed loop control system.
2. Conduct experiments to study the open loop time response behaviour for various set points.

3. Conduct experiments to study the closed loop time response behaviour for various set points.
4. Repeat 3 with a second type of controller and discuss the result

Equipment

1.A complete closed loop position / speed / Temperature or equivalent system with two detachable controller units.
2. CRO

10. Study of Synchros

Aim

To study the characteristics of synchros as error detector

Exercise

1. Obtain the input-output characteristics of synchro transmitter by giving excitation to the rotor winding and measuring the output voltages across S1 – S2, S2-S3 and S3-S1 of stator windings for different rotor positions
2. Obtain the characteristics of synchro as angular displacement sensor and plot voltage Vs angle characteristics
3. Obtain the characteristic of synchro used as remote angle displacement of receiver tracks that of transmitter

Equipment

1.	Synchronous (transmitter and Receiver)	: 1 set
2.	Rheostat	: 1 No
3.	Multimeter	: 1 No

EE1273 ELECTRICAL MACHINES LABORATORY – II 0 1 2 2

AIM

To expose the students to the operation of synchronous machines and induction motors and give them experimental skill.

1. Load test on three-phase induction motor.
2. No load and blocked rotor test on three-phase induction motor.
3. Separation of No-load losses of three-phase induction motor.
4. Load test on single-phase induction motor
5. No load and blocked rotor test on single-phase induction motor.
6. Regulation of three phase alternator by emf and mmf methods
7. Regulation of three phase alternator by ZPF and ASA methods
8. Regulation of three phase salient pole alternator by slip test
9. Measurements of negative sequence and zero sequence impedance of alternators.

10. V and Inverted V curves of Three Phase Synchronous Motor.

TOTAL: 45 PERIODS

Detailed Syllabus

1. Load Test On Three Phase Induction Motor

Aim

To obtain the load characteristics of three phase induction motor.

Exercise

1. Conduct the load test on a given three-phase induction motor and draw the following curves.
   1 Output Vs % η
   2. Output Vs Speed
   3. Output Vs Line current
   4. Output Vs Slip
   5. Output Vs Power factor
   6. T Vs N (on separate graph sheet)

2. No Load And Blocked Rotor Test On Three-Phase Induction Motor

Aim

To conduct no load and blocked rotor test and to draw the equivalent circuit and predetermine the performance.

Exercise

1. Determine the equivalent circuit parameters.
2. Draw the circle diagram and predetermine the efficiency, torque, power factor, slip and line current for three load condition.
3. Predetermine the performance characteristics using the equivalent circuit for three load condition.

3. Separation Of No-Load Losses Of Three Phase Induction Motor

Aim

To separate the constant loss of a three phase induction motor and separate into iron loss and mechanical losses.

Exercise

1. Draw the curve voltage Vs Input and separate the constant losses into iron and mechanical loss.
2. Study the star / delta and autotransformer starters internal circuitry arrangements.

4. Load Test On Single Phase Induction Motor

Aim

To obtain the load characteristics of single phase motor by load test.

Exercise

1. Conduct the load test on given single-phase induction motor and draw the following curves.
    1. Output Vs % η
    2. Output Vs Speed
    3. Output Vs Line current I_B
    4. Output Vs Slip
    5. Output Vs Power factor

5. No Load And Blocked Rotor Test On Single Phase Induction Motor

Aim

To conduct no load and blocked rotor test on single phase induction motor and predetermine the performance using equivalent circuit.

Exercise

1. Determine the equivalent circuit parameters from no load and blocked rotor test.
2. To predetermine the efficiency, torque, power factor and line current using the equivalent circuit parameters.

6.Regulation of three phase alternator by EMF and MMF methods

Aim

To predetermine the voltage regulation of given three phase alternator by emf and mmf methods.

Exercise

1. Obtain the open circuit and short circuit characteristics of a three phase alternator.
2 Calculate synchronous impedance from the open circuit characteristics and short circuit characteristics

1. Predetermine the full load regulation at different power factor by EMF and MMF methods and draw the graph between regulation Vs Power factor.

2. Draw the phasor diagram for EMF and MMF method.

7. Regulation of three-phase alternator by ZPF and ASA methods

Aim

To predetermine the voltage regulation of given three phase alternator by ZPF and ASA method

Exercise

a. Obtain the open circuit, short circuit and zero power factor lagging load characteristics.
b. To construct the Potier triangle.
c. Draw the phasor diagram for ZPF and ASA method.
d. Predetermine the full load regulation at different power factor by ZPF and ASA methods.

8..Regulation of three-phase salient pole alternator by slip test

Aim

To predetermine the voltage regulation of a given three phase salient pole alternator.

Exercise

1. Determine the X_d and X_q of the salient pole alternator.
2. To draw the phasor diagram.
3. To predetermine full load regulation at different power factor.

9. Measurements of negative sequence and zero sequence impedances of alternators

Aim

To determine the positive, negative and zero sequence impedance of alternator.

Exercise

1. Determine the positive and negative sequence impedance by suitable test.
2. Determine the zero sequence impedance by suitable test.

10. V And Inverted V Curves Of Three Phase Synchronous Motor

Aim

To determine the V and inverted V curves of three phase synchronous motor.

Exercise

1. Synchronize the synchronous motor to the bus bar.
2. Obtain the V and inverted V curves of the synchronous motor at no load, constant input and constant output.

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B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER V

SI. No	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
THEORY						
1.	MS1202	Professional and Business Ethics	3	0	0	3
2.	EE1207	Power Electronics	3	1	0	4
3.	EE1208	Protection & Switchgear	3	0	0	3
4.	EE1209	Digital Systems	3	1	0	4
5.	EE1210	Fundamentals of DSP for Electrical Engineers	3	1	0	4
6.	EE1211	Linear Integrated Circuit for Electrical Engineers	3	1	0	4
PRACTICAL						
7.	EE1274	Power Electronics and Drives Laboratory	0	1	2	2
8.	EE1275	Analog and Linear Integrated Circuits Lab	0	1	2	2
TOTAL			18	6	4	26

MS1202 PROFESSIONAL AND BUSINESS ETHICS 3 0 0 3

OBJECTIVES

• To create an awareness on Engineering Ethics and Human Values.
• To instill Moral and Social Values and Loyalty
• To appreciate the rights of Others.

UNIT I: HUMAN VALUES 9

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.

UNIT II: ENGINEERING ETHICS 9

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.

UNIT III: ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as experimentation - engineers as responsible experimenters - codes of ethics - a balanced outlook on law - the challenger case study

UNIT IV: SAFETY, RESPONSIBILITIES AND RIGHTS 9

Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime -Professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT V: GLOBAL ISSUES 9

Multinational corporations - Environmental ethics - computer ethics - weapons development - engineers as managers-consulting engineers-engineers as expert witnesses and advisors - oral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of electronics and telecommunication engineers (IETE), India, etc.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw-Hill, New York.1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).

2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics – Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi,2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

EE1207 POWER ELECTRONICS 3 1 0 4

OBJECTIVES

i. To get an overview of different types of power semi-conductor devices and their switching characteristics.
ii. To understand the operation, characteristics and performance parameters of controlled rectifiers.
iii. To study the operation, switching techniques and basic topologics of DC-DC switching regulators.
iv. To learn the different modulation techniques of pulse width modulated inverters and to understand the harmonic reduction methods.
v. To know the practical application for power electronics converters in conditioning the power supply.

1. POWER SEMI-CONDUCTOR DEVICES 9

Structure, operation and static and dynamic characteristics of SCR, TRIAC, power transistor, MOSFET and IGBT, Loss calculation and thermal management of heat sinks - Heat sinks, Commutation circuits and snubber circuits for SCR

2. PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse converters – Operation with R, RL and back emf load- - Effect of source inductance – Line side and load side performance parameters-Dual Converters.

3. DC TO DC CONVERTERS 9

Step-down and step-up choppers with R and RL load: Continuous ans discontinuous conduction – Class A,B,C,D and Class E choppers - Switching mode regulators: Buck, boost, buck-boost and cuk converter - Design of simple choppers.

4. INVERTERS 9

Single phase and three phase (both 120^0 mode and 180^0 mode) inverters - Voltage and harmonic control - PWM techniques: Sinusoidal PWM, modified sinusoidal PWM -, SVPWM technique – Elementary treatment of basic MLI topologies.

5. AC TO AC CONVERTERS 9

Single phase AC voltage controllers – Principle of ON-OFF Control and Phase Control- Sequence control - AC Voltage controllers with PWM control - single and three phase cycloconverters –Introduction to matrix converters.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS

1. Muhammad H. Rashid, 'Power Electronics: Circuits, Devices and Applications', Pearson Education, Third edition, 2004 / PHI.
2. M. D. Singh, K. B. Khanchandani, Tata McGraw-Hill Education, second edition, 2008.
3. Ned Mohan, Tore.M.Undeland, William.P.Robbins, 'Power Electronics: Converters, Applications and Design', John Wiley and sons, third edition, 2003.

REFERENCE BOOKS

1. Cyril.W.Lander, 'Power Electronics', McGraw Hill International, Third edition, 1993.
2. Bimal K. Bose, 'Modern Power Electronics and AC Drives', Pearson Education, 2003.

EE1208 PROTECTION AND SWITCHGEAR 3 0 0 3

OBJECTIVES

1. Discussion on various earthing practices usage of symmetrical components to estimate fault current and fault MVA.
2. Study of Relays & Study of protection scheme, solid state relays.
3. To understand instrument transformer and accuracy.
4. To understand the method of circuit breaking various arc theories Arcing phenomena – capacitive and inductive breaking.
5. Types of circuit breakers.

1. INTRODUCTION 9

Principles and need for protective schemes – nature and causes of faults – types of faults – Power system earthing - Zones of protection and essential qualities of protection – Protection schemes-Representaton of power system protection layout with all protection schemes.

2. OPERATING PRINCIPLES AND RELAY CONSTRUCTIONS 9

Types of relays, principle and applications – Over current, directional, distance, differential and non differential relay, frequency relays– static relays-Earth fault relay-Introduction to numerical relay.

3. EQUIPMENT PROTECTION 9

Equipment protection transformer, generator, motor, protection of bus bars, transmission lines : CTs and PTs and their applications in protection schemes.

4. THEORY OF CIRCUIT INTERRUPTION 9

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 and AC circuit breaking.

5. CIRCUIT BREAKERS 9

Types of Circuit Breakers – Air blast, Air break, oil ,SF_6 and Vacuum circuit breakers – comparative merits of different circuit breakers – Testing of circuit breakers.

TOTAL: 45 PERIODS

TEXT BOOKS

1. M.L. Soni, P.V. Gupta, V.S. Bhatnagar, A. Chakrabarti, '*A Text Book on Power System Engineering*', Dhanpat Rai & Co., 2007.
2. B. Ravindranath, and N. Chander, '*Power System Protection & Switchgear'*, Wiley Eastern Ltd., 1977.

REFERENCE BOOKS

1. Sunil S. Rao, '*Switchgear and Protection'*, Khanna publishers, New Delhi, 1986 .
2. C.L. Wadhwa, '*Electrical Power Systems'*, Newage International (P) Ltd., 2000.
3. R.K.Rajput,*A textbook of Power system Engineering*,*Laxmi Publications*,First Edition Reprint 2007.
4. Badri Ram, Vishwakarma, '*Power System Protection and Switchgear'*, Tata McGraw hill, 2001.
5. Y.G. Paithankar and S.R. Bhide, '*Fundamentals of Power System Protection'*, Prentice Hall of India Pvt. Ltd., New Delhi – 110001, 2003.

EE1209 DIGITAL SYSTEMS 3 1 0 4

1. INTRODUCTION 9

Introduction – Number system, Boolean algebra, Simplification by using K-Map, Error correcting codes, parity, hamming codes, Comparison of RTL, DTL, TTL, ECL, CMOS families

2. COMBINATIONAL CIRCUITS – I 9

Design procedure – Adders-Subtractors – Serial adder/ Subtractor - Parallel adder/ Subtractor, Carry look ahead adder- BCD adder- Magnitude Comparator, LFSR

3. COMBINATIONAL CIRCUITS – II 9

Multiplexer/ Demultiplexer- encoder / decoder – parity checker – code converters. Implementation of combinational logic using MUX, ROM, PAL and PLA- HDL for combinational Circuits

4. SEQUENTIAL CIRCUIT 9

Flip flops-SR, D, JK and T, Classification of sequential circuits, Analysis of clocked synchronous sequential network (CSSN), – Moore and Mealy -Design of Synchronous counters: state diagram- State table –State minimization –State assignment- ASM-Excitation table and maps-Circuit implementation - Universal shift register – Shift counters – Ring counters**.**

5. ASYNCHRONOUS SEQUENTIAL CIRCUITS 9

Design of fundamental mode and pulse mode circuits – primitive state / flow table – Minimization of primitive state table –state assignment – Excitation table – Excitation map- cycles – Races –Hazards: Static –Dynamic –Essential – Hazards elimination.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3.ed., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003 – (Unit I, II, V)
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas publishing house, New Delhi, 2002. (Unit III, IV**)**

REFERENCES

1. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 2nd ed., Vikas Publishing House Pvt. Ltd, New Delhi, 2004
2. Charles H.Roth. “Fundamentals of Logic Design”, Thomson Publication Company, 2003.
3. Donald P.Leach and Albert Paul Malvino, Digital Principles and Applications, 5 ed., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. R.P.Jain, Modern Digital Electronics, 3 ed., Tata McGraw–Hill publishing company limited, New Delhi, 2003.
5. Thomas L. Floyd, Digital Fundamentals, Pearson Education, Inc, New Delhi, 2003.
6. Donald D.Givone, Digital Principles and Design, Tata Mc-Graw-Hill Publishing company limited, New Delhi, 2003.

EE1210 FUNDAMENTALS OF DIGITAL SIGNAL PROCESSING FOR ELECTRICAL ENGINEERS 3 1 0 4

AIM

To study the signal processing methods and processors.

OBJECTIVES

- To study about signals & systems.
- To study DFT ,FFT and its computation
- To study the design techniques for digital filters
- To study the fundamentals of digital signal processors.

UNIT I INTRODUCTION: 9

Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations - Frequency domain representation of discrete time signals and systems.

UNIT II DFT 9

Discrete Fourier series: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT.

UNIT III FFT 9

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT) – Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N.

UNIT IV DIGITAL FILTERS DESIGN 9

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Hamming, Hanning, Bartlett, Kaiser windows – frequency sampling techniques – IIR Filters- Design of Butterworth and Chebyshev Filters - Bilinear transformation – pre warping, impulse invariant transformation.

UNIT V DIGITAL SIGNAL PROCESSORS 9

Introduction to DSP architecture – Harvard architecture - Dedicated MAC unit - Multiple ALUs, Advanced addressing modes, Pipelining, Overview of instruction set of TMS320F28XX series.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS

1. John G Proakis, Dimtris G Manolakis, Digital Signal Processing Principles, Algorithms and Application, PHI, 3rd Edition, 2000.
2. S.Salivahanan, A.Vallavaraj, Gnanapriya, Digital Signal Processing, McGraw-Hill / TMH, 2000.

REFERENCES

1. Alan V Oppenheim, Ronald W Schafer, John R Back, Discrete Time Signal Processing, PHI, 2nd Edition 2000,
2. Avtar singh, S.Srinivasan DSP Implementation using DSP microprocessor with Examples from TMS32C54XX -Thomson / Brooks cole Publishers, 2003
3. http://www.ti.com
4. Johny R.Johnson :Introduction to Digital Signal Processing, Prentice Hall, 1984.
5. S.K.Mitra, “Digital Signal Processing- A Computer based approach”, Tata McGraw-Hill, 1998, New Delhi.
6. B.Venkataramani & M. Bhaskar, Digital Signal Processor Architecture, Programming and Application, TMH 2002. (UNIT – V)

EE1211 LINEAR INTEGRATED CIRCUIT FOR ELECTRICAL ENGINEERS

3 1 0 4

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To teach active filters and oscillators.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce a few special functions integrated circuits and voltage regulators.

UNIT - I CHARACTERISTICS AND APPLICATIONS OF OPERATIONAL AMPLIFIER 9

Op-amp configurations -Pin diagram – Manufacturers –Stages in the operational amplifier ; Ideal op-amp circuit analysis - DC and AC characteristics of ideal op-amp; Application examples-Inverting and Non-inverting amplifiers, summing amplifier, differential amplifier, voltage follower, Differentiator, Integrator, Log and Antilog Amplifier.

UNIT - II ACTIVE FILTERS AND OSCILLATOR 9

First order and Second order ,low pass, high pass , band pass and band reject filters- Design-transfer fiunction –gain characteristics; Wein bridge and Phase shift oscillator, square wave generator, triangular wave generator and saw tooth wave generation, Schmitt trigger-Design – transfer function.

UNIT III ANALOGMULTIPLIER AND PLL 9

Analysis of four quadrant (Gilbert cell) and variable transconductance multipliers, Phase locked loop: Basic Principles of PLL-block diagram-transfer characteristics applications of PLL as FM demodulator, AM demodulator and frequency multiplier, Voltage controlled Oscillator.

UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS 9

Analog switches, High speed sample and hold circuits and sample and hold ICs, Types of D/A converter, Current driven DAC, Switches for DAC, A/D converter-Flash, Single slope, Dual slope, Successive approximation.

UNITV SPECIAL FUNCTION ICS AND VOLTAGE REGULATORS 9

The 555 timer-functional block diagram-astable and monostable operation of 555 Timers, Regulated Power Supplies: Series op-amp rregulators- IC Voltage regulators- -723/317 general purpose switching regulator.,Design of 12V power supply.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOK

1. D.Roy Choudhry, Shail Jain, “Linear Integrated Circuits”, New Age International Pvt. Ltd., 2000.
2. Gray and Meyer, ‘Analysis and Design of Analog Integrated Circuits’, Wiley International, 1995.

REFERENCES

1. Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.
2. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
3. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.
4. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
5. Taub and Schilling, Digital Integrated Electronics, McGraw-Hill, 1997.
6. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972.
7. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits'. Pearson Education, 2004.

EE1274 POWER ELECTRONICS & DRIVES LAB 0 1 2 2

AIM

Real time / simulation study of the characteristics of switching devices and its applications in rectifier, inverter, chopper and resonant converter.

List of experiments with objectives and exercises

1. Characteristics of SCR
2. Characteristics of TRIAC
3. Characteristics of MOSFET and IGBT
4. Transient characteristics of SCR and MOSFET
5. AC to DC fully controlled converter
6. AC to DC half-controlled converter
7. Step down and step up MOSFET based choppers
8. IGBT based single-phase PWM inverter
9. IGBT based three-phase PWM inverter
10. Resonant dc-to-dc converter
11. Single-phase cycloconverter
12. Single phase cascaded multi-level inverter

TOTAL: 45 PERIODS

EE1275 ANALOG AND LINEAR INTEGRATED CIRCUITS LAB 0 1 2 2

Aim:

To understand the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

Design and testing of:

1. Inverting, Non inverting and Differential amplifiers.
2. Integrator and Differentiator.
3. Instrumentation amplifier.
4. Simulation of1,2,3 using ORCAD Software.
5. Active low pass and band pass filter.

6. Astable, Monostable multivibrators and Schmitt Trigger using op-amp.
7. Phase shift and Wien bridge oscillator using op-amp.
8. Astable and monostable using NE555 Timer.
9. PLL characteristics and Frequency Multiplier using PLL.
10. DC power supply using LM317 and LM723.
11. Study of SMPS control IC SG3524 / SG3525.
12. Design of 12V power supply.

TOTAL: 45 PERIODS

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B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

SEMESTER IV

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	IT1212	Cyber Security	3	0	0	3
2.	EE1212	Power System Analysis	3	1	0	4
3.	EE1218	Electrical Measurements & Instrumentation	3	1	0	4
4.	EE1219	Solid State Drives & Control	3	1	0	4
5.	XX2E1	Elective –I	3	0	0	3
6.	XX2E2	Elective –II	3	0	0	3
PRACTICAL						
7.	EE1279	Electrical Measurement & Instrumentation Laboratory	0	1	2	2
8.	EE1280	Power System Simulation Laboratory	0	1	2	2
TOTAL			18	5	4	25

IT1212 CYBER SECURITY 3 0 0 3

AIM

The Course curriculum aims at imparting the fundamentals of cyber crime investigation, the tools used for the investigation, in addition to giving an exposure to the various kinds of cyber security threats and their impact on connected systems/resources.

OBJECTIVES

- The course also gives an exposure to the different types of mechanisms to sanitize the cyber space by adopting standardized operating procedures while transacting business/commerce online, and also to ensure security of information handled over the net.
- Introduction to the Cyber Laws and the IPC/Cr.PC equips the students with sufficient legal knowledge about deterrence in preventing cyber crimes.

UNIT I COMPUTER ORGANIZATION& ARCHITECTURE AND OPERATINGSYSTEMS 6

Computer Organization, Architecture, Operating Systems, Process Management, CPU Scheduling, I/O Memory Management, file systems and deadlocks. LAN, MAN, WAN, ISO/OSI seven layer architecture.

UNIT II INFORMATION SECURITY FUNDAMENTALS 6

Background, Importance, statistics, national and international scenarios. Identification and authentication, confidentiality, privacy, integrity, non-repudiation. Goals of security: prevention, detection and recovery. E-commerce security. Critical Infrastructure Protection.

UNIT III SECURITY THREATS AND VULNERABILITIES 9

Overview of security threats, various kinds of threats; Authentication-weak passwords. Insecure internet connection- internet cookies, viruses and other infections. Security of hard drives, security of laptops; sniffers, backdoors and Trojans. Buffer overflow and other programming bugs. Common attacks- DoS, man-in-the-middle, brute force attacks

UNIT IV OVERVIEW OF SECURITY PRINCIPLES 15

Security policies and procedures, International standards, Security consideration of OS- OS hardening - Internet protocols and security: SSL/TLS, IP Security, Application layer security - Access Control: Physical, Logical and Biometric - Tools and Techniques: Firewalls, Antivirus, IDS, Log analysis, Cryptography, steganography - Security Infrastructure: PKI, VPN, Digital signature - Network scanners, vulnerability scanners - Device Security - Cloud computing security, Database security.

UNIT V CYBER CRIMES. 9

Cyber crimes, Cyber crime Investigation, and Cyber forensic tools. Cyber Laws. Information Technology Act, Cyber laws and cyber crime investigation. Social networks and analysis.

TOTAL: 45 PERIODS

TEXT BOOKS

1. Thomas Calabres and Tom Calabrese, “Information Security Intelligence: Cryptographic Principles & Application”, Thomson Delmar Learning, 2004.
2. Bernadette H Schell, Clemens Martin, “Cyber Crime”, ABC-CLIO Inc, California, 2004.
3. Swiderski, Frank and Syndex, “Threat Modeling”, Microsoft Press, 2004.
4. William Stallings and Lawrie Brown, “Computer Security: Principles and Practice”, Prentice Hall, 2008.

REFERENCES

1. Silberschatz A, Galvin P, Gagne G, "Operating Systems Concepts", John Wiley & Sons, Singapore, 2006.
2. Principles and Practices of Information Security by Michael.E. Whiteman and Herbert .J. Mattord.
3. Cyber Laws by Aparna Viswanathan.
4. Joseph M Kizza, “Computer Network Security”, Springer Verlag, 2005.

EE1212 POWER SYSTEM ANALYSIS 3 1 0 4

OBJECTIVES

i. To model steady-state operation of large-scale power systems and solve the power flow problems using efficient numerical methods suitable for computer simulation.
ii. To model and analyze power systems under abnormal (fault) conditions.
iii. To model and analyze the dynamics of power system for small-signal and large signal disturbances and o design the systems for enhancing stability.

1. THE POWER SYSTEM – AN OVERVIEW AND MODELLING: 9

Modern Power System - Basic Components of a power system - Per Phase Analysis; Generator model - Transformer model - line model. The per unit system - Change of base.

2. POWER FLOW ANALYSIS: 9

Importance of power flow analysis,Introduction - Bus Classification - Bus admittance matrix - Solution of non-linear Algebraic equations - Gauss seidal method – Newon raphson method - Fast decoupled method - Flow charts and comparison of the three methods.

3. FAULT ANALYSIS-BALANCED FAULT 9

Introduction-Importance of short circuit analysis and basic assumptions in short circuit – Balanced three phase fault – short circuit capacity – systematic fault analysis using bus impedance matrix –Nature and causes of faults-Types of faults.

4. FAULT ANALYSIS –UNBALANCED FAULT: 9

Introduction – Fundamentals of symmetrical components – sequence impedances – sequence networks – single line to ground fault – line to line faults - Double line to ground fault – Unbalanced fault analysis,analysis using z bus impedance matrix.

5. POWER SYSTEM STABILITY 9

Basic concepts and definitions – Rotor angle stability – Voltage stability – Mid Term and Long Term stability – Classification of stability – An elementary view of transient stability – Equal area criterion – Reponses to a short circuit fault- factors influencing transient stability – Numerical integration methods – Euler method –Runge – Kutta methods.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS:

1. Hadi Saadat " Power system analysis", Tata McGraw Hill Publishing Company, New Delhi, 2002 (Unit I, II, III, IV)
2. P.Kundur, "Power System Stability and Control", Tata McGraw Hill Publishing Company, New Delhi, 1994 (Unit V)
3. I.J.Nagrath and D.P.Kothari, 'Modern Power System Analysis', Tata McGraw-Hill publishing company, New Delhi, 1990.
4. M.A.Pai,'Computer Techniques in power system Analysis,'Tata McGraw-Hill publishing company,New Delhi,2003.
5. John J.Grainger and W.D.Stevenson Jr.,'Power System Analysis',McGraw-Hill International Book Company,1994.

REFERENCE BOOK:

1. M.A. Pai, 'Computer Techniques in power system Analysis', Tata McGraw – Hill publishing company, New Delhi, 2003.

EE1218 ELECTRICAL MEASUREMENTS AND INSTRUMENTATION 3 1 0 4

UNIT I MEASUREMENT OF VOLTAGE CURRENT AND POWER 9

Functional elements of an instrument – Static and dynamic characteristics – Errors in measurement – Principles and types of analog and digital voltmeter, ammeter-Single and three phase energy meter, wattmeter. Extension of range of meters.

UNIT II RESISTANCE MEASUREMENT 9

Measurement of low,medium and high resistance-Ammeter voltmeter method-Wheatstones bridge-Kelvin double bridge-Ductor ohmmeter-Series and shunt type ohmmeter-High resistance measurement-Megger-Direct deflection methods-Prices guard wire method-Loss of charge method-Earth resistance measurement.

UNIT III IMPEDANCE MEASUREMENT 9

A.C. bridges-Measurement of inductance,capacitance –Q of coil-Maxwell Bridge-Weins bridge-Hey bridge-Scherings bridge-Anderson Bridge –Cambell bridge to measure mutual inductance-Errors in A.C.Bridge methods and their compensation-A.C.galvanometer-Vibration Galvanometer-Localisation of cable faults.

UNIT IV STORAGE AND DISPLAY DEVICES 9

Magnetic disk and tape – Recorders, digital plotters and printers, CRT display, digital CRO, LED, LCD & dot matrix display – Data Loggers

UNIT V TRANSDUCERS 9

Classification of transducers – Selection of transducers – Resistive, capacitive & inductive transducers – Piezoelectric, Hall effect, optical and digital transducers

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXTBOOKS:

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

REFERENCES:

1. Doebelin E.O. and Manik D.N., Measurement Systems – Applications and Design, Special Indian Edition, Tata McGraw Hill Education Pvt. Ltd., 2007
2. H.S. Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, II Edition 2004.
3. D.V.S. Moorthy, 'Transducers and Instrumentation', Prentice Hall of India Pvt Ltd, 2007.
4. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.
5. Martin Reissland, 'Electrical Measurements', New Age International (P) Ltd., Delhi, 2001.
6. Alan. S. Morris, Principles of Measurements and Instrumentation, 2nd Edition, Prentice Hall of India, 2003.

EE1219 SOLID STATE DRIVES AND CONTROL 3 1 0 4

OBJECTIVES

- To understand steady state operation and transient dynamics of a motor load system.
- To study and analyze the operation of the converter / chopper fed dc drive, both qualitatively and quantitatively.
- To study and understand the operation and performance of AC motor drives.
- To analyze and design the current and speed controllers for a closed loop solid state DC motor drive.

UNIT I DRIVE CHARACTERISTICS 9

Elements of Electrical Drives – Equations governing motor load dynamics – Multi-quadrant operation – Components of load torque – Types of loads – Classes of motor duty – Thermal model of motor for heating and cooling - Determination of motor power rating for various duty loads – Steady state stability

UNIT II CONVERTER / CHOPPER FED DC MOTOR DRIVE 9

Single and three phase converter fed DC motor drive – continuous and discontinuous conduction – Chopper control of separately excited dc motor - Time ratio and current limit control – Armature and field control – Constant torque and constant power region - 4 quadrant operation of converter / chopper fed drive.

UNIT III INDUCTION MOTOR DRIVES 9

Stator side control: Principle, characteristics and applications of stator voltage control – v/f control; Rotor side control: Rotor resistance control - Static Kramer and Static Scherbius drives; Introduction to direct and indirect vector control.

UNIT IV SYNCHRONOUS MOTOR DRIVES 9

V/f control and self control of synchronous motor - Margin angle control and power factor control – Permanent magnet synchronous motor drive.

UNIT V DESIGN OF CONTROLLERS FOR DRIVES 9

Transfer function for open loop dc drive system – closed loop control with current and speed feedback - Design of controller: current controller and speed controller-converter selection and characteristics.

L: 45 + T: 15 = TOTAL: 60 PERIODS

TEXT BOOKS:

1. P.C. Sen, “Thyristor DC Drives”, John Wiley and Sons Ltd., New Delhi.
2. Gopal K. Dubey, "Fundamentals of Electrical Drives", Narosa Publishing House,1992.
3. Bimal K.Bose. "Modern Power Electronics and AC Drives", Pearson Education,2002.

REFERENCES:

1. R.Krishnan, "Electric Motor & Drives: Modeling, Analysis and Control", Prentice hall of India, 2001.
2. Gopal K.Dubey, "Power semiconductor controlled Drives”, Prentice Hall Inc., New Jersey, 1989.
3. Murphy J.M.D and Turnbull, "Thyristor Control of AC Motor", Pergamon Press, Oxford 1988.
4. S. K. Pillai, "A First course on Electrical Drives", Wiley Eastern Limited, 1993.

EE1279 ELECTRICAL MEASUREMENT AND INSTRUMENTATION LABORATORY 0 1 2 2

OBJECTIVES

The objective this is, the student acquires sufficient knowledge experience and enhance his capability for handling the equipment and ease of measurement.

1. Statistical analysis of random errors.
2. CRO Measurements.
3. Study of transients.
4. Measurement of medium resistance using Wheatstone’s bridge.
5. Kelvin’s Double Bridge.
6. Calibration of single-phase energy meter.
7. Calibration of wattmeter.
8. Schering and Anderson Bridges.

9. Calibration of ammeter, voltmeter.
10. Study of LVDT.

TOTAL: 45 PERIODS

EE1280 POWER SYSTEM SIMULATION LABORATORY 0 1 2 2

OBJECTIVES

- To understand, the basic aspects of steady state analysis of power systems that are required for effective planning and operation of power systems.
- To understand the basics of economic operation of power system.
- To become familiar with the modeling and analysis of load-frequency and tie-line flow dynamics of a power system with load-frequency controller (LFC) under different control modes.

LIST OF EXPERIMENTS

1. Computation of Parameters and Modeling of Transmission Lines
2. Formation of Bus Admittance and Impedance Matrices and Solution of Networks.
3. Load Flow Analysis - I: Solution of Load Flow and Related Problems Using Gauss-Seidel Method
4. Load Flow Analysis - II: Solution of Load Flow and Related Problems Using Newton-Raphson and Fast-Decoupled Methods
5. Fault Analysis
6. Transient and Small Signal Stability Analysis: Single-Machine Infinite Bus System
7. Electromagnetic Transients in Power Systems
8. Load – Frequency Dynamics of Single- Area and Two-Area Power Systems
9. Economic Dispatch in Power Systems.

TOTAL: 45 PERIODS

NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

NOORUL ISLAM UNIVERSITY, KUMARACOIL

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

CURRICULUM & SYLLABUS

LIST OF ELECTIVES

SL. No.	Course Code	Course Title	L	T	P	C
1	EE12A1	HVDC &FACTS	3	0	0	3
2	EE12A2	High Voltage Engineering	3	0	0	3
3	MS12A1	Total Quality Management Concepts	3	0	0	3
4	NT1202	Introduction to Nano-Science & Technology	3	1	0	4
5	EI12B2	VLSI Design	3	0	0	3

EE12A1 HVDC &FACTS 3 0 0 3

OBJECTIVE

i. To understand the concept, planning of DC power transmission and comparison with AC power transmission.
i. To analyze HVDC converters.
iii. To analyze harmonics and design of filters
iv. To understand the concept of flexible AC transmission and the associated problems.
v. To review the static devices for series and shunt control.

1. INTRODUCTION 9

Introduction of DC Power transmission technology – Comparison of AC and DC transmission – Application of DC transmission – Description of DC transmission system & types of DC links– Planning for HVDC transmission – Modern trends in DC transmission.

2. ANALYSIS OF HVDC CONVERTERS 9

Pulse number – Choice of converter configuration – Simplified analysis of Graetz circuit– Converter bridge characteristics – Characteristics of a twelve pulse converter –Detailed analysis of converters.

3. HARMONICS AND FILTERS 9

Introduction – Generation of harmonics – Design of AC filters and DC filters – Interference with neighboring communication lines. HVDC system simulation and Modeling of HVDC systems for digital dynamic simulation.

4. CONCEPT OF FACTS CONTROLLERS & SCR BASED DEVICES 9

The concept of flexible AC transmission - reactive power control in electrical power transmission lines -uncompensated transmission line – series and shunt compensation. Overview of FACTS devices :Thyrstor Controlled Reactor(TCR)- Thyristor Switched Series capacitor (TCSC) – Static Var Compensator (SVC).

5. IGBT BASED FACTS CONTROLLERS 9

Static Synchronous Compensator (STATCOM) – operating principle – V-I characteristics – Unified Power Flow Controller (UPFC) - IPFC-Principle of operation - modes of operation.

TOTAL: 45 PERIODS

TEXT BOOK

1. Padiyar, K. R., “HVDC power transmission system”, Wiley Eastern Limited, NewDelhi 1990. First edition.
2. Vijay.K.Sood.,”HVDC and FACTS Controllers”,Kluwer Academic Publishers,Boston,2004 edition.
3. Mohan Mathur, R., Rajiv. K. Varma, “Thyristor – Based Facts Controllers for Electrical Transmission Systems”, IEEE press and John Wiley & Sons, Inc.
4. Narain G.Hingorani, Laszio. Gyugyl, “Understanding FACTS Concepts and Technology of Flexible AC Transmission System”, Standard Publishers, Delhi 2001.

REFERENCES

1. Colin Adamson and Hingorani N G, "High Voltage Direct Current Power Transmission", Garraway Limited, London, 1960.
2. Arrillaga, J., "High Voltage Direct Current Transmission", Peter Pregrinus, London, 1983.
3. Rakosh Das Begamudre, "Extra High Voltage AC Transmission Engineering",New Age International (P) Ltd., New Delhi, 1990.
4. A.T.John, "Flexible AC Transmission System", Institution of Electrical and Electronic Engineers (IEEE), 1999.

EE12A2 HIGH VOLTAGE ENGINEERING 3 0 0 3

OBJECTIVES

1. To understand the various types of over voltages in power system and protection methods.
2. Generation of over voltages in laboratories.
3. Measurement of over voltages.
4. Nature of Breakdown mechanism in solid, liquid and gaseous dielectrics – discussion on commercial insulants.
5. Testing of power apparatus and insulation coordination

1. OVER VOLTAGES IN ELECTRICAL POWER SYSTEMS 9

Causes of over voltages and its effect on power system – Lightning, switching surges, surge voltages and their distribution and control, surge specifications. Temporary over voltages - protection against over voltages -Insulation coordination.

2. ELECTRICAL BREAKDOWN IN GASES, SOLIDS AND LIQUIDS 9

Gaseous breakdown: Gaseous breakdown in uniform and non-uniform fields – corona discharges – Townsend's criteria of breakdown in gases- Paschen's law. Liquid breakdown: conduction and breakdown in pure and commercial liquids. Solid breakdown: breakdown mechanisms in solid and composite dielectrics,

3. GENERATION OF HIGH VOLTAGES AND HIGH CURRENTS 9

Generation of High DC, AC, impulse voltages and currents. Tripping and control of impulse generators. Marx circuit -Generation of high impulse current

4. MEASUREMENT OF HIGH VOLTAGES AND HIGH CURRENTS 9

Measurement of High voltages and High currents – digital techniques in high voltage measurement. Measurement of High voltages by fiber optic method.

5. TESTING & INDUSTRIAL APPLICATION OF HIGH VOLTAGE 9

TESTING: High voltage testing of electrical power apparatus – power frequency, impulse voltage and DC testing – International and Indian standards. Application: Electrostatic application; Electrostatic precipitator- electrostatic separator- Electrostatic coating

TOTAL: 45 PERIODS

TEXT BOOK

1. M.S. Naidu and V. Kamaraju, 'High Voltage Engineering', Tata McGraw Hill, 3rd Edition, 2004.
2. E. Kuffel and W.S. Zaengl, 'High Voltage Engineering Fundamentals', Pergamon press, Oxford, London, 1986.

REFERENCE BOOKS

1. E. Kuffel and M. Abdullah, 'High Voltage Engineering', Pergamon press, Oxford, 1970.
2. Ravindra Arora, " High voltage insulation engineering", Wolfgang Mosch, New Age International (p) Limited, 1995

MS12A1 TOTAL QUALITY MANAGEMENT CONCEPTS 3 0 0 3

OBJECTIVE

i) To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
ii) To understand the statistical approach for quality control.
iii) To create an awareness about the ISO and QS certification process and its need for the industries.

UNIT – I INTRODUCTION 9

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT – II TQM PRINCIPLES 9

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 – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

UNIT – III STATISTICAL PROCESS CONTROL (SPC) 9

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT – IV TQM TOOLS 9

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

UNIT – V QUALITY SYSTEMS **9**

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.

TOTAL: 45 PERIODS

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES

1. James R.Evans& William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
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.

NT1202 INTRODUCTION TO NANOSCIENCE AND TECHNOLOGY 3 1 0 4

PREREQUISITE: Nil

AIM: To learn the basic concepts of nanoscale phenomena at the atomic and molecular scale.

OBJECTIVE: The objective of this course is to know the revolutions behind nanotechnology and nanomachines. The student will be clear about the aspects of intermolecular forces, various properties and other phenomena seen in the nanomaterials.

UNIT – I **9**

Background to nanotechnology – Definition for Nanotechnology - Scientific Revolutions – Types of nanotechnology – Top-Down and Bottom-Up – Moore's Law – Basic problems and limitations – Opportunities at the Nanoscale

UNIT – II **9**

Intermolecular forces – hydrophobic – van der Waals – hydrogen bonding – electrical double layer, self-assembly, micelles

UNIT – III **9**

Introduction to 0D, 1D & 2D nanomaterials, introduction to quantum confinement, introduction to quantum mechanical tunneling.

UNIT – IV **9**

Influence of nanosize on electronic transport, ballistic conductivity, quantum hall effect, single domain magnetic nanoparticles, uniaxial anisotropy, superparamagnetism, magnetic thin films – shape anisotropy. Exchange anisotropy

UNIT – V **9**

Grain size effects on strength of metals- Optical properties of quantum dots and metal nanoparticles – Hall – petch relationship – super plasticity.

T: 15 + L: 45 = TOTAL: 60 PERIODS

TEXT BOOKS

1. Ratner, M. A., & Ratner, D. (2003). *Nanotechnology: A gentle introduction to the next big idea*. Upper Saddle River, NJ: Prentice Hall.

REFERENCE BOOKS

1. Wilson, M. (2002). *Nanotechnology: Basic science and emerging technologies*. Boca Raton: Chapman & Hall/CRC.
2. Poole, C. P., & Owens, F. J. (2003). *Introduction to nanotechnology*. Hoboken, NJ: J. Wiley.

EI12A4 VLSI DESIGN 3 0 0 3

1. MOS TECHNOLOGY AND CIRCUITS **9**

MOS Technology and VLSI, Process parameters and considerations for BJT, MOS and CMOS, Electrical properties of MOS circuits and Device modeling.

2. MOS CIRCUIT DESIGN PROCESS **9**

MOS Layers, Stick diagram, Layout diagram, Propagation delays, Examples of combinational logic design, Scaling of MOS circuits.

3. ANALOG VLSI AND HIGH SPEED VLSI **9**

Introduction to Analog VLSI, Realisation of Neural Networks and Switched capacitor filters, Sub-micron technology and GaAs VLSI technology

4. DESIGN OF COMBINATIONAL ELEMENTS **9**

Programmable Logic devices (PLA, CPLD), Introduction to FPGA. Tally circuits – (NAND-NAND, NOR-NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

5. HARDWARE DESCRIPTION LANGUAGES **9**

VHDL background and basic concepts, Structural specifications of hardware design organisation and parametrisation. (Examples: adders, counters, flip flops, Multiplexers / Demltiplexers), Overview of digital design with Verilog HDL.

TOTAL: 45 PERIODS

REFERENCES:

1. Douglas A. Pucknell and Kamran Eshraghian, Basic VLSI Design Systems and Circuits, 3rd edition, Prentice Hall of India Pvt Ltd.2003.
2. A. Albert Raj, T. Latha. VLSI Design. PHI Learning Pvt. Ltd., 2008.
3. N.H.Weste, 'Principles of CMOS VLSI Design', Pearson Eduction, India, 2002.
4. Wayne Wolf, Modern VLSI Design, 2nd Edition, Prentice Hall,1998.
5. Randall .L.Geiger and P.E. Allen, VLSI Design Techniques for Analog and Digital Circuits, McGraw Hill International Company, 1990.
6. Fabricious. E , Introduction to VLSI Design, McGraw Hill, 1990.
7. Navabi .Z., VHDL Analysis and Modeling of Digital Systems, McGraw Hill, 1993.
8. Mohmmed Ismail and Terri Fiez, Analog VLSI Signal and Information Processing, McGraw Hill, 1994.
9. Douglas Perry, 'VHDL Programming by example', Tata McGraw Hill, 3rd Edition, 2003.
10. JayaramBhasker, 'A VHDL Primer' 3rd edition, Prentice Hall PTR, 1999.