KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE-6
(An Autonomous Institution Affiliated to Anna University, Coimbatore)

CURRICULUM 2009

B.E - ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER - I

Code No.	Course Title	L	T	P	C
THEORY					
ENG101	Technical English	2	1	0	3
MAT101	Engineering Mathematics – I	3	1	0	4
PHY101	Engineering Physics	3	0	0	3
CHY101	Engineering Chemistry	3	0	0	3
MEC101	Engineering Graphics	2	0	3	3
CSE101	Programming with 'C'	3	1	0	4
GHE101	Personal Values -I	1	0	0	1
PRACTICAL					
CHY401	Chemistry Laboratory	0	0	3	1
MEC401	Engineering Practices Laboratory	0	0	3	1
CSE401	Programming Laboratory	0	0	3	1

TOTAL PERIODS – 32 **TOTAL CREDIT – 24**

SEMESTER - II

Code No.	Course Title	L	T	P	C
THEORY					
ENG102	English For Pragmatic Usage	1	0	2	2
MAT102	Engineering Mathematics – II	3	1	0	4
PHY104	Materials Science	3	0	0	3
CHY104	Chemistry for Circuit Engineering	3	0	0	3
ECE101	Circuit theory	3	1	0	4
EIE101	Transducer Engineering	3	0	0	3
PRACTICAL					
PHY401	Physics Laboratory	0	0	3	1
CSE451	Advanced Programming Laboratory	0	0	3	1
EIE401	Transducer Laboratory	0	0	3	1
GHE102	Personal Values -II	0	0	2	1

TOTAL PERIODS – 31 **TOTAL CREDIT – 23**

ENG101 TECHNICAL ENGLISH
(Common to all branches of Engineering and Technology)

L	T	P	C
2	1	0	3

OBJECTIVES

- To assist learners enhance their technical jargon and to impart knowledge about the application of technical English.
- To familiarize learners with different rhetorical functions of technical syntax
- To inculcate written proficiency in commercial and business context
- To improve the competency of professional writing with special reference to career related situations
- To provide pragmatic exposure to technical correspondence.

UNIT – I FOUNDATIONS OF TECHNICAL COMMUNICATION 5

Technical Jargon – Formation of engineering & technical vocabulary – Affixing – Derivational jargon – Inflectional Morphemes – Nominal Compounds & technical vocabulary – Acronyms and abbreviations, Concord – Agreement and Government of scientific / technical syntax – Tense – Impersonal passive structure used in engineering & technical texts, Modal verbs, Infinitives and Gerunds

UNIT - II TECHNICAL SYNTAX 5

Kinds of Technical Syntax – Causal expressions – Purpose and functional expressions, Conditional syntax – Four types, Reported speech – Imperative structure – Instructions in industrial situation, Discourse markers – Equipment / Process description, Analytical writing – Writing a paragraph – Scientific text – Juxtaposed technical facts

UNIT – III CORRESPONDENCE IN CORPORATE SECTOR 9

Creating an advertisement, Transcoding – Graphics into text – Text into Charts / Tables – Bar charts – Pie Charts – Flow charts, Editing – Contextual occurrence of common errors – Syntactic & Semantic Errors – Preventive Parameters – General application of articles and preposition – Punctuation – Spelling – Tags – Interrogative structures – Proof reading

UNIT – IV TECHNICAL WRITING 5

Writing abstracts, Note making, Summarizing – Diction – Objective tone, Report writing – Techniques of writing a report – Kinds of Reports – Industrial Report – Project Proposals – Report on the status of a project – Report on the challenges of a project.

UNIT - V GENERAL CORRESPONDENCE 6

Modules of a letter – Official & Demi-Official Letters – Applying for Educational / Car / Home Loans – Internet connection – Joining Report – Leave letter – email correspondence – Industrial visit – Inplant Training – Letter to the Editor, Business Letters – Calling for a quotation – Placing Order – Letter of Complaint – Letter seeking Clarification – Acknowledging prompt / quality service

L: 30 T: 15 Total : 45Hrs

TEXT BOOK

1. Dhanavel.S.P, English and Communication Skills for students of Science & Engineering, Chennai: Orient Blackswan, 2009 (ISBN 13: 9788125037392)

REFERENCES

1. Rizvi Ashraf .M., Effective Technical Communication, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2008.
2. Seely John., The Oxford Guide to Writing and speaking, Oxford University Press, Chennai, 2006.
3. Devadoss K., Professional Communication for Engineers, Inder Publications, Coimbatore, 2009.
4. Devadoss K, & Malathy P., Enhance your Employability, Inder Publications, Coimbatore, 2009.

MAT101 ENGINEERING MATHEMATICS I
(Common to All Branches of Engineering & Technology)

L	T	P	C
3	1	0	4

OBJECTIVES:

On completion of the course the students are expected

- To know eigen values and eigen vectors and diagonalization of a matrix.
- To understand the concepts of three dimensional geometry including plane, straight line and sphere.
- To know about the geometrical aspects of curvature, evolute and envelope.
- To understand the concepts of partial differentiation, maxima and minima.
- To solve ordinary differential equations of certain types.

UNIT – I MATRICES **9**

Eigen values and eigenvectors of a real matrix – Properties of eigen values and eigenvectors- Cayley - Hamilton theorem (excluding proof) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

UNIT – II THREE DIMENSIONAL ANALYTICAL GEOMETRY **9**

Equations of a plane – Equations of a straight line – Coplanar lines – Shortest distance between skew lines – Sphere – Plane section of a sphere – Orthogonal spheres.

UNIT – III GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS **9**

Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature –Evolutes – Envelopes.

UNIT – IV FUNCTIONS OF SEVERAL VARIABLES **9**

Total derivative – Taylor's series expansion – Maxima and minima for functions of two variables – Constrained maxima and minima – Lagrange's multiplier method – Jacobians.

UNIT – V ORDINARY DIFFERENTIAL EQUATIONS **9**

Linear equations of second order with constant coefficients – Euler's and Legendre's linear equations - Method of variation of parameters – Simultaneous first order linear equations with constant coefficients.

L: 45 ,T: 15 Total : 60Hrs

TEXT BOOK

1. Veerarajan T., Engineering Mathematics (for First Year) , Revised Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2007.

REFERENCES

1. Kreyzig E., "Advanced Engineering Mathematics", John Wiley & Sons (Asia) Pvt, Ltd., Singapore, 8th Edition, 2001.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi, 36th Edition, 2001.
3. Venkataraman M.K., "Engineering Mathematics", Volume - II, The National Pub. Co., Chennai, 2003.

4. Kandasamy P., Thilagavathy K., and Gunavathy K., “Engineering Mathematics”, S. Chand & Co., New Delhi, (Re print) 2008.
5. Arunachalam T., “Engineering Mathematics I”, Sri Vignesh Publications, Coimbatore. (Revised) 2009.

PHY101 ENGINEERING PHYSICS
(Common to all branches of Engineering and Technology)

L	T	P	C
3	0	0	3

OBJECTIVES

At the end of the course the students would be exposed to

- To impart fundamental knowledge in various engineering subjects and applications
- Design of acoustically good buildings
- Structure identification of engineering materials
- Non destructive techniques
- Interferometric techniques in metrology, communication and civil engineering
- Application of quantum physics to optical & electrical phenomena
- Application of lasers in engineering and technology.

UNIT – I ACOUSTICS AND ULTRASONICS 9

Classification of sound characteristics of musical sound, Loudness Weber Fechner law Decibel, Phon,-Reverberation Reverberation time, Derivation of Sabine s formula for reverberation time (Rate of Growth and Rate of Decay) Absorption coefficient and its determination - Factors affecting acoustics of buildings (Optimum reverberation time, Loudness, Focussing, Echo, Echelon effect, Resonance and Noise) and their remedies. Ultrasonic production Magnetostriction & piezoelectric methods - Detection Thermal and Piezoelectric methods, properties, Determination of velocity of ultrasonic waves in liquid using acoustic grating - Applications SONAR, Measurement of velocity of blood flow & movement of heart.

UNIT – II CRYSTALLOGRAPHY & NON-DESTRUCTIVE TESTING 9

Space lattice, unit cell, Bravais space lattices, Lattice planes, Miller indices Calculation of inter planar Distance, number of atoms per unit cell, Atomic radius, coordination number & packing factor for simple cubic, BCC, FCC and HCP structures NDT methods: Liquid penetrant method, Ultrasonic flaw detector, X-ray radiography & fluoroscopy. Thermography

UNIT – III WAVE OPTICS 9

Air wedge (theory and experiment) - testing of flat surfaces - Michelson interferometer, Types of fringes, Determination of wavelength of monochromatic source and thickness of a thin transparent sheet - Theory of plane, circularly and elliptically polarized light - quarter and half wave plates, production and analysis of plane, circularly and elliptically polarized light - Photo elasticity Birefringence - effect of a stressed model in a plane polariscope Isoclinic and isochromatic fringes Photo elastic bench

UNIT – IV QUANTUM PHYSICS 9

Planck s quantum theory of black body radiation (Derivations), Photo electric effect - Compton effect (derivation) and Experimental verification of Compton effect Schr dinger wave equation Time independent and time dependent equations (derivation), Physical significance of wave function, particle in a box (in one dimension) electrons in a metal.

UNIT – V LASER & FIBRE OPTICS 9

Einstein s coefficients (A & B), Nd-YAG laser, He-Ne laser, CO2 laser, semiconductor laser - Homo-junction and Hetero-junction (only qualitative description) - Applications

Material processing, CD-ROM & Holography (Qualitative) Optical fibre- Principle and Propagation of light in optical fibres-Numerical aperture and acceptance angle-types of optical fibres Single and Multimode, step index & graded index fibres Applications - Fibre optics communication system, Fibre optic sensors(Displacement and temperature sensors), Medical endoscope.

L: 45, T : 15 Total :60Hrs

TEXT BOOK

1. Avadhanalu.M.N., & Kshirsagar.P.G,, A textbook of Engineering Physics, S.Chand & Company Ltd, New Delhi, 2005.
2. Gaur R.K., & Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003.

REFERENCES

1. Rajendran V., & Marikani A., Applied Physics for Engineers, 3rd Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
2. Gopal.S., Engineering Physics, Inder Publications, Coimbatore, 2006.
3. Arumugam M., Engineering Physics, 5th Edition, Anuradha Agencies, Kumbakonam, 2003.
4. Palanisamy P.K., Physics for Engineers, Vol.1 & Vol.2, 2nd Edition, Scitech publications, Chennai, 2003.

CHY101 ENGINEERING CHEMISTRY
(Common to all branches of Engineering and Technology)

L	T	P	C
3	0	0	3

OBJECTIVES

- To develop a sound knowledge of theoretical and modern technological aspects of applied chemistry.
- To correlate the theoretical principles with application oriented studies.

UNIT – I ELECTROCHEMISTRY 9

Single electrode potential - standard electrodes (Hydrogen & calomel electrodes) - electrochemical series - Nernst equation and problems. Types of electrodes (Metal-metal ion electrode, metal -metal insoluble salt electrode, glass electrode) - determination of pH using glass electrode - application of emf measurements and problems - reversible and irreversible cell - Galvanic cell - Concentration cells - Kohlrausch law of independent migration of ions and its application - Conductometric titration - Polarization - Overvoltage - Decomposition potential.

UNIT – II ENERGY STORING DEVICES 9

Introduction - primary and secondary batteries (dry cells - alkaline batteries, lead acid storage cell, nickel - cadmium cell, lithium battery) - fuel cell (hydrogen and oxygen fuel cell) - photogalvanic cell.

Nuclear Energy Sources

Nuclear fission process - characteristics of nuclear fission - chain reactions - nuclear energy - nuclear reactors (light water nuclear power plant).

UNIT – III THERMODYNAMICS 9

Thermodynamics - thermodynamic processes (isothermal, isobaric, isochoric and adiabatic processes) - internal energy mathematical form of first law – enthalpy - limitation of first law - statement of second law of thermodynamics (Clausius and Kelvin) - definition of entropy - entropy change for a reversible process - entropy change for an isothermal expansion of an ideal gas and problems - definition of free energy and work function - Gibbs Helmholtz equation - applications and problems – Van't Hoff isotherm and isochore - applications and problems.

UNIT – IV SURFACE CHEMISTRY 9

Adsorption: Types of adsorption - adsorption of gases on solids - adsorption isotherm (Freundlich, Langmuir isotherms) - adsorption of solutes from solutions - applications role of adsorption in catalytic reactions - ion exchange adsorption - basic principles in adsorption chromatography.

UNIT – V SPECTROSCOPY 9

Beer Lambert's Law - colorimetric analysis - principles, instrumentation (block diagram only) - estimation of concentration of a solution by colorimetry - flame photometry - theory, instrumentation (block diagram only) and application – UV – Visible & IR spectroscopy - principles, instrumentation (block diagram only) and simple applications.

Total : 45Hrs

TEXT BOOK

1. Jain P.C. and Monika Jain, Engineering Chemistry, Dhanpat Rai Pub. Co. (P) Ltd., New Delhi, 14th edition, 2002.

2. Kuriacose J.C. and Rajaram J., Chemistry in Engineering and Technology, Vol. 1& 2 , Tata McGraw-Hill Publishing Co. Ltd.., New Delhi, 2005.

REFERENCES

1. Bahl B.S., Tuli G.D., and Arun Bahl, Essentials of Physical Chemistry, S.Chand & Co. Ltd., New Delhi, 2004.
2. Somorjai G A, Introduction to Surface Chemistry and Catalysis, John Wiley and Sons. Inc. New York, 1994.
3. Shaw D.J., Introduction to Colloid and Surface Chemistry, Butterworth-heinemann publishers, 1992.
4. Syed Shabudeen P.S., and Shoba U.S., Applied Engineering Chemistry, Inder publications, Coimbatore 2009.

MEC101 ENGINEERING GRAPHICS
(Common to all branches of Engineering and Technology)

L	T	P	C
2	0	3	3

OBJECTIVES

- To understand the principle of orthographic projection of points, lines, surfaces and solids.
- To understand the principle of section and development of solids.
- To understand the principle of Isometric and Perspective projections.
- To study the principle of free-hand sketching techniques.

UNIT- I PLANE CURVES, PROJECTION OF POINTS AND LINES 15

Importance of graphics in design process, visualization, communication, documentation and drafting tools, Construction of curves - ellipse, parabola, and hyperbola by eccentricity method only. Orthographic projection of points.
Projections of straight lines located in first quadrant - determination of true length and true inclinations.

UNIT -II PROJECTIONS OF SURFACES AND SOLIDS 15

Projections of plane surfaces - polygonal lamina and circular lamina, located in first quadrant and inclined to one reference plane., Projection of simple solids - prism, pyramid, cylinder and cone. Drawing views when the axis of the solid is inclined to one reference plane.

UNIT- III SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES 15

Sectioning of simple solids - prisms, pyramids, cylinder and cone. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.
Development of lateral surfaces of truncated prisms, pyramids, cylinders and cones.

UNIT -IV PICTORIAL PROJECTIONS 15

Isometric projection, Isometric scale, Isometric views of simple solids, truncated prisms, pyramids, cylinders and cones.
Perspective projection of prisms and pyramids when its base resting on the ground by vanishing point method.

UNIT -V FREE-HAND SKETCHING 15

Free hand sketching techniques sketching of orthographic views from given pictorial views of objects, including free-hand dimensioning.
Sketching pictorial views from given orthographic views.

L: 30, P: 45 Total : 75Hrs

TEXT BOOK

1. Basant Agrawal and CM Agrawal, Engineering Drawing, McGraw-Hill, New Delhi, First Edition, 2008
2. Venugopal K., and Prabhu Raja V., Engineering Graphics, New Age International (P) Limited, New Delhi , 2008.

REFERENCES

1. Nataraajan K.V, Engineering Drawing and Graphics, Dhanalakshmi Publisher, Chennai, 2005.
2. Warren J. Luzadder and Jon. M.Duff, Fundamentals of Engineering Drawing, Prentice Hall of India Pvt. Ltd., New Delhi, Eleventh Edition, 2005.
3. Gopalakirishna K.R., Engineering Drawing (Vol. I & II), Subhas Publications, 2001.

CSE101 PROGRAMMING WITH 'C'

L	T	P	C
3	1	0	4

OBJECTIVES

- To learn the basic concepts of computing.
- To know the methodology of problem solving.
- To develop skills in programming using C language.

UNIT-I BASICS OF COMPUTERS AND PROGRAMMING LANGUAGES 9

Components of a computer system – Hardware – Software - Problem solving techniques- Program control structures – Programming paradigms – Programming languages- Generations of programming languages -Language translators - Features of programming languages.

UNIT II C FUNDAMENTALS 9

Introduction to C –Overview of compilers and interpreters – Structure of a C program – Programming rules – Executing the program - **C declarations –** Introduction – C character set – Delimiters – C key words – Identifiers – Constants – Variables – Rules for defining variables – Data types – Declaring variables – Initializing variables – Type conversion – Constant and volatile variables - **Operators and Expressions –** Introduction – Priority of operators and their clubbing- Comma and conditional operator- Arithmetic operators- Relational, Logical and Bitwise operators- **Input and Output in C-** Introduction – Formatted and Unformatted functions- Commonly used library functions- **Decision statements –** Introduction **–** *if, if-else,* nested *if-else, break, continue*, *goto, switch ( ),* nested *switch ( ), switch ( ) case* and nested *if* statements - **Loop control statements-** Introduction- *for* loop, nested *for* loop,*while* loop, *do-while* loop, *do- while* statement with *while* loop

UNIT III FUNCTIONS AND ARRAYS 9

Functions – Introduction- Declaration of function and function prototypes-The return statement- Types of functions-Call by value and Call by reference-Function returning more values-Function as an argument- Function with operators - Function and decision statements-Function and loop statements-Functions with arrays and pointers- Recursion- Pointer to function- **Storage class –**Introduction- Automatic, External, Static and Register variables- **Arrays-** Introduction- Array initialization – Definition of array- Characteristic of array-One dimensional array - Predefined Streams - Two dimensional array - Three or multi-dimensional arrays – *sscanf ( )* and *sprintf ( )* functions – Operation with arrays.

UNIT IV STRINGS AND POINTERS 9

Working with strings and Standard functions - Introduction **-** Declaration and initialization of string – Display of strings with different formats – String standard functions – **Pointers –** Introduction – Features of pointers – Pointer declaration – Arithmetic operations with pointers – Pointers and arrays – Pointers and two-dimensional arrays – Array of pointers – Pointers to pointer – Pointers and strings – Void pointers **–Dynamic memory allocation –** Dynamic memory allocation – Memory models – Memory allocation functions.

UNIT V STRUCTURE, UNION AND FILES 9

Structure and Union – Introduction – Features of structures – Declaration and initialization of structures – Structure within structure – Array of structures – Pointer to structure – Structure and functions – Typedef – Bit fields – Enumerated data type – Union – Calling BIOS and DOS services – Union of structures - **Files –** Introduction - Streams and file types – Steps for file operations – File I/O – Structures read and write – Other files functions – Searching errors in reading / writing files – Low level disk I/O – Command line arguments – Application of command line argruments – Environment variables – I/O redirection.

L: 45, T: 15 Total : 60Hrs

TEXT BOOK

1. ITL Education Solutions Limited, A N Kamthane, "Computer Programming ", Pearson Education (India), 2009.

REFERENCES

1. Byron S Gottfried, "Programming with C", Second Edition, Schaum's OuTlines, Tata MCGraw –Hill Publishing Company Limited, 2006.
2. E.Balagurusamy,"Programming in ANSI C", Fourth Edition, TMH, 2007.

GHE101 PERSONAL VALUES - I
(Common to all branches of Engineering and Technology)

L	T	P	C
1	0	0	1

UNIT – I **5**

Introduction – Importance's of Human Excellence – Objectives – Personal Values – definitions- purpose and Philosophy of Human life – Body, Mind and Soul – Physical exercises introductions.

UNIT – II **5**

Introduction - Need and Practice – Analysis of thought – origins of thought and its effect – what you think, you become – Refinement of desire – Physical exercises continuation – Meditations – I stage (Agna Initiation)

UNIT- III **5**

Anger management - What is Anger – Its evil effect - Neutralizations of anger– Practice – Worry – why to Worry – Eradications of worries – Method – Physical exercises – continuation – Meditation – II stage (Santhi Initiation)

Total : 15Hrs

CHY401 CHEMISTRY LABORATORY
(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	3	1

OBJECTIVES

Should be Conversant with the theoretical principles and experimental procedures for quantitative analysis and hands on experience in using analytical equipments.

PREPARATION OF SOLUTIONS (STANDARD)

1. Preparation of normal solutions of the following substances - oxalic acid, sodium carbonate, hydrochloric acid.
2. Preparation of phosphate buffer using Henderson equation.

WATER TESTING

3. Determination of total, temporary and permanent hardness by EDTA method.
4. Estimation of DO by Winkler's method.
5. Estimation of alkalinity by Indicator method.
6. Estimation of chloride by Argentometric method.

ELECTRO CHEMICAL ANALYSIS

7. Estimation of hydrochloric acid by pH metry.
8. Conductometric titration of strong acid and strong base.
9. Conductometric precipitation titration using $BaCl_2$ and Na_2SO_4.
10. Estimation of Iron by potentiometry

PHOTOMETRY

11. Estimation of the Ferrous ions (Thiocyanate method) by Spectrophotmetry.
12. Estimation of sodium and potassium by Flame photometry.

Total : 45Hrs

REFERENCES

1. Jeffery, G.H., Bassett, J., Mendham, J. and Denny, R.C., Vogel's Text Book of Quantitative Chemical Analysis, Oxford, ELBS, London, 2002.
2. Shoemaker D.P. and C.W. Garland., Experiments in Physical Chemistry, Tata McGraw-Hill Pub. Co., Ltd., London, 2003.
3. Shoba, U.S., Sivahari, R. and Mayildurai, R., Practical Chemistry, Inder Publications, Coimbatore, 2009.

MEC401 ENGINEERING PRACTICES LABORATORY
(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	3	1

A. CIVIL ENGINEERING

1. Carpentry

- Study of carpentry tools
- Preparation of T joint
- Preparation of dovetail joint

2. Plumbing

- Study of pipeline joints
- Preparation of plumbing line sketches for water supply.

B. MECHANICAL ENGINEERING

1. Fitting

- Study of fitting tools
- Preparation of L joint
- Preparation of square joint

2. Sheet Metal Working

- Study of sheet metal working tools
- Preparation of cone and tray

3. Welding

- Study of arc welding tools and equipment
- Preparation of butt joint

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Group - II (Electrical & Electronics Engineering)

C. ELECTRICAL ENGINEERING PRACTICE **12**

- Basic household wiring using switches, fuse, indicator-lamp, etc.,
- Preparation of wiring diagrams.
- Stair case light wiring.
- Tube light wiring
- Study of iron-box, fan with regulator, emergency lamp and microwave oven.

D. ELECTRONIC ENGINEERING PRACTICE **12**

List of Experiments

1. Assembling simple electronic component on a small PCB and Testing.
2. Soldering simple electronic circuits and checking continuity.
3. Measurements using digital multimeter.
    - DC and AC voltage measurement
    - DC and AC current measurements.
    - Resistance Measurement.
    - Continuity measurement.
4. Testing of Electronic components
    - Resistors
    - Inductors and capacitors
    - Diodes (resistance in forward bias and reverse bias)
    - Transistors

5. Study of CRO and Function generator
    - Study of Panel Controls
    - Measurement of Amplitude, Frequency, phase difference

.

Total : 45Hrs

CSE401 PROGRAMMING LABORATORY
(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	3	1

LIST OF EXERCISES

1. Practice sessions on the usage of Office package**.**
2. To find the biggest of 3 numbers.
3. To find whether the given number is an Armstrong number.
4. To find the roots of a quadratic equation.
5. To sum the individual digits of an integer.
6. To evaluate the sine series and to generate Fibonacci series.
7. To perform matrix operations
   - Calculation of row sum and column sum
   - To find the maximum and minimum number
   - Addition and multiplication
8. To perform string operations.
9. To check whether a given number is prime or not using functions(use all function prototypes)
10. To compare two strings using pointers.
11. Mark sheet processing using files.

Total : 45Hrs

ENG102 ENGLISH FOR PRAGMATIC USAGE
(Common to all B.E / B.Tech courses)

L	T	P	C
1	0	2	2

OBJECTIVES

To impart the reading comprehension through interpretative and analytic reading exercises, provide exposure to the learners on drafting letters and filling up several applications, improve the level of competency of public speaking with special reference to academic related situations besides, giving practical exposure to professional and formal speaking.

READING COMPREHENSION **10**

1. Exercises to examine the reading comprehension capacity
2. reading for global understanding
3. Reading for specific information
4. Reading for Reviewing (Books, Articles)

TARGETTED WRITING **15**

5. Writing Applications

Opening an SB account and filling bank challans for various purposes
Applying for a Passport
Filling applications for competitive exams
Applying for Medical Leave

6. Drafting Job Application Letters

Writing Resume

7. Writing Statement of Purpose for pursuing higher studies abroad
8. Preparing Notices and Circulars
9. Booking train tickets Online
10. Thematic writing

PUBLIC SPEAKING **10**

11. Appropriate stress and tonal variation
12. Accent neutralization and pronunciation improvement
13. Welcoming a gathering
14. Proposing a Vote of Thanks
15. Compering
16. Presenting one's perception on the picture given
17. Giving Seminars

KINESTHETICS & FORMAL SPEAKING **10**

18. Assessing body language during presentation
19. Involving in constructive conversation
20. Assigning formal situations to enhance the style of telephonic conversation
21. Discriminating assertive and aggressive conversation
22. Power point presentations

Total : 45Hrs

TEXT BOOK

1. Rizvi Ashraf. M, Effective Technical Communication, Tata McGraw Hill Publishing Co., Ltd., New Delhi.

REFERENCES

1. Aruna Koneru , Professional Communication, Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2008.
2. Devadoss, K & Malathy. P, Enhance your Employability, Inder Publications, Coimbatore, 2009

MAT102 ENGINEERING MATHEMATICS II
(Common to CE, AE, ME, MCE, EEE, ECE & EIE branches)

L	T	P	C
3	1	0	4

OBJECTIVES:

On completion of the course the students are expected

- To understand double and triple integrations and enable them to find area and volume using multiple integrals.
- To know the basics of vector calculus comprising gradient , divergence and curl and line, surface and volume integrals.
- To understand analytic function and conformal mappings.
- To know the basics of residues, complex integration and contour integration.
- To understand about Laplace transform and its properties and to solve certain linear differential equations using Laplace transform technique.

UNIT – I MULTIPLE INTEGRALS 9

Double integration – Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in cartesian coordinates – Change of variables between cartesian and polar coordinates.

UNIT –II VECTOR CALCULUS 9

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector
fields - Green's theorem in the plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT – III ANALYTIC FUNCTION 9

Functions of a complex variable – Analytic function – Necessary conditions, Cauchy Riemann equations in Cartesian coordinates and sufficient conditions (excluding proofs) – Properties of analytic function – Construction of analytic function by Milne Thomson method – Conformal mapping $w = z + c$, cz , $1/z$ and bilinear transformation.

UNIT – IV COMPLEX INTEGRATION 9

Cauchy's integral theorem and Cauchy's integral formula (excluding proofs) – Taylor's and Laurent's series expansions – Singularities – Classification – Residues – Cauchy's residue theorem (excluding proof) – Contour integration – Unit circle and semi-circular contours (excluding poles on real axis).

UNIT – V LAPLACE TRANSFORM 9

Laplace Transform – Sufficient conditions – Transforms of elementary functions – Basic properties — Transforms of derivatives and integrals – Transform of periodic functions – Inverse transforms - Convolution theorem – Application to solution of linear ordinary differential equations of second order with constant coefficients.

L: 45, T: 15 Total : 60Hrs

TEXT BOOK

1. Veerarajan T., "Engineering Mathematics" (for First Year), Tata McGraw Hill Pub. Co. Ltd., New Delhi, Revised Edition, 2007.

REFERENCES

1. Kreyzig E., "Advanced Engineering Mathematics", John Wiley & Sons (Asia) Pvt, Ltd., Singapore, 8th Edition, 2001.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi, 36th Edition, 2001.
3. Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics", S. Chand & Co., New Delhi, (Re print) 2008.
4. Arunachalam, T., "Engineering Mathematics II", Sri Vignesh Publications, Coimbatore. (Revised) 2009.

L	T	P	C
3	0	0	3

PHY104 MATERIALS SCIENCE
(Common to Electrical and Electronics Engineering, Electronics and Instrumentation, Computer Science Engineering& Information Technology)

OBJECTIVES

At end of the course students would be exposed to

- Conducting, super conducting, magnetic and dielectric materials in electrical devices.
- Semi conducting, optical and new engineering materials in switching and display devices, data storage.

UNIT – I CONDUCTING MATERIALS 9

Classical free electron theory of metals-electrical conductivity – Thermal conductivity - expression – Wiedemann Franz law(derivation) – Lorentz number – drawbacks of classical theory – Fermi distribution function – density of energy states – effect of temperature on Fermi energy – Superconducting phenomena – properties of superconductors – Meissner effect, Isotope effect, Type I &Type II superconductors – High Tc superconductors - Applications – cryotron, magnetic levitation and squids.

UNIT – II SEMICONDUCTING MATERIALS 9

Origin or band gap in solids (Qualitative treatment only) - Concept of effective mass of an electron and hole – carrier concentration in an intrinsic semi conductor (derivation) – Fermi level – variation of Fermi level with temperature - Electrical conductivity – band gap semiconductor – carrier concentration in n-type and p-type semi conductors (derivation) – Variation of Fermi level with temperature and impurity concentration – Hall effect – Determination of Hall coefficient – experimental set up – Applications.

UNIT – III MAGNETIC & DIELECTRIC MATERIALS 9

Properties of dia, para, ferro, anti ferro and ferri magnetic materials - Langevin's theory of paramagnetism – Determination of paramagnetic susceptibility of a solid Weiss theory of Ferromagnetism – Domain theory of ferromagnetism - hysteresis – soft and hard magnetic materials – Ferrites – Applications - magnetic recording and readout - Storage of magnetic data, Tapes, floppy and magnetic disc drives – magnetic memories – Core memory and Bubble memory - dielectric materials – Electronic ionic, orientation and space charge polarization - Frequency and temperature dependence of polarization – Die electric loss – Dielectric breakdown – different types of break down mechanism - Ferro electric materials - properties and applications.

UNIT – IV NANOTECHNOLOGY AND NEW ENGINEERING MATERIALS 9

Metallic glasses – preparation, properties and applications – shape memory alloys (SMA) – characteristics, properties of NiTi alloy applications advantages and disadvantages of SMA – Nano materials - synthesis - plasma arcing – Chemical vapour deposition – sol-gel - Electro deposition – ball milling – properties of nanoparicles and applications. – Carbon nano tubes – fabrication - arc method – pulsed laser deposition - Chemical vapour deposition - structure, properties & applications.

UNIT – V OPTICAL MATERIALS 9

Optical properties of semiconductors – Excitons- Traps – colour centre – Types of colour centres – luminescence – fluorescence and phosphorescence - liquid crystal display – Dynamics scattering display – Twisted nematic crystal display – Non- linear materials –

second harmonic generation – optical mixing – optical phase conjugation – solitons, IC packaging materials.

Total : 45Hrs

TEXT BOOKS

1. Gaur R.K. and Gupta S.L., Engineering Physics, 8th edition, Dhanpat Rai Publications (P) Ltd., New Delhi, 2003
2. Pillai S.O., Solid State Physics, 5th edition, New Age International Publication, New Delhi, 2003.

REFERENCES

1. Rajendran V. and Marikani A., "Materials Science" Tata McGraw Hill Publishing Company Limited, New Delhi, 2005
2. Gopal.S, "Materials Science" Inder Publications, Coimbatore, 2007.
3. Arumugam M, Materials Science 3rd Edition, Anuradha Agencies, Kumbakonam, 2003.
4. Palanisamy, P.K., Materials Science, 2nd Edition, Scitech Pub. India, Pvt., Ltd., Chennai, 2003

CHY104 CHEMISTRY FOR CIRCUIT ENGINEERING
(Common to Circuit Branches)

L	T	P	C
3	0	0	3

OBJECTIVES

To impart a sound knowledge and modern technological aspects of spectroscopy, polymeric electronic materials, specialty materials, fabrications of IC, 'C's (programming language) application in chemistry.

UNIT- I SPECTROSCOPY 12

General features – Interaction of electromagnetic radiation with matter – regions of electromagnetic radiation with matter – regions of electromagnetic spectrum – absorption and emission of radiation- instruments for optical spectrometry : components, sources, wavelengths selectors (monochromators – gratings), radiation detectors (transducers-photo multiplier tubes-silicon photodiodes- CTD detectors) - signal and double beam instruments – FT spectroscopy - X-ray diffraction - Principles. Using C language to programme to find wave numbers of stokes, Anti stokes Raman Lines and determine the masses of isotopes from rotational and vibrations spectroscopic data.

UNIT- II POLYMERS IN ELECTRONICS 9

Introduction – Liquid crystalline, conducting, piezo and pyro electric polymers. Nano materials lithographic materials, packing materials and encapsulates – applications in electrical and electronic, Computer Science and Information Technology Industries – Polymer composites.

UNIT -III SPECIALTY MATERIALS AND PROGRAMMING IN NUCLEAR ENERGY 9

Dielectrics, insulating materials, soldering materials, magnetic materials, metals and semiconductors – properties - applications in micro electronics.

Using computer language skills, to determine the Half-Life and Average Life of a Radioactive Nucleus: obtain the value of Atomic Mass Unit in MeV: determine the Binding Energy of a Nucleus or a Particle.

UNIT -IV FABRICATION OF IC 6

Fabrication: Oxidation, diffusion, Implantations and thin film process – photolithography and etching – NMOS, PMOS, CMOS, Ga-As technologies- printed circuit boards.

UNIT - V WATER TECHNOLOGY 9

Boiler feed water- Disadvantages of hard water in industries – conditioning methods (external treatment methods (ion exchange methods) - internal treatment (colloidal, phosphate, calgon, and carbonate methods) – desalination (reverse osmosis)

CORROSION SCIENCE

Corrosion: causes of corrosion – principles of electro chemical corrosion – Pilling – Bedworth rule – factors influencing corrosion –corrosion control (cathodic protection - sacrificial anode, corrosion inhibitor).

Total : 45Hrs

TEXT BOOKS

1. Glasstone S., Electrochemistry, 5th edition, Maurice Press, USA.
2. A Chemistry text book for Computer Technologists – K.P.Vinothkumar & M.sirajal meera: Spectrum publications, Nagercoil:2008

REFERENCES

1. Silverstein R. and Webster F.X. Spectrometric identification of organic compounds, sixth edition, John Wiley and sons. Inc. Newyork1998.
2. Syed Shabudeen P.S, Chemistry II, Inder publications, Coimbatore 2009 (revised edition)
3. Barrow, J., Physical chemistry, Fifth edition, Indian edition McGraw Hill limited, India
4. Jain P.C. and Monica Jain, Engineering Chemistry, Dhanpat Rai Publishing company (P) Ltd, New Delhi, 2004.
5. K.V.Raman, Computers in Chemistry, Tata McGraw-Hill Publishing company Limited, New Delhi I print 1996.

ECE101 CIRCUIT THEORY
(For ECE Programme)

L	T	P	C
3	1	0	4

UNIT – I DC CIRCUIT ANALYSIS 10

Basic Components and Electric Circuits: Charge, Current, Voltage and Power, Voltage and Current Sources, Ohm's Laws;

Voltage and Current Laws: Kirchoff's Current Law, Kirchoff's V oltage Law, The Single Node - Pair Circuit, Series and Parallel Connected Independent Sources, Resistors in Series and Parallel, Voltage and Current Division; Basic Nodal and Mesh Analysis: Nodal Analysis, Mesh Analysis.

UNIT – II NETWORK THEOREMS 8

Linearity and Superposition Theorem, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer Theorem , Delta- Wye Conversion.

UNIT – III SINUSOIDAL STEADY ST ATE ANALYSIS 9

Sinusoidal Steady - State Analysis: Characteristics of Sinusoids, The Complex Forcing Function, The Phasor, Phasor Relationships for R, Land C, Impedance and Admittance, Nodal and Mesh Analysis, Phasor Diagrams; AC Circuit Power Analysis: Instantaneous Power, Average Power, Apparent. Power and Power Factor, Complex Power.

UNIT – IV TRANSIENTS AND RESONANCE IN RLC CIRCUITS 9

Basic RL and RC Circuits: The Source-Free RL Circuit, The Source-Free RC Circuit,The Unit-Step Function, Driven RL Circuits, Driven RC Circuits; Frequency Response:Parallel Resonance, Series Resonance.

UNIT – V COUPLED CIRCUITS, DUALITY AND TOPOLOGY 9

Magnetically Coupled Circuits: Mutual Inductance, The Linear Transformer, The IdealTransformer; Duality; An Introduction to Network Topology: Trees and General NodalAnalysis, Links and Loop Analysis.

Total : 45Hrs

TEXTBOOK

1. William H. Hayt, Jr, Jack E. Kemmerly, Steven M. Durbin, "Engineering Circuit Analysis", 6th Edition, Tata MC GrawHill Edition, 2002.
2. Joseph Edministor, Nahvi (Mohmood), “Theory & Problems of Electric Circuits”, 3rd Edition, MC Graw Hill.

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-Hili, 1994.
4. Charles K. Alexander & Mathew N. O. Sadiku, "Fundamentals of Electric Circuits", Second Edition, McGraw-Hili 2003.
5. Fundamentals of R.A. Decarlo and P.M.Lin, "Linear circuit analysis" Oxford press, Reprint Edition 2003

EIE101 TRANSDUCER ENGINEERING

L	T	P	C
3	0	0	3

UNIT- I SCIENCE OF MEASUREMENTS AND INSTRUMENTATION OF TRANSDUCERS 9

Units and standards – Calibration methods – Static calibration – Classification of errors – Error analysis – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

UNIT -II CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Accuracy, precision, resolution, sensitivity, linearity etc.
Dynamic characteristics – Mathematical model of transducer – Zero, I and II order transducers. Response to impulse, step, ramp and sinusoidal inputs.

UNIT- III VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and application of resistance potentiometer, strain gauge, resistance thermometer, thermistor, hot-wire anemometer, piezoresistive sensor and humidity sensor.

UNIT -IV VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS 9

Induction potentiometer – Variable reluctance transducers – EI pick up – LVDT – Capacitive transducer and types – Capacitor microphone – Frequency response.

UNIT- V OTHER TRANSDUCERS 9

Piezoelectric transducer, magnetostrictive – IC sensor – Digital transducers – Smart sensor – Fibre optic transducer.

Total : 45Hrs

TEXT BOOKS

1. E.A. Doebelin, 'Measurement Systems – Applications and Design', Tata McGraw Hill, New York, 1990.
2. A.K. Sawhney, 'A course in Electrical & Electronic Measurement and Instrumentation', Dhanpat Rai and Co (P) Ltd., 2004.

REFERENCES

1. D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999.
2. John P. Bentley, 'Principles of Measurement Systems', III Edition, Pearson Education, 2000.
3. Hermann K.P. Neubert, 'Instrument Transducers', Oxford University Press, 2000.
4. D.V.S Murthy, 'Transducers and Instrumentation', Prentice Hall of India, 2001.
5. S. Ranganathan, 'Transducer Engineering', Allied Publishers Pvt. Ltd., 2003.
6. Al Sutko and J.D. Faulk, 'Industrial Instrumentation', Vikas Publications, Delhi, 1996.

PHY401 PHYSICS LABORATORY
(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	3	1

1. Torsional Pendulum determination of rigidity modulus of wire and moment of inertia of disc.
2. Non Uniform Bending - Young modulus determination
3. Viscosity- Determination of co-efficient of Viscosity of liquid by Poiseuilles flow
4. Lee s disc- Determination of thermal conductivity of a bad conductor
5. Air wedge- Determination of thickness of a thin wire
6. Determination of velocity of sound and compressibility of liquid - Ultrasonic interferometer.
7. Determination of specific resistance of given coil of wire – Carey Foster's Bridge.
8. Spectrometer - Determination of wavelength of Hg source using Grating
9. Determination of wavelength of Laser using Grating and Particle size determination and acceptance angle in an optical fibre.
10. Determination of Band gap of semiconductor material.

Total : 45Hrs

CSE451 ADVANCED PROGRAMMING LABORATORY
(For all branches other than CSE & IT)

L	T	P	C
0	0	3	1

List of Programs
UNIX & C

The following programs are to be executed in Linux environment.
C programs are expected to employ pointers wherever possible.

1. Create a file which contains the student details and perform the following operations.
    a. Display the contents of a file on the screen.
    b. Rename the file
    c. Create a new directory and move the above file into it.
    d. Copy the contents of two files into a third file.

2. Create a file which contains the employee details such as Employee No., Employee Name, Employee Salary, Employee Designation and perform the following operations.
    e. Search for a particular employee.
    f. Create a file containing details of employees with salary greater than 5000 using pipes.

3. List the files and directories created and change the access rights of the employee file as follows.
    g. Only readable
    h. Only writable

4. Write a C program to find the roots of a quadratic equation of the form $ax^2+bx+c=0$. The roots can be calculated using the formula $\frac{-b \pm \sqrt{b2-4ac.}}{2a}$
   Write a function to calculate the roots of the given equation. The function must use three formal parameters to receive the coefficients a, b and c and two pointer parameters to send the roots to the calling function.

5. Write a C program to find the sum of two (nxn) matrices and to print the resultant matrix using pointers.

6. Write a C program to count
    a. No .of characters.
    b. No .of words.
    c. No .of lines / sentences
   in a given text file.

7. Write a C program that compares two text files and returns 0 if they are identical and 1 if they are not identical

MATLAB PROGRAMS

8. Matrices – Addition, subtraction, multiplication, Inverse and Determinant of a matrix calculation.
9. Polynomials –Evaluating & Plotting, determining roots of a polynomial.
10. Polynomial curve fitting.
11. Numerical integration.
12. Differential equations- numerical solution.

Total : 45Hrs

EIE401 TRANSDUCER LABORATORY

L	T	P	C
0	0	3	1

LIST OF EXPERIMENTS

1. Loading effect of potentiometer.
2. Strain gauge & load cell characteristics.
3. Capacitive transducers.
4. Photoelectric tachometer & piezoelectric transducers.
5. Hall effect transducers.
6. Characteristics of LVDT.
7. Characteristics of thermocouple, Thermistor and LDR.
8. Step response characteristics of RTD and thermocouple.
9. P/I and I/P converters.
10. Digital transducer – shaft angle encoder.

Total : 45Hrs

GHE102 PERSONAL VALUES - II

L	T	P	C
0	0	2	1

UNIT – I **5**

Understanding Self – Who am I? – self realisation - our different self – Kaya Kalpam – Theory & practice – physical exercises – Completion – Meditation III stage (Thuria Initiations)

UNIT – II **5**

Harmony between body, mind & soul – physical well being – Exercises practical benefits - Benefits of meditations – benefits of Kaya Kalpa – Applying the practices in Life –

UNIT – III **5**

Personal values – Identifications – Adaptations – Implementations – practices & Benefits – Exercises, Meditation and Kaya Kalpa practices – perceptions.

Total : 15Hrs

KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE – 641 006
(An autonomous Institution affiliated to Anna University, Coimbatore)

CBCS CURRICULUM 2009

B.E ELECTRONICS AND INSTRUMENTATION ENGINEERING

SEMESTER III

Code No.	Course Title	L	T	P	C
THEORY					
MAT104	Engineering Mathematics – III	3	1	0	4
EEE264	Electrical Measurements and Instruments	3	0	0	3
EEE261	Electrical Machines and power systems	3	0	0	3
EIE102	Electronic Circuits	3	0	0	3
CSE201	Data Structures and Algorithms	3	0	0	3
EIE103	Electronic Devices	3	0	0	3
PRACTICAL					
EIE402	Electronic Devices and Circuits Laboratory	0	0	3	1
CSE452	Data Structures and Algorithms Laboratory	0	0	3	1
EEE409	Electrical and Electronic Measurements Laboratory	0	0	3	1
GHE103	Human Excellence - Family Values	0	0	2	1
TOTAL					**23**

TOTAL PERIODS – 30 **TOTAL CREDIT – 23**

SEMESTER IV

Code No.	Course Title	L	T	P	C
THEORY					
MAT108	Numerical methods	3	1	0	4
EEE111	Control Systems	3	0	0	3
EIE105	Electronic Instrumentation	3	0	0	3
ECE103	Digital Electronics	3	0	0	3
EEE106	Linear Integrated Circuits	3	0	0	3
MEC231	Applied Thermodynamics	3	1	0	4
PRACTICAL					
EEE461	Electrical Machines Laboratory	0	0	3	1
MEC422	Thermodynamics and Fluid Mechanics Laboratory	0	0	3	1
GHE104	Human Excellence - Professional Values	0	0	2	1
TOTAL					**23**

TOTAL PERIODS – 28 **TOTAL CREDIT – 23**

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MAT104 ENGINEERING MATHEMATICS III 3 1 0 4
(Common for III Semester CE, ME, MCE, EEE, EIE, ECE &AE)

OBJECTIVES

- To impart analytical skills in the areas of boundary value problems and transform techniques.
- To understand the basic concepts of partial differential equations

1. PARTIAL DIFFERENTIAL EQUATIONS 9

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

2. FOURIER SERIES 9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS 9

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

4. FOURIER TRANSFORM 9

Infinite Fourier transform pair – Infinite Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

5. Z –TRANSFORM 9

Z-transform - Elementary properties – Convolution theorem- Inverse Z – transform (by using partial fractions, residue methods and convolution theorem) - Solution of difference equations using Z - transform.

L: 45 T:15 Total: 60Hrs

TEXT BOOK

1. Veerarajan T., "Engineering Mathematics" (for semester III), Third Edition, Tata McGraw Hill, New Delhi (2007)

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume-III", S. Chand & Company ltd., New Delhi, 1996.
3. Ian Sneddon. , Elements of partial differential equations, McGraw – Hill New Delhi, 2003.
4. Arunachalam T., "Engineering Mathematics I", Sri Vignesh Publications, Coimbatore. (Revised) 2009.

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EEE264 ELECTRICAL MEASUREMENTS AND INSTRUMENTS 3 0 0 3

1. MEASUREMENT OF VOLTAGE AND CURRENT 9

Galvanometers – Ballistic, D'Arsonval galvanometer – Theory, calibration, application – Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter, rectifier type – Extension of range and calibration of voltmeter and ammeter – Errors and compensation.

2. MEASUREMENT OF POWER AND ENERGY 9

Electrodynamometer type wattmeter – Theory & its errors – Methods of correction – LPF wattmeter – Phantom loading – Induction type KWH meter – Calibration of wattmeter, energy meter.

3. **POTENTIOMETERS & INSTRUMENT TRANSFORMERS 9**

DC potentiometer – Basic circuit, standardization – Laboratory type (Crompton's) – AC potentiometer – Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations & applications – C.T and V.T construction, theory, operation, phasor diagram, characteristics, testing, error elimination – Applications.

4. RESISTANCE MEASUREMENT 9

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

5. IMPEDANCE MEASUREMENT 9

A.C bridges – Measurement of inductance, capacitance – Q of coil – Maxwell Bridge – Wein's bridge – Hey's bridge – Schering bridge – Anderson bridge – Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation – Detectors – Excited field – A.C. galvanometer – Vibration galvanometer – Introduction to cable fault and eddy current measurement.

L : 45 Total : 45Hrs

TEXT BOOKS

1. E.W.Golding & F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H.Wheeler & Co, 1994.
2. A.K. Sawhney, 'Electrical & Electronic Measurements and Instrumentation', Dhanpath Rai & Co (P) Ltd, 2004.

REFERENCES

1. J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation', S.K. Kataria & Sons, Delhi, 2003.
2. S.K.Singh, 'Industrial Instrumentation and control', Tata McGraw Hill, 2003.
3. H.S.Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, 1995.
4. Martia U. Reissland, 'Electrical Measurement', New Age International (P) Ltd., 2001.

Signature of the Chairman BOS E & I

EEE261 ELECTRICAL MACHINES AND POWER SYSTEM 3 0 0 3
(Common to III Semester ECE & EIE)

OBJECTIVES

- To introduce the basic concept of machines and its working principles
- To introduce the basic concept of power system transmission

1. D.C. MACHINES 9

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters - Testing, brake test and Swinburne's test – Speed control of D.C. shunt motors.

2. TRANSFORMERS 9

Constructional details – Principle of operation – emf equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

3. INDUCTION MOTORS 9

Construction – Types – Principle of operation of three-phase induction motors – Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

4. SYNCHRONOUS AND SPECIAL MACHINES 9

Construction of synchronous machines-types – Induced emf – Voltage regulation; emf and mmf methods – Brushless alternators – Reluctance motor – Hysteresis motor – Stepper motor.

5. TRANSMISSION AND DISTRIBUTION 9

Structure of electric power systems – Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

L :45 Total: 45Hrs

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, 'Electrical Machine', Tata McGraw Hill publishing company ltd, second edition, 2002.
2. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.

REFERENCES

1. S.K.Bhattacharya, "Electrical Machines", Tata McGraw Hill Publishing company ltd, second edition, 1998.
2. V.K.Mehta and Rohit Mehta, "Principles of Power System", S.Chand and Company Ltd, third edition, 2003.
3. Vincent Del Taro "Electrical Machine and Power System"

Signature of the Chairman BOS E & I

EIE102 ELECTRONIC CIRCUITS 3 0 0 3

1. SMALL-SIGNAL AND LARGE SIGNAL AMPLIFIERS 9

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

2. DIFFERENTIAL AND TUNED AMPLIFIERS 9

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

3. FEEDBACK AMPLIFIER AND OSCILLATORS 9

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

4. PULSE CIRCUITS 9

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

5. RECTIFIERS AND POWER SUPPLY CIRCUITS 9

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

L: 45 Total: 45Hrs

TEXT BOOKS

1. David A. Bell, 'Electronic Devices & Circuits', Prentice Hall of India/ Pearson Education, IV Edition, Eighth printing, 2003.
2. Jacob Millman & Christos.C.Halkias, 'Integrated Electronics: Analog and Digital Circuits and System', Tata McGraw Hill, 1991.

REFERENCES

1. Robert. L. Boylestad & Lo Nashelsky, 'Electronic Devices & Circuit Theory', 8th edition, Pearson Education, Third Indian Reprint, 2002 / PHI.
2. Jacob Millman & Herbert Taub, 'Pulse, Digital & Switching Waveforms', Tata McGraw Hill, Edition 2000, 24th reprint, 2003.
3. Donald L.Schilling and Charles Belove, 'Electronic Circuits', Tata McGraw Hill, 3rd Edition, 2003.

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CSE201 DATA STRUCTURES AND ALGORITHMS 3 0 0 3
(Common to III Semester EEE, ECE & EIE)

OBJECTIVES

- To introduce the concept of arrays, structures, pointers and recursion.
- To study stack, queue and linked list concepts.
- To study about trees, representation of trees, tree traversal and basic operations on trees.
- To study some of the sorting and searching techniques.
- To study the concept of graphs, traversal techniques and minimum spanning tree.

1. PROBLEM SOLVING 9

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

2. LISTS, STACKS AND QUEUES 9

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

3. TREES 9

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing

4. SORTING 9

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

5. GRAPHS 9

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity

L: 45 Total : 45Hrs

TEXT BOOKS

1. R. G. Dromey, "How to Solve it by Computer" (Chaps 1-2), Prentice-Hall of India,2002.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia, 2002.

REFERENCES

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C and C++", 2nd ed, Prentice-Hall of India, 2000.
2. Richard F. Gilberg, Behrouz A. Forouzan, " Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Addison-Wesley Publishing Company, 1983.

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EIE103 ELECTRONIC DEVICES 3 0 0 3

1. SEMICONDUCTOR DIODE 9

Theory of p-n junction – p-n junction as diode – p-n diode currents – Volt-amp characteristics – Diode resistance – Temperature effect of p-n junction – Transition and diffusion capacitance of p-n diode – Diode switching times.

2. BI-POLAR TRANSISTOR 9

Junction transistor – Transistor construction – Detailed study of currents in transistor – Input and output characteristics of CE, CB and CC configurations – Transistor hybrid model for CE configuration – Analytical expressions for transistor characteristics – Transistor switching times – Voltage rating – Power transistors.

3. FIELD EFFECT TRANSITORS 9

Junction field effect transistor – Pinch off voltage – JFET volt-ampere characteristics – JFET small signal model – MOSFETS and their characteristics – FET as a variable resistor – Unijunction transistor.

4. OPTO ELECTRONIC DEVICES 9

Photo emissivity and photo electric theory – Theory, construction and characteristics: light emitting diodes, liquid crystal cell, seven segment display, photo conductive cell, photodiode, solar cell, photo transistor, opto couplers and laser diode.

5. MISCELLANEOUS DEVICES 9

Theory, characteristics and application: SCR, TRIAC, PUT, tunnel diode, thermistors, piezo electric devices, zener diode, charge coupled devices, varactor diode and LDR.

L : 45 Total: 45Hrs

TEXT BOOKS

1. David A.Bell, 'Electronic Devices and Circuits', Prentice Hall of India Private Limited, New Delhi, 2003.

REFERENCES

1. Theodere. F. Bogart, 'Electronic Devices & Circuits', Pearson Education, VI Edition, 2003.
2. Ben G. Streetman and Sanjay Banerjee, 'Solid State Electronic Devices', Pearson Education, 2002 / PHI
3. Allen Mottershead, 'Electronic Devices and Circuits – An Introduction', Prentice Hall of India Private Limited, New Delhi, 2003.
4. Jacob. Millman, Christos C.Halkias, 'Electronic Devices and Circuits', Tata McGraw Hill Publishing Limited, New Delhi, 2003.
5. V.K.Metha, Rohit Metha, 'Principles of Electronics', S. Chand & Co. Ltd., Edition 2006

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EIE402 ELECTRONIC DEVICES AND CIRCUITS LABORATORY 0 0 3 1

AIM

- To study the characteristics and to determine the device parameters of various solid-state devices.

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

P : 45 Total : 45Hrs

Detailed Syllabus

1. Static Characteristics of transistor under CE, CB, CC and determination of hybrid parameters

Aim

To determine the static characteristics of transistor under CE, CB, CC mode.

Exercise

a. Plot the BJT CE, CB and CC input and output characteristics.
b. Determine the h-parameters hi, ho, hr and hf for CE, CB and CC characteristics from I/P and O/P characteristics.

2. Static characteristics and parameter determination of JFET

Aim

To determine the static characteristics of JFET

Exercise

1. Plot the JFET drain characteristics from the results obtained
2. Plot the JFET transfer characteristics from the results obtained.
3. From the drain characteristics for $V_{GS} = 0$ determine the value of the r_D and Y_{OS} parameters.
4. From the transfer characteristic, determine the values of the Y_{fs} parameters at V_{GS} =-1 V and V_{GS} = - 4V.
5. Draw horizontal and vertical scales on the drain characteristics plotted by the XY recorder. Identify each characteristic according to the V_{GS} level. Also, print the JFET type number on the characteristics.

3. Static characteristics of semiconductor diode, zener diode and study of simple voltage regulator circuits

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Aim

1. To determine the static characteristics of semiconductor diode and zener diode
2. To study the simple voltage regulator circuits as Op-amp voltage regulator, source effect and load effect measurement, use of current limiter.

Exercise

Semiconductor diode

1. Plot the forward characteristic of the low – current diode and rectifier diode from the results obtained.
2. From the forward characteristics, determine the approximate forward voltage drop and dc forward resistance for D_2 and for D_2. Also estimate the ac resistance for each diode.
3. Comment on the results of reverse biased diode current measurements.

Zener diode

1. Plot a graph showing the Zener diode reverse characteristics.
2. From the Zener diode reverse characteristics determine the reverse voltage at I_Z = 20 mA. Also determine the dynamic impedance for the device.
3. Calculate the line regulation, load regulation and ripple reduction factor produced by the Zener diode regulator.

Voltage regulator

1. Analyze the voltage regulator circuit for ripple reduction, source effect and load effect. Compare the calculated and measured circuit performance.
2. Plot the regulator current limiting characteristics. Analyze the two current limiter circuits and compare the calculated and measured circuit performances.

4. Static characteristics of UJT and its application as a relaxation oscillator

Aim

To determine the static characteristics of UJT.

Exercise

1. Plot the UJT characteristics from the results obtained.
2. Calculate the intrinsic stand – off ratio from the results obtained.
3. Compare the calculated value with the specified value for the UJT.
4. Discuss the waveforms obtained for the UJT relaxation oscillator investigated. Compare the operating frequency with that calculated frequency.

5. Photodiode, Phototransistor characteristics and study of light activated relay circuit

Aim

1. To draw the characteristics of photodiode, phototransistor.
2. To study the light activated relay circuit.

Exercise

Photodiode

1. Plot the photodiode reverse current upon different level of illumination.

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2. Draw the dc load line for the circuit and determine the diode currents and voltages at different level of illumination.

Phototransistor

1. Draw the output characteristics I_C / V_{CE} of a phototransistor and determine the output voltage at different illumination levels.
2. Bias Phototransistor as a switch. Illuminate the phototransistor to activate a relay.

6. Static characteristics of Thermistors

Aim

To determine the static characteristics of thermistors.

Exercise

1. Draw the resistance / temperature characteristic of a thermistor and determine the resistance value for variations in temperature.
2. Draw the static voltage / current characteristics of a thermistor and determine whether device resistance remains constant until power dissipation is large enough to produce self-heating.
3. Use the thermistor as a temperature-compensating device by increasing the resistance with increasing temperature.

7. Single phase half wave and full wave rectifiers with inductive and capacitive filters

Aim

To construct half wave and full wave rectifiers and to draw their input and output waveforms.

Exercise

1. Plot the input and output waveforms and explain the difference between the two.
2. Explain the effect of open – circuiting of any one diode.
3. Measure the PIV of two-diode full wave rectifier to the bridge rectifier.
4. Calculate the ripple factor of output waveform of inductive and capacitive filter and compare it with measured practical values.

8. Phase shift oscillators and Wien bridge oscillators

Aim

To construct the phase shift oscillator and Wien bridge oscillators and to draw its output waveforms.

Exercise

1. Discuss the phase shift oscillator and Wien bridge oscillator output waveforms obtained from the experiment. Analyze the circuits and compare the calculated and measured frequencies.
2. Change the capacitor values and discuss the results.
3. Analyze the diode amplitude stabilization circuit for the Wien bridge oscillator and compare the calculated output amplitude to that of the measured values.

9. Frequency response of common emitter amplifiers

Aim

To determine the frequency response of common emitter amplifiers.

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Exercise

1. For different values of cut – off frequencies determine suitable values of resistors and capacitors for common emitter amplifiers.
2. Plot the frequency response and determine 3dB bandwidth.

10. Differential amplifiers using FET

Aim

To analyze the characteristics of differential amplifier circuit using FET

Exercise

1. Construct the circuit and
   a. Determine differential gain A_d
   b. Determine common mode gain A_c
   c. Determine the CMRR = A_d / A_c
2. Construct the circuit using common source configuration. Measure i/p – o/p impedance of the circuit.
3. Try the same as common drain circuit (source follower) and check for V_{DD} = 25 V

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CSE452 DATA STRUCTURES & ALGORITHMS LABORATORY 0 0 3 1
(Common to III Semester EEE, ECE & EIE)

OBJECTIVES

- To implement Queue, stack, linked lists and to implement search, sort and traversal Technique.

1. Implementation of Queue using arrays.
2. Implementation of Stack using arrays.
3. Implement List using pointers and perform all possible operations.
4. Linked Queue and Linked Stack implementation.
5. Binary Tree implementation using linked lists and perform insertion and deletion operations.
6. Perform In-order, Pre-order and Post-order traversals on a given binary tree.
7. Sorting algorithms: Quick and Heap sort implementation.
8. Implement binary search algorithm.
9. Implement graph representations.
10. Perform depth-first and breadth-first traversal for a given graph.

P : 45 Total : 45Hrs

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EEE409 ELECTRICAL & ELECTRONIC MEASUREMENTS LABORATORY

0 0 3 1

AIM

- The aim of this lab is to impart the students an adequate knowledge and work experience of the different types of AC and DC bridges, electronic measurement methods for different electronic instruments.

OBJECTIVE

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

1. Measurement of medium resistance using Wheatstone 's bridge.
2. Kelvin's Double Bridge.
3. Calibration of single-phase energy meter.
4. Calibration of wattmeter.
5. Schering and Anderson Bridges.
6. Calibration of ammeter, voltmeter.
7. Statistical analysis of random errors.
8. V / I, I / V converters.
9. CRO Measurements.
10. Study of transients.

P : 45 Total : 45Hrs

Detailed Syllabus

1. Measurement of Medium Resistance Using Wheatstone's Bridge

Aim

To measure the value of unknown resistance using Wheatstone's Bridge.

Exercise

Find the value of unknown resistance.

Procedure

1. Connections are given as per the circuit diagram.
2. Supply is switched on.
3. When the unknown resistance s connected, the bridge becomes unbalanced.
4. The bridge is balanced by varying standard resistance.
5. The value of unknown resistance is calculated by the given formula.
6. The above steps are repeated for different value of unknown resistances.

Equipment

1.	Resistors	– 1 No
2.	Galvanometer	– 1 No
3.	Regulated Power supply	– 1 No
4.	Bread board	– 1 No
5.	Decade resistance box	– 1 No
6.	Multimeter	– 1 No

2. Kelvin's Double Bridge

Aim

To find the unknown value of low resistance using Kelvin's Double

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Bridge.

Exercise

Find the unknown value of low resistance.

Procedure

1. Connections are given as per the circuit diagram.
2. Supply is switched on.
3. The bridge becomes unbalanced when unknown resistance R is connected.
4. The bridge is balanced by varying standard resistance.
5. Unknown resistance is calculated using balance equation.
6. The above steps are repeated for various values of unknown resistance.

Equipment

1. Power supply – 1 No
2. Fixed resistance – 1 No
3. Unknown resistors – 1 No
4. Decade resistance box – 1 No
5. Multimeter – 1 No
6. Galvanometer – 1 No
7. Bred board - 1 No

3. Calibration of Single Phase Energy Meter

Aim

To calibrate the given energy meter using two substandard wattmeters and to obtain percentage error.

Exercise

Calibrate the given energy meter and draw % error Vs load graph.

Procedure

1. Connections are given as per the circuit diagram.
2. The value of load current is adjusted to desire value.
3. When the red mark on the disk of the energy meter passes the observation point, the stopwatch is started and the number of revolution made by the disc is noted.
4. The load current is maintained by adjusting the load.
5. When the disc of the energy meter completes desired number of revolutions the stopwatch is stopped and the time taken is noted.
6. The procedure is repeated for different values of wattmeter reading and time taken, number of revolutions of the disc is noted down.
7. The graph is plotted between percentage error and load.

Equipment

1. Wattmeter – 2 No
2. Voltmeter – 1 No
3. Ammeter – 1 No
4. Resistive load – 1 No

4. Calibration of Wattmeter

Aim

To calibrate the given wattmeter using direct loading.

Exercise

Calibrate the given wattmeter and draw the graph between % error and load current.

Procedure

1. Connections are given as per the circuit diagram.
2. Supply is given at no load condition.
3. Resistive load is applied in steps and the readings are tabulated.
4. Graph is drawn between % error and load current.

Equipment

1. Ammeter – 1 No
2. Voltmeter – 1 No
3. Wattmeter – 1 No
4. Load – 1 No

5(a) Schering's Bridge

Aim

To measure the unknown value of capacitance using Schering's bridge

Exercise

Measure the unknown value of capacitance.

Procedure

1. Connections are given as per the circuit.
2. Supply is witched on.
3. When unknown value of capacitance is connected, bridge becomes unbalanced.
4. The bridge is balanced by varying the standard.
5. The unknown value of capacitance is calculated using the balance equation.
6. The above steps are repeated for different values of unknown capacitances.

Equipment

1. Resistors - Some set.
2. Capacitors – Some set.
3. Decade Resistance box – 1 No.
4. Decade Capacitance box – 1 No.
4. **CRO** **– 1 No.**
6. Function Generator – 1 No.

5(b) Anderson's Bridge

Aim

To measure the unknown value of inductance using Anderson's Bridge

Exercise

Measure the unknown value of inductance.

Procedure

1. Connections are given as per the circuit diagram.
2. Supply is switched on.
3. When unknown value of inductance is connected the bridge becomes unbalanced.
4. The unknown value of inductance is calculated by using the balance equation.
5. The above step are repeated for different values of unknown inductance.

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Equipment

1. Resistors – Some set
2. Decade Inductance box – 1 No.
3. Decade Condenser box – 1 No.
4. Regulated power supply – 1 No.
5. CRO – 1 No.
6. Bread board - 1 No.

6(a) Calibration of Ammeter

Aim

To calibrate the given ammeter using standard ammeter

Exercise

Calibrate the given ammeter and draw the graph between % error and A_s.

Procedure

1. Connections are given as per the circuit diagram.
2. The standard ammeter should be selected properly.
3. Supply is switched on.
4. At no load condition the readings of all the meters are noted.
5. By gradually increasing the load, the respective readings are taken from the meters.
6. The readings are tabulated and % error is calculated from the formula.
7. Graph is drawn between A_s and % error.
8. The procedure is repeated for both ac and dc supply.

Equipment

1. Standard ammeter – 1 No.
2. Ammeter – 1 No.
3. Variable resistive load – 1 No.
4. RPS – 1 No.

6(b) Calibration of Voltmeter

Aim

To calibrate the given voltmeter using standard voltmeter.

Exercise

Calibrate the given voltmeter and draw the graph between % error and V_S.

Procedure

1. Connections are given as per the circuit diagram.
2. The standard voltmeter should be selected properly.
3. Supply is switched on.
4. At no load condition the readings of all the meters are noted.
5. By gradually increasing the voltage, the respective readings are taken from the meters.
6. The readings are tabulated and % error is calculated from the formula.
7. Graph is drawn between V_s and % error.
8. The procedure is repeated for both ac and dc supply.

Equipment

1. Standard voltmeter – 1 No.
2. Voltmeter – 1 No.
3. Auto transformer – 1 No.
4. RPS – 1 No.

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7. Statistical Analysis of Random Errors

Aim

To analyze the measured data statistically.

Exercise

Take a set of data and calculate the arithmetic mean, deviation from the mean, average deviation, standard deviation and variance.

Procedure

1. Connect the voltage source to the load.
2. Measure the load current or load voltage using the digital meter.
3. After taking the reading switch off the supply.
4. Switch on the supply and repeat the experiment.
5. Take 4 readings for same supply voltage or same load current.
6. Using the data calculate the Arithmetic mean, Deviation from the mean, Average deviation, Standard deviation, Variance.

Equipment

1. Digital voltmeter or ammeter of suitable range – 1 No
2. Resistor to act as load – 1 No
3. Voltage source – 1 No

8. Voltage To Current, Current To Voltage Converter

Aim

To construct a current to voltage & Voltage to current converter circuit.

Exercise

Voltage To Current Converter

Observe the changes in o/p current for changes in i/p voltage.

1. Connect the circuit
2. Vary the R.P.S
3. Observe the O/P current

Current To Voltage Converter

Observe the changes in o/p voltage for changes in i/p current.

1. Connect the circuit
2. Vary the i/p current by varying the R.P.S
3. Tabulate the changes in o/p voltage

Equipment

1. IC 741 Trainer kit – 1 No
2. Resistors – A set
3. RPS – 1 No
4. Multimeter – 1 No
5. Ammeter – 1 No
6. Voltmeter – 1 No

9. CRO Measurements

Aim

To determine the unknown frequency & phase angle using CRO BY Lissajous pattern.

Exercise

1. Measure the frequency of a signal.

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2. Measure the Phase angle between any two signals.

Procedure

1. The function generators are connected in the channels of CRO.
2. The unknown frequency is applied to Y-plate and known frequency to X-plate.
3. The known frequency is set to a constant value and unknown frequency is adjusted in multiples or sub multiples of known frequency to get Lissajous pattern.
4. When the pattern becomes stable, these are graphed, tabulated and analysed.

Equipment

1. CRO with probes – 1 No.
2. Function generator – 2 Nos.
3. Connecting wires

10. Study of Transients

Aim

Trace the transient waveform and peek time, settling time.

Exercise

Wire up a RLC circuit and obtain its waveform on CRO. Find out peak time, settling time etc., form the waveform.

Procedure

1. Wire ups as PLC circuit.
2. Give a suitable (Sine wave input).
3. Observe the output waveform storage oscilloscope.
4. Find out peak line setting time etc, from the waveform.

Equipment

1. Breadboard – 1 No.
2. Storage C.R.O. – 1 No.
3. Resisters – A set.
4. Capacitors – A set.
5. Inductors – A set.

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GHE 103 HUMAN EXCELLENCES – FAMILY VALUES 0 0 2 1
(Common to III Semester all Branches)

1. Family value-meaning –Introduction-values-Blessings for family peace-Restraint in family life- harmony in family-Interactive workshop.

2. Blissful married life-Greatness of good family relationship – Family life & Spiritual development.

3. Love and compassion –Greatness of womanhood –Food is medicine (healthy food habits)

4. Simple physical exercises.

5. Kayakalpa Yoga.

6. Sun Rays Therapy

7. Padmasana.

8. Vajrasana.

9. Chakrasana & Viruchasana

10. Meditation

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MAT108 NUMERICAL METHODS 3 1 0 4
(Common for IV Semester ME, CE, MCE, EEE, AE, TXT & EIE)

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

1. NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 9

Linear interpolation method (method of false position) – Iteration method - Newton's method - Solution of linear system by Gaussian elimination and Gauss-Jordan methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods – Inverse of matrix by Gauss – Jordan method.

2. INTERPOLATION 9

Newton's forward and backward difference formulas – Stirling's formula - Divided differences – Newton's divided difference formula - Lagrange's interpolation (derivations are excluded for all methods).

3. NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation: Derivatives by using Newton's forward , backward and divided differences – Derivatives by using Stirling's formula - Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Double integrals using Trapezoidal and Simpson's 1/3 rules.

4. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor's series method – Euler and Improved Euler methods for solving first order equations – Fourth order Runge – Kutta method for solving first and second order equations – Multistep method: Milne's predictor and corrector method.

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5. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of one dimensional heat equation by Bender Schmidt and Crank Nicholson methods – One dimensional wave equation by explicit method and two dimensional Laplace and Poisson equations.

L : 45 T: 15 Total: 60Hrs

TEXT BOOK

1. Venkataraman M.K., "Numerical Methods in Science and Engineering", The National Publishing company, 5th Edition, May 2003.

REFERENCES

1. Gerald C. F. and Wheatley P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Sastry S.S, "Introductory Methods of Numerical Analysis", Third Edition, Prentice – Hall of India Pvt Ltd, New Delhi, 2003.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007.
4. Arunachalam. T., "Numerical Methods", Inder Publications, Coimbatore, 2009.

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EEE111 CONTROL SYSTEMS 3 0 0 3

(Common to IV Semester EIE, AE & V Semester EEE, ECE)

OBJECTIVES

- To introduce the basic concept of control system
- To introduce the basic concept of stability of a system
- To introduce the basic concept of compensator design

1. SYSTEMS AND THEIR REPRESENTATION 9

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors –Block diagram reduction techniques – Signal flow graphs.

2. TIME RESPONSE 9

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feed back control.

3. FREQUENCY RESPONSE 9

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

4. STABILITY OF CONTROL SYSTEM 9

Characteristics equation – Location of roots in S-plane for stability – Routh Hurwitz criterion –Root locus construction – effect of poles, zero addition – Gain margin and phase margin –Nyquist stability criterion.

5. COMPENSATOR DESIGN 9

Performance criteria – Lag, lead and lag-lead networks – Cascade Compensator design usingBode plots.

Total: 45Hrs

TEXT BOOKS

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

REFERENCES

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.

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EIE105 ELECTRONIC INSTRUMENTATION 3 0 0 3

1. ANALOG METERS 9

D.C, A.C voltmeters, ammeters, multimeter, power meter, Q-meter, true RMS meter, vector impedance meter, vector voltmeter, component measuring instrument.

2. SIGNAL GENERATORS AND ANALYZERS 9

Sine wave generator – Frequency synthesized sine wave generator – Sweep frequency generator, pulse and square wave generator – Function generator – Wave analyzer – Applications – Harmonic distortion analyzer – Spectrum analyzer – Applications – Audio Frequency generator – Noise generator.

3. CATHODE RAY OSCILLOSCOPE 9

General purpose oscilloscope – Screens for CRT graticules – Vertical & horizontal deflection systems – Delay line – Multiple trace – Dual beam & dual trace – Probes – Oscilloscope techniques – Special oscilloscopes – Storage oscilloscopes – Sampling oscilloscope – Digital CRO.

4. DIGITAL INSTRUMENTS 9

Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count – Digital voltmeter – Types – Automatic polarity indication, automatic ranging, auto zeroing – DMM – Microprocessor based DM0M – DPM – IEEE 488 bus.

5. DISPLAY AND RECORDING DEVICES 9

LED, LCD and Dot Matrix Display – X-Y recorders, magnetic tape recorders – Digital recording – Data loggers Interference and screening – Electrostatic and Electromagnetic interference & earth loops.

L : 45 Total : 45Hrs

TEXT BOOKS

1. Albert D. Helfrick & William D. Cooper, 'Modern Electronic Instrumentation & Measurement Techniques', Prentice Hall of India, 2002.
2. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.

REFERENCES

1. B.M.Oliver and J.M.cage, 'Electronic Measurements & Instrumentation', McGraw Hill International Edition, 1975.
2. Joseph. J. Carr, 'Elements of Electronic Instrumentation & Measurements', III edition, Pearson Education, 2003.
3. C.S. Rangan, G.R. Sarma, V.S.V. Mani, 'Instrumentation Devices & Systems', Tata McGraw Hill, 2002.
4. D. A. Bell, 'Electronic Instrumentation and Measurements', Prentice Hall of India, 2002.

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ECE103 DIGITAL ELECTRONICS 3 0 0 3
Common for III semester CSE, ECE, IT,MCE & IV semester EEE, EIE)

OBJECTIVES

- To introduce the basic concept of Hardware Components
- To introduce the basic of circuit design with fundamental hardware components

1. NUMBER SYSTEM AND BASIC LOGIC 10

Number systems-Binary, Octal, Hexadecimal, Number base conversions , Binary codes: Weighted codes-BCD - 8421-2421, Non Weighted codes - Gray code - Excess 3 code Binary arithmetic,1's complements , 2's complements, and Code conversions.
Boolean algebra , Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality – AND, OR, NOT NAND & NOR operation, Minterm- Maxterm- Canonical forms - Conversion between canonical forms, sum of product and product of sum forms. Karnaugh map Minimization – Don't care conditions, Tabulation method.

2. COMBINATIONAL CIRCUITS 9

Problem formulation and design of combinational circuits, adder , subtractor, Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator , parity checker , Encoder , decoder, Multiplexer/ Demultiplexer , code converters, Function realization using gates and multiplexers.

3. SEQUENTIAL CIRCUIT 9

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation –Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Synchronous Binary counters –Modulo–n counter- Decade - BCD counters.

4. DESIGN OF SEQUENTIAL CIRCUITS 9

Classification of sequential circuits – Moore and Mealy - Design of Asynchronous counters- state diagram- State table –State minimization –State assignment- Register – shift registers - Universal shift register –Ring counters. Hazards: Static - Dynamic.

5. DIGITAL LOGIC FAMILIES AND PLD 8

Memories – ROM, PROM, EEPROM, RAM.– Programmable Logic Devices: Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Implementation of combinational logic using PROM and PLA, Introduction to FPGA- Digital logic families :TTL,ECL,CMOS.

Total : 45Hrs

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson- Vikas Publishing House, New Delhi, 2002.

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REFERENCES

1. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design",Second Edition, 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 Edition., Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.
4. R.P.Jain, "Modern Digital Electronics", Third Edition., 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.

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EEE106 LINEAR INTEGRATED CIRCUITS 3 0 0 3
(Common for IV semester EEE, ECE & EIE)

OBJECTIVES

- To introduce the basic of integrated circuits technology, types of IC's and their applications.

1. IC FABRICATION 9

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realization of MOS, CMOS and BJT ICs – packaging.

2. CHARACTERISTICS OF OPAMP 9

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp – summation, differentiator and integrator.

3. APPLICATIONS OF OPAMP 9

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

4. SPECIAL ICs 9

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

5. APPLICATION ICs 9

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

L : 45 Total : 45Hrs

TEXT BOOKS

1. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI.
2. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

REFERENCES

1. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', Tata McGraw Hill, 2003.
2. Robert F.Coughlin, Fredrick F.Driscoll, 'Op-amp and Linear ICs', Pearson Education, 4th edition, 2002 / PHI.
3. David A.Bell, 'Op-amp & Linear ICs', Prentice Hall of India, 2nd edition, 1997.

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MEC231 APPLIED THERMODYNAMICS 3 1 0 4

1. BASIC CONCEPTS AND LAWS OF THERMODYNAMICS 12

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

2. IC ENGINES AND GAS TURBINES 8

Air standard cycles: Otto, diesel and dual cycles and comparison of efficiency - Working Principle of four stroke and two stroke engines - Working principle of spark ignition and compression ignition engines - Applications of IC engines - Normal and abnormal combustion - Working principle of four stroke and two stroke engines - Working principle of spark ignition and compression ignition engines - Applications of IC engines.
Open and closed cycle gas turbines – Ideal and actual cycles - Brayton cycle - Cycle with reheat, intercooling and regeneration – Applications of gas turbines for aviation and power generation.

3. STEAM BOILERS AND TURBINES 8

Formation of steam - Properties of steam – Use of steam tables and charts – Steam power cycle (Rankine) - Modern features of high-pressure boilers – Mountings and accessories – Testing of boilers.
Steam turbines: Impulse and reaction principle – Velocity diagrams – Compounding and governing methods of steam turbines (qualitative treatment only) - Layout diagram and working principle of a steam power plant.

4. COMPRESSORS, REFRIGERATION AND AIR CONDITIONING 8

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

5. HEAT TRANSFER 9

One-dimensional Heat Conduction: Plane wall – Cylinder – Sphere - Composite walls – Critical thickness of insulation –Heat transfer through extended surfaces (simple fins).
Convection: Free convection and forced convection - Internal and external flow - Empirical relations - Determination of convection heat transfer co-efficient by using Dittus–Baetter equation.

Signature of the Chairman BOS E & I

Radiation: Black–Gray bodies - Radiation Shape Factor (RSF) - Cooling of electronic components: Thermoelectric cooling – Chip cooling.

L : 45 T : 15 Total : 60Hrs

TEXT BOOKS

1. P.K. Nag, 'Basic and Applied Engineering Thermodynamics', Tata McGraw Hill, New Delhi, 2002.
2. B.K. Sachdeva, 'Fundamentals of Engineering Heat and Mass Transfer (SI Units)', New Age International (P) Limited, Chennai, 2003.

REFERENCES

1. Rogers and Mayhew, 'Engineering Thermodynamics – Work and Heat Transfer', Addision Wesley, New Delhi, 1999.
2. Eastop and McConkey, 'Applied Thermodynamics', Addison Wesley, New Delhi. 1999.
3. M.L. Mathur and F.S. Metha, 'Thermal Engineering', Jain Brothers, New Delhi, 1997.
4. B.K. Sankaar, 'Thermal Engineering', Tata McGraw Hill, New Delhi, 1998.

Signature of the Chairman BOS E & I

EEE461 ELECTRICAL MACHINES LABORATORY 0 0 3 1
(Common to III Semester ECE & IV Semester EIE)

1. Open circuit and load characteristics of separately excited and self excited D.C. generator
2. Open circuit and load characteristics of self-excited D.C. generator.
3. Load test on D.C. shunt motor.
4. Load test on D.C. series motor.
5. Speed control of D.C. shunts motor.
6. Load test on single phase transformer
7. Open circuit and short circuit test on single phase transformer
8. Load test on three-phase induction motor.
9. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
10. Load test on single-phase induction motor.
11. Stepper motor control

Total : 45Hrs

Signature of the Chairman BOS E & I

MEC422 THERMODYNAMICS AND FLUID MECHANICS LABORATORY 0 0 3 1

THERMODYNAMICS LAB

1. Valve timing and port timing diagrams for IC Engines.
2. Performance test on a Petrol Engine.
3. Performance test on a Diesel Engine.
4. Heat Balance test on an IC Engine.
5. Boiler – performance and Heat Balance Test.
6. Performance test on a Refrigerator (Determination of COP)
7. Determination of heat transfer Coefficient (Free and forced convection)

LIST OF EQUIPMENT

1. Engine – cut section models.
2. Single cylinder petrol engine with Mechanical dynamometer.
3. Multi cylinder petrol engine with hydraulic dynamometer.
4. Multi cylinder diesel engine with Electrical dynamometer.
5. Steam boilers with suitable mountings and accessories.
6. Refrigeration Test Rig.
7. Forced convection Heat transfer Test set up.
8. Free convection Heat transfer test set up.

FLUID MECHANICS LABORATORY

OBJECTIVES

At the end of this course the student shall be able to do hydraulic tests on pumps and turbines and should have developed the knowledge about the characteristics of hydraulic machines and their importance.

1. Flow measurements using venturi meter.
2. Test to estimate frictional losses in pipe flow.
3. Test on positive displacement pump for obtaining its characteristics curves and design flow parameters.
4. Test on centrifugal pump for obtaining its characteristics curves and design flow parameters.
5. Test on jet pump for obtaining its characteristics curves and design flow parameters.
6. Test on reaction turbine for obtaining the characteristics curves and to design values of specific speed, discharge, output and efficiency.
7. Test on impulse turbine to obtain its characteristics curves and hydraulic design values.

Equipment List

S.No	Apparatus	Quantity
1	Apparatus for measuring pipe friction	1 No
2	Francis turbine	1 No
3	Pelton wheel	1 No
4	Turbo impulse wheel	1 No
5	Positive displacement and accessories for conducting the test	1 No
6	Centrifugal pump and accessories for conducting the test	1 No
7	Venturi meter with connecting pipes for flow measurement	1 No
8	Jet pump	1 No
9	Stop watches	6 Nos

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GHE 104 HUMAN EXCELLENCES – PROFESSIONAL VALUES 0 0 2 1
(Common to IV Semester all Branches)

1. Personality –Concepts, definitions -5 C's and 5 E's – Self development – Leadership Traits –IQ,EQ,SQ.

2. Time management-Practice –Cause and Effect –Professional Ethics –Values.

3. Quality Enhancement – Empowerment of mind – Passion for Excellence –Auto suggestions – Self control.

4. Simplified physical exercises.

5. Yoga Mudra.

6. Pachi Motasana.

7. Ustrasana.

8. Vakkarasana.

9. Salapasana.

10. Meditation

Signature of the Chairman BOS E & I

B.E DEGREE PROGRAMME

ELECTRONICS AND INSTRUMENTATION ENGINEERING

CURRICULUM AND SYLLABUS – REGULATIONS – 2009

SEMESTER – I

Code No.	Course Title	L	T	P	C
THEORY					
ENG101	Technical English	2	1	0	3
MAT101	Engineering Mathematics – I	3	1	0	4
PHY101	Engineering Physics	3	0	0	3
CHY101	Engineering Chemistry	3	0	0	3
MEC101	Engineering Graphics	2	0	3	3
CSE101	Programming with 'C'	3	1	0	4
GHE101	Human Excellence - Personal Values –I	1	0	0	1
PRACTICAL					
CHY401	Chemistry Laboratory	0	0	3	1
MEC401	Engineering Practices Laboratory	0	0	3	1
CSE401	Programming Laboratory	0	0	3	1

TOTAL PERIODS – 32 **TOTAL CREDITS – 24**

SEMESTER – II

Code No.	Course Title	L	T	P	C
THEORY					
ENG102	English For Pragmatic Usage	1	0	2	2
MAT102	Engineering Mathematics – II	3	1	0	4
PHY104	Materials Science	3	0	0	3
CHY104	Chemistry for Circuit Engineering	3	0	0	3
ECE101	Circuit theory	3	1	0	4
EIE103	Electronic Devices	3	0	0	3
PRACTICAL					
PHY401	Physics Laboratory	0	0	3	1
CSE451	Advanced Programming Laboratory	0	0	3	1
EIE402A	Circuits and Devices Laboratory	0	0	3	1
GHE102	Human Excellence - Personal Values –II	0	0	2	1

TOTAL PERIODS – 31 **TOTAL CREDITS – 23**

SEMESTER III

Code No.	Course Title	L	T	P	C
THEORY					
MAT104	Engineering Mathematics – III	3	1	0	4
EIE101	Transducer Engineering	3	0	0	3
EIE102	Electronic Circuits	3	0	0	3
EEE264	Electrical Measurements and Instruments	3	0	0	3
EEE261	Electrical Machines and Power systems	3	0	0	3
CSE201	Data Structures and Algorithms	3	0	0	3
PRACTICAL					
EIE402 B	Electronic Circuits Laboratory	0	0	3	1
CSE452	Data Structures and Algorithms Laboratory	0	0	3	1
EEE409	Electrical and Electronic Measurements lab	0	0	3	1
GHE103	Human Excellence - Family Values	0	0	2	1
TOTAL					**23**

TOTAL PERIODS – 30 **TOTAL CREDIT – 23**

SEMESTER IV

Code No.	Course Title	L	T	P	C
THEORY					
MAT108	Numerical methods	3	1	0	4
EEE111	Control Systems	3	1	0	4
EIE105	Electronic Instrumentation	3	0	0	3
ECE103	Digital Electronics	3	0	0	3
EEE106	Linear Integrated Circuits	3	0	0	3
MEC231	Applied Thermodynamics	3	1	0	4
PRACTICAL					
EIE401	Transducer Laboratory	0	0	3	1
EEE461	Electrical Machines Lab	0	0	3	1
MEC422	Thermodynamics and Fluid Mechanics Lab	0	0	3	1
GHE104	Human Excellence - Professional Values	0	0	2	1
TOTAL					**25**

TOTAL PERIODS – 32 **TOTAL CREDIT – 25**

SEMESTER V

Code No.	Course Title	L	T	P	C
THEORY					
EIE104	Industrial Instrumentation – I	3	0	0	3
EIE106	Process control	3	0	0	3
EIE107	Microprocessor and Microcontroller	3	0	0	3
EIE108	Communication Engineering	3	0	0	3
CHY107	Environmental Science and Engineering	3	0	0	3
MAT106	Probability and Applied statistics	3	1	0	4
PRACTICAL					
EIE403	Microprocessor and Microcontroller Lab	0	0	3	1
EIE404	Integrated Circuits Laboratory	0	0	3	1
ENG401	Communication Skill Lab	0	0	3	1
GHE105	Human Excellence - Social Values	0	0	2	1
				TOTAL	**23**

TOTAL PERIODS – 30 **TOTAL CREDIT – 23**

SEMESTER VI

Code No.	Course Title	L	T	P	C
THEORY					
EIE109	Industrial Instrumentation – II	3	0	0	3
EIE110	Analytical Instruments	3	0	0	3
EIE111	Digital control systems	3	1	0	4
EIE112	Digital Signal Processing	3	1	0	4
EIE113	Real time embedded system	3	0	0	3
	Elective – I	3	0	0	3
PRACTICAL					
EIE405	Industrial Instrumentation Laboratory	0	0	3	1
EIE406	Process Control Laboratory	0	0	3	1
EIE407	Mini – Project	0	0	0	1
GHE106	Human Excellence - National Values	0	0	2	1
TOTAL					**24**

TOTAL PERIODS – 28 **TOTAL CREDIT – 24**

Note: During Vacation the students are required to undertake a mini – project.

SEMESTER VII

Code No.	Course Title	L	T	P	C
THEORY					
EIE114	Power Plant Instrumentation	3	0	0	3
EIE115	Logic and Distributed control Systems	3	0	0	3
EIE116	Applied soft computing	3	1	0	4
EIE117	VLSI Design	3	1	0	4
GSS104	Principles of Management and Total Quality Management	3	0	0	3
	Elective – II	3	0	0	3
PRACTICAL					
EIE408	Instrumentation System Design Laboratory	0	0	3	1
EIE409	Industrial Automation Laboratory	0	0	3	1
GHE107	Human Excellence-Global Values	0	0	2	1
TOTAL					**23**

TOTAL PERIODS – 28 **TOTAL CREDIT – 23**

SEMESTER VIII

Code No.	Course Title	L	T	P	C
THEORY					
	Elective – III	3	0	0	3
	Elective – IV	3	0	0	3
	Elective –V	3	0	0	3
PRACTICAL					
EIE410	Project Work	0	0	18	6
TOTAL					**15**

TOTAL PERIODS – 27 **TOTAL CREDIT – 15**

Total Credits:180

LIST OF ELECTIVES

Code No.	Course Title	L	T	P	C
ELECTIVE I					
EIE118	Power Electronics	3	0	0	3
EIE119	Robotics and Automation	3	0	0	3
EIE120	Industrial Chemical process	3	0	0	3
CSE202	Object Oriented Programming & C++	3	0	0	3
ELECTIVE II					
EIE121	Bio-Medical Instrumentation	3	0	0	3
EIE122	Instrumentation in Iron and Steel Industries	3	0	0	3
EIE123	Automobile and Aircraft Instrumentation	3	0	0	3
EIE124	Fibre Optics and Laser Instruments	3	0	0	3
ELECTIVE III					
EIE125	Advanced Control Systems	3	0	0	3
EIE126	Adaptive Control	3	0	0	3
EIE127	Optimal Control	3	0	0	3
EIE128	System Identification	3	0	0	3
ELECTIVE IV					
EIE129	Industrial data Networks	3	0	0	3
EIE130	Advanced Microprocessors & Microcontrollers	3	0	0	3
EIE131	Computer Architecture	3	0	0	3
EIE132	Instrumentation in Petrochemical Industries	3	0	0	3
ELECTIVE V					
GSS101	Professional Ethics	3	0	0	3
GSS105	Entrepreneurship Development	3	0	0	3
GSS106	Governance in India	3	0	0	3
GSS107	Indian Economy	3	0	0	3

SEMESTER II

EIE103 ELECTRONIC DEVICES 3 0 0 3

1. SEMICONDUCTOR DIODE 9

Theory of p-n junction – p-n junction as diode – p-n diode currents – Volt-amp characteristics – Diode resistance – Temperature effect of p-n junction – Transition and diffusion capacitance of p-n diode – Diode switching times.

2. BI-POLAR TRANSISTOR 9

Junction transistor – Transistor construction – Detailed study of currents in transistor –Input and output characteristics of CE, CB and CC configurations – Transistor hybrid model for CE configuration – Analytical expressions for transistor characteristics – Transistor switching times – Voltage rating – Power transistors.

3. FIELD EFFECT TRANSITORS 9

Junction field effect transistor – Pinch off voltage – JFET volt-ampere characteristics – JFET small signal model – MOSFETS and their characteristics – FET as a variable resistor – Unijunction transistor.

4. OPTO ELECTRONIC DEVICES 9

Photo emissivity and photo electric theory – Theory, construction and characteristics: light emitting diodes, liquid crystal cell, seven segment display, photo conductive cell, photodiode, solar cell, photo transistor, opto couplers and laser diode.

5. MISCELLANEOUS DEVICES 9

Theory, characteristics and application: SCR, TRIAC, PUT, tunnel diode, thermistors, piezo electric devices, zener diode, charge coupled devices, varactor diode and LDR.

L : 45 Total: 45

TEXT BOOKS

1. David A.Bell, ‘Electronic Devices and Circuits’, Prentice Hall of India Private Limited, New Delhi, 2003.

REFERENCES

1. Theodere. F. Bogart, ‘Electronic Devices & Circuits’, Pearson Education, VI Edition, 2003.
2. Ben G. Streetman and Sanjay Banerjee, ‘Solid State Electronic Devices’, Pearson Education, 2002 / PHI
3. Allen Mottershead, ‘Electronic Devices and Circuits – An Introduction’, Prentice Hall of India Private Limited, New Delhi, 2003.
4. Jacob. Millman, Christos C.Halkias, ‘Electronic Devices and Circuits’, Tata McGraw Hill Publishing Limited, New Delhi, 2003.
5. V.K.Metha, Rohit Metha, ‘Principles of Electronics’, S. Chand & Co. Ltd., Edition 2006

EIE402A Circuits and Devices Laboratory 0 0 3 1

(Any TEN experiments)

1. Static characteristics of semiconductor and Zener diode
2. Static characteristics of transistor under CE configuration and Determination of h parameters.
3. Static characteristics of transistor under CB configuration and Determination of h parameters.
4. Static characteristics of transistor under CC configuration and Determination of h parameters.
5. Static characteristics of JFET
6. Static characteristics of UJT
7. Static characteristics of Photo diode, Photo transistor, LDR
8. Verification of ohms law, Kirchoff's voltage and current laws.
9. Verification of Thevenin's and Norton's Theorems.
10. Verification of Super position and maximum power transfer theorem.
11. Characteristics of attenuator and equalizer.
12. Characteristics of Resonance circuits.

SEMESTER: III

MAT104 ENGINEERING MATHEMATICS III 3 1 0 4

(Common for III Semester CE, ME, MCE, EEE, EIE, ECE &AE)

OBJECTIVES

- To impart analytical skills in the areas of boundary value problems and transform techniques.
- To understand the basic concepts of partial differential equations

1. **PARTIAL DIFFERENTIAL EQUATIONS** **9**

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

2. FOURIER SERIES **9**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

3. BOUNDARY VALUE PROBLEMS **9**

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

4. FOURIER TRANSFORM **9**

Infinite Fourier transform pair – Infinite Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

5. Z –TRANSFORM **9**

Z-transform - Elementary properties – Convolution theorem- Inverse Z – transform (by using partial fractions, residue methods and convolution theorem) - Solution of difference equations using Z - transform.

L: 45 T:15 Total: 60

TEXT BOOK

1. Veerarajan T., "Engineering Mathematics" (for semester III), Third Edition, Tata McGraw Hill, New Delhi (2007)

REFERENCES

1. Grewal B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume-III", S. Chand & Company ltd., New Delhi, 1996.
3. Ian Sneddon. , Elements of partial differential equations, McGraw – Hill New Delhi, 2003.
4. Arunachalam T., "Engineering Mathematics I", Sri Vignesh Publications, Coimbatore. (Revised) 2009.

EIE101 TRANSDUCER ENGINEERING 3 0 0 3

1. SCIENCE OF MEASUREMENTS AND INSTRUMENTATION OF TRANSDUCERS 9

Units and standards – Calibration methods – Static calibration – Classification of errors – Error analysis – Statistical methods – Odds and uncertainty – Classification of transducers – Selection of transducers.

2. CHARACTERISTICS OF TRANSDUCERS 9

Static characteristics – Accuracy, precision, resolution, sensitivity, linearity etc. Dynamic characteristics – Mathematical model of transducer – Zero, I and II order transducers. Response to impulse, step, ramp and sinusoidal inputs.

3. VARIABLE RESISTANCE TRANSDUCERS 9

Principle of operation, construction details, characteristics and application of resistance potentiometer, strain gauge, load cell, resistance thermometer, thermistor, hot-wire anemometer, piezo-resistive sensor and humidity sensor.

4. VARIABLE INDUCTANCE AND VARIABLE CAPACITANCE TRANSDUCERS 9

Induction potentiometer – Variable reluctance transducers – EI pick up – LVDT – Capacitive transducer and types – Capacitor microphone – Frequency response.

5. OTHER TRANSDUCERS 9

Piezoelectric transducer, magnetostrictive – IC sensor – Digital transducers – Smart sensor – Fibre optic transducer- Hall Effect transducer – Photo electric transducer.

L = 45 Total = 45

TEXT BOOKS

1. D.V.S Murthy, 'Transducers and Instrumentation', Prentice Hall of India, 2001.
2. A.K. Sawhney, 'A course in Electrical & Electronic Measurement and Instrumentation', Dhanpat Rai and Co (P) Ltd., 2004.

REFERENCE BOOKS

1. John P. Bentley, 'Principles of Measurement Systems', III Edition, Pearson Education, 2000.
2. D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999.
3. E.A. Doebelin, 'Measurement Systems – Applications and Design', Tata McGraw Hill, New York, 1990.
4. Hermann K.P. Neubert, 'Instrument Transducers', Oxford University Press, 2000.
5. S. Ranganathan, 'Transducer Engineering', Allied Publishers Pvt. Ltd., 2003.
6. Al Sutko and J.D. Faulk, 'Industrial Instrumentation', Vikas Publications, Delhi, 1996.

EIE102 ELECTRONIC CIRCUITS 3 0 0 3

1. SMALL-SIGNAL AND LARGE SIGNAL AMPLIFIERS 9

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

2. DIFFERENTIAL AND TUNED AMPLIFIERS 9

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

3. FEEDBACK AMPLIFIER AND OSCILLATORS 9

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

4. PULSE CIRCUITS 9

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

5. RECTIFIERS AND POWER SUPPLY CIRCUITS 9

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

L: 45 Total: 45

TEXT BOOKS

1. David A. Bell, 'Electronic Devices & Circuits', Prentice Hall of India/ Pearson Education, IV Edition, Eighth printing, 2003.
2. Jacob Millman & Christos.C.Halkias, 'Integrated Electronics: Analog and Digital Circuits and System', Tata McGraw Hill, 1991.

REFERENCES

1. Robert. L. Boylestad & Lo Nashelsky, 'Electronic Devices & Circuit Theory', 8th edition, Pearson Education, Third Indian Reprint, 2002 / PHI.
2. Jacob Millman & Herbert Taub, 'Pulse, Digital & Switching Waveforms', Tata McGraw Hill, Edition 2000, 24th reprint, 2003.
3. Donald L.Schilling and Charles Belove, 'Electronic Circuits', Tata McGraw Hill, 3rd Edition, 2003.

EEE 264 ELECTRICAL MEASUREMENTS AND INSTRUMENTS 3 0 0 3

1. MEASUREMENT OF VOLTAGE AND CURRENT 9

Galvanometers – Ballistic, D'Arsonval galvanometer – Theory, calibration, application – Principle, construction, operation and comparison of moving coil, moving iron meters, dynamometer, induction type & thermal type meter, rectifier type – Extension of range and calibration of voltmeter and ammeter – Errors and compensation.

2. MEASUREMENT OF POWER AND ENERGY 9

Electrodynamometer type wattmeter – Theory & its errors – Methods of correction – LPF wattmeter – Phantom loading – Induction type KWH meter – Calibration of wattmeter, energy meter.

3. POTENTIOMETERS & INSTRUMENT TRANSFORMERS 9

DC potentiometer – Basic circuit, standardization – Laboratory type (Crompton's) – AC potentiometer – Drysdale (polar type) type – Gall-Tinsley (coordinate) type – Limitations & applications – C.T and V.T construction, theory, operation, phasor diagram, characteristics, testing, error elimination – Applications.

4. RESISTANCE MEASUREMENT 9

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

5. IMPEDANCE MEASUREMENT 9

A.C bridges – Measurement of inductance, capacitance – Q of coil – Maxwell Bridge – Wein's bridge – Hey's bridge – Schering bridge – Anderson bridge – Campbell bridge to measure mutual inductance – Errors in A.C. bridge methods and their compensation – Detectors – Excited field – A.C. galvanometer – Vibration galvanometer – Introduction to cable fault and eddy current measurement.

TEXT BOOKS L : 45 Total : 45

1. E.W.Golding & F.C.Widdis, 'Electrical Measurements & Measuring Instruments', A.H.Wheeler & Co, 1994.
2. A.K. Sawhney, 'Electrical & Electronic Measurements and Instrumentation', Dhanpath Rai & Co (P) Ltd, 2004.

REFERENCES

1. J.B.Gupta, 'A Course in Electronic and Electrical Measurements and Instrumentation', S.K. Kataria & Sons, Delhi, 2003.
2. S.K.Singh, 'Industrial Instrumentation and control', Tata McGraw Hill, 2003.
3. H.S.Kalsi, 'Electronic Instrumentation', Tata McGraw Hill, 1995.
4. Martia U. Reissland, 'Electrical Measurement', New Age International (P) Ltd., 2001

EEE261 ELECTRICAL MACHINES AND POWER SYSTEMS 3 0 0 3

(Common to III Semester ECE & EIE)

OBJECTIVES

- To introduce the basic concept of machines and its working principles
- To introduce the basic concept of power system transmission

1. D.C. MACHINES 9

Constructional details – emf equation – Methods of excitation – Self and separately excited generators – Characteristics of series, shunt and compound generators – Principle of operation of D.C. motor – Back emf and torque equation – Characteristics of series, shunt and compound motors - Starting of D.C. motors – Types of starters - Testing, brake test and Swinburne's test – Speed control of D.C. shunt motors.

2. TRANSFORMERS 9

Constructional details – Principle of operation – emf equation – Transformation ratio – Transformer on no load – Parameters referred to HV/LV windings – Equivalent circuit – Transformer on load – Regulation - Testing – Load test, open circuit and short circuit tests.

3. INDUCTION MOTORS 9

Construction – Types – Principle of operation of three-phase induction motors – Equivalent circuit – Performance calculation – Starting and speed control – Single-phase induction motors (only qualitative treatment).

4. SYNCHRONOUS AND SPECIAL MACHINES 9

Construction of synchronous machines-types – Induced emf – Voltage regulation; emf and mmf methods – Brushless alternators – Reluctance motor – Hysteresis motor – Stepper motor.(5 unit can be removed, machines is more than enough.)

5. TRANSMISSION AND DISTRIBUTION 9

Structure of electric power systems – Generation, transmission, sub-transmission and distribution systems - EHVAC and EHVDC transmission systems – Substation layout – Insulators – cables.

L :45 Total: 45

TEXT BOOKS

1. D.P.Kothari and I.J.Nagrath, 'Electrical Machine', Tata McGraw Hill publishing company ltd, second edition, 2002.
2. C.L. Wadhwa, 'Electrical Power Systems', Wiley eastern ltd India, 1985.

REFERENCES

1. S.K.Bhattacharya, "Electrical Machines", Tata McGraw Hill Publishing company ltd, second edition, 1998.
2. V.K.Mehta and Rohit Mehta, "Principles of Power System", S.Chand and Company Ltd, third edition, 2003.
3. Vincent Del Taro "Electrical Machine and Power System"

CSE201 DATA STRUCTURES AND ALGORITHMS 3 0 0 3

(Common to III Semester EEE, ECE & EIE)

OBJECTIVES

- To introduce the concept of arrays, structures, pointers and recursion.
- To study stack, queue and linked list concepts.
- To study about trees, representation of trees, tree traversal and basic operations on trees.
- To study some of the sorting and searching techniques.
- To study the concept of graphs, traversal techniques and minimum spanning tree.

1. PROBLEM SOLVING 9

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

2. LISTS, STACKS AND QUEUES 9

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

3. TREES 9

Preliminaries – Binary Trees – The Search Tree ADT – Binary Search Trees – Tree Traversals – Hashing – General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing

4. SORTING 9

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

5. GRAPHS 9

Definitions – Topological Sort – Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm – Minimum Spanning Tree – Prim's Algorithm – Applications of Depth-First Search – Undirected Graphs – Biconnectivity

L: 45 Total : 45

TEXT BOOKS

1. R. G. Dromey, "How to Solve it by Computer" (Chaps 1-2), Prentice-Hall of India,2002.
2. M. A. Weiss, "Data Structures and Algorithm Analysis in C", 2nd ed, Pearson Education Asia, 2002.

REFERENCES

1. Y. Langsam, M. J. Augenstein and A. M. Tenenbaum, "Data Structures using C and C++", 2nd ed, Prentice-Hall of India, 2000.
2. Richard F. Gilberg, Behrouz A. Forouzan, " Data Structures – A Pseudocode Approach with C", Thomson Brooks / COLE, 1998.
3. Aho, J. E. Hopcroft and J. D. Ullman, "Data Structures and Algorithms", Addison- Wesley Publishing Company, 1983.

EIE402B ELECTRONIC CIRCUITS LABORATORY 0 0 3 1

(Any TEN experiments)

1. Regulation & filter characteristics of Half Wave Rectifier and Full Wave Rectifier.
2. Wein Bridge Oscillator construction and verification of Wein Bridge Oscillator and Phase Shift Oscillator.
3. Construction and verification of Hartley/Colpitts Oscillator.
4. Frequency Response of CE Amplifier.
5. Differential Amplifier characteristics using FET.
6. Design of Clipper and Clamper.
7. Design and testing of Schmitt Trigger.
8. Design of series Voltage Regulators.
9. Design of Astable Multivibrator. (Transistor based)
10. Design of UJT Relaxation Oscillator. (Saw Tooth Generator)
11. Simulation of amplifier circuit.
12. Simulation of oscillator circuit.

CSE452 DATA STRUCTURES AND ALGORITHMS LABORATORY 0 0 3 1
(Common to Semester EEE, ECE & EIE)

OBJECTIVES

- To implement Queue, stack, linked lists and to implement search, sort and traversal Technique.

1. Implementation of Queue using arrays.
2. Implementation of Stack using arrays.
3. Implement List using pointers and perform all possible operations.
4. Linked Queue and Linked Stack implementation.
5. Binary Tree implementation using linked lists and perform insertion and deletion operations.
6. Perform In-order, Pre-order and Post-order traversals on a given binary tree.
7. Sorting algorithms: Quick and Heap sort implementation.
8. Implement binary search algorithm.
9. Implement graph representations.
10. Perform depth-first and breadth-first traversal for a given graph.

EEE409 ELECTRICAL & ELECTRONIC MEASUREMENTS LABORATORY

0 0 3 1

AIM

- The aim of this lab is to impart the students an adequate knowledge and work experience of the different types of AC and DC bridges, electronic measurement methods for different electronic instruments.

OBJECTIVE

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

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

GHE 103 HUMAN EXCELLENCES – FAMILY VALUES 0 0 2 1

(Common to III Semester all Branches)

1. Family value-meaning –Introduction-values-Blessings for family peace-Restraint in family life- harmony in family-Interactive workshop.
2. Blissful married life-Greatness of good family relationship – Family life & Spiritual development.
3. Love and compassion –Greatness of womanhood –Food is medicine (healthy food habits)
4. Simple physical exercises.
5. Kayakalpa Yoga.
6. Sun Rays Therapy
7. Padmasana.
8. Vajrasana.
9. Chakrasana & Viruchasana
10. Meditation

SEMESTER IV

MAT108 NUMERICAL METHODS 3 1 0 4

(Common for IV Semester ME, CE, MCE, EEE, AE, TXT & EIE)

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

1. NUMERICAL SOLUTION OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS 9

Linear interpolation method (method of false position) – Iteration method - Newton's method - Solution of linear system by Gaussian elimination and Gauss-Jordan methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods – Inverse of matrix by Gauss – Jordan method.

2. INTERPOLATION 9

Newton's forward and backward difference formulas – Stirling's formula - Divided differences – Newton's divided difference formula - Lagrange's interpolation (derivations are excluded for all methods).

3. NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Numerical differentiation: Derivatives by using Newton's forward , backward and divided differences – Derivatives by using Stirling's formula - Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Double integrals using Trapezoidal and Simpson's 1/3 rules.

4. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor's series method – Euler and Improved Euler methods for solving first order equations – Fourth order Runge – Kutta method for solving first and second order equations – Multistep method: Milne's predictor and corrector method.

5. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **9**

Finite difference solution of one dimensional heat equation by Bender Schmidt and Crank Nicholson methods – One dimensional wave equation by explicit method and two dimensional Laplace and Poisson equations.

L : 45 T: 15 Total: 60

TEXT BOOK

1. Venkataraman M.K., "Numerical Methods in Science and Engineering", The National Publishing company, 5^{th} Edition, May 2003.

REFERENCES

1. Gerald C. F. and Wheatley P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Sastry S.S, "Introductory Methods of Numerical Analysis", Third Edition, Prentice – Hall of India Pvt Ltd, New Delhi, 2003.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007.
4. Arunachalam. T., "Numerical Methods", Inder Publications, Coimbatore, 2009.

EEE111 CONTROL SYSTEMS 3 1 0 4

(Common to IV Semester EIE, AE & V Semester EEE, ECE)

OBJECTIVES

- To introduce the basic concept of control system
- To introduce the basic concept of stability of a system
- To introduce the basic concept of compensator design

1. SYSTEMS AND THEIR REPRESENTATION 9

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Synchros – AC and DC servomotors –Block diagram reduction techniques – Signal flow graphs.

2. TIME RESPONSE 9

Time response – Time domain specifications – Types of test input – I and II order system response – Error coefficients – Generalized error series – Steady state error – P, PI, PID modes of feed back control.

3. FREQUENCY RESPONSE 9

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

4. STABILITY OF CONTROL SYSTEM 9

Characteristics equation – Location of roots in S-plane for stability – Routh Hurwitz criterion –Root locus construction – effect of poles, zero addition – Gain margin and phase margin –Nyquist stability criterion.

5. COMPENSATOR DESIGN 9

Performance criteria – Lag, lead and lag-lead networks – Cascade Compensator design using Bode plots.

Total:45

TEXT BOOKS

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

REFERENCES

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.

EIE105 ELECTRONIC INSTRUMENTATION 3 0 0 3

1. ANALOG METERS 9

D.C, A.C voltmeters, ammeters, multimeter, power meter, Q-meter, true RMS meter,vector impedancemeter,vector voltmeter, component measuring instrument.

2. SIGNAL GENERATORS AND ANALYZERS 9

Sine wave generator – Frequency synthesized sine wave generator – Sweep frequency generator, pulse and square wave generator – Function generator – Wave analyzer – Applications – Harmonic distortion analyzer – Spectrum analyzer – Applications – Audio Frequency generator – Noise generator.

3. CATHODE RAY OSCILLOSCOPE 9

General purpose oscilloscope – Screens for CRT graticules – Vertical & horizontal deflection systems – Delay line – Multiple trace – Dual beam & dual trace – Probes – Oscilloscope techniques – Special oscilloscopes – Storage oscilloscopes – Sampling oscilloscope – Digital CRO.

4. DIGITAL INSTRUMENTS 9

Digital method for measuring frequency, period, phase difference, pulse width, time interval, total count – Digital voltmeter – Types – Automatic polarity indication, automatic ranging, auto zeroing – DMM – Microprocessor based DM0M – DPM – IEEE 488 bus.

5. DISPLAY AND RECORDING DEVICES 9

LED, LCD and Dot Matrix Display – X-Y recorders, magnetic tape recorders – Digital recording – Data loggers Interference and screening – Electrostatic and Electromagnetic interference & earth loops.

L : 45 Total : 45

TEXT BOOKS

1. Albert D. Helfrick & William D. Cooper, 'Modern Electronic Instrumentation & Measurement Techniques', Prentice Hall of India, 2002.
2. A.J. Bouwens, 'Digital Instrumentation', Tata McGraw Hill, 1997.

REFERENCES

1. B.M.Oliver and J.M.cage, 'Electronic Measurements & Instrumentation', McGraw Hill International Edition, 1975.
2. Joseph. J. Carr, 'Elements of Electronic Instrumentation & Measurements', III edition, Pearson Education, 2003.
3. C.S. Rangan, G.R. Sarma, V.S.V. Mani, 'Instrumentation Devices & Systems', Tata McGraw Hill, 2002.
4. D. A. Bell, 'Electronic Instrumentation and Measurements', Prentice Hall of India, 2002.

ECE103 DIGITAL ELECTRONICS 3 0 0 3

(Common for III semester CSE, ECE, IT,MCE & IV semester EEE, EIE)

OBJECTIVES

- To introduce the basic concept of Hardware Components
- To introduce the basic of circuit design with fundamental hardware components

1. NUMBER SYSTEM AND BASIC LOGIC 10

Number systems-Binary, Octal, Hexadecimal, Number base conversions , Binary codes: Weighted codes-BCD - 8421-2421, Non Weighted codes - Gray code - Excess 3 code Binary arithmetic,1's complements , 2's complements, and Code conversions. Boolean algebra , Boolean postulates and laws –De-Morgan's Theorem- Principle of Duality – AND, OR, NOT NAND & NOR operation, Minterm- Maxterm- Canonical forms - Conversion between canonical forms, sum of product and product of sum forms. Karnaugh map Minimization – Don't care conditions, Tabulation method.

2. COMBINATIONAL CIRCUITS 9

Problem formulation and design of combinational circuits, adder , subtractor, Serial adder/ Subtractor - Parallel adder/ Subtractor- Carry look ahead adder- BCD adder- Magnitude Comparator , parity checker , Encoder , decoder, Multiplexer/ Demultiplexer , code converters, Function realization using gates and multiplexers.

3. SEQUENTIAL CIRCUIT 9

Flip flops SR, JK, T, D and Master slave – Characteristic table and equation – Application table – Edge triggering –Level Triggering –Realization of one flip flop using other flip flops –Synchronous Binary counters –Modulo–n counter- Decade - BCD counters.

4. DESIGN OF SEQUENTIAL CIRCUITS 9

Classification of sequential circuits – Moore and Mealy - Design of Asynchronous counters- state diagram- State table –State minimization –State assignment- Register – shift registers - Universal shift register –Ring counters. Hazards: Static - Dynamic.

5. DIGITAL LOGIC FAMILIES AND PL 8

Memories – ROM, PROM, EEPROM, RAM.– Programmable Logic devices: Programmable Logic Array (PLA)- Programmable Array Logic (PAL)- Implementation of combinational logic using PROM and PLA, Introduction to FPGA- Digital logic families : TTL,ECL,CMOS.

Total : 45

TEXT BOOKS

1. M. Morris Mano, Digital Design, 3rd Edition., Prentice Hall of India Pvt. Ltd., New Delhi, 2003/Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003
2. John .M Yarbrough, Digital Logic Applications and Design, Thomson-Vikas Publishing House, New Delhi, 2002.

REFERENCES

1. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design",Second Edition, 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", 5th Edition. Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

4. R.P.Jain, “Modern Digital Electronics”, Third Edition., 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.

EEE106 LINEAR INTEGRATED CIRCUITS 3 0 0 3

(Common for IV semester EEE, ECE & EIE)

OBJECTIVES

- To introduce the basic of integrated circuits technology, types of IC's and their applications

1. IC FABRICATION **9**

IC classification, fundamental of monolithic IC technology, epitaxial growth, masking and etching, diffusion of impurities. Realization of MOS, CMOS and BJT ICs – packaging.

2. CHARACTERISTICS OF OPAMP **9**

Ideal OP-AMP characteristics, DC characteristics, AC characteristics, offset voltage and current: voltage series feedback and shunt feedback amplifiers, differential amplifier; frequency response of OP-AMP; Basic applications of op-amp –summation, differentiator and integrator.

3. APPLICATIONS OF OPAMP **9**

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

4. SPECIAL ICs **9**

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

5. APPLICATION ICs

9

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

L : 45 Total : 45

TEXT BOOKS

1. Ramakant A.Gayakward, 'Op-amps and Linear Integrated Circuits', IV edition, Pearson Education, 2003 / PHI.
2. D.Roy Choudhary, Sheil B.Jani, 'Linear Integrated Circuits', II edition, New Age, 2003.

REFERENCES

1. Jacob Millman, Christos C.Halkias, 'Integrated Electronics - Analog and Digital circuits system', Tata McGraw Hill, 2003.
2. Robert F.Coughlin, Fredrick F.Driscoll, 'Op-amp and Linear ICs', Pearson Education, 4th edition, 2002 / PHI.
3. David A.Bell, 'Op-amp & Linear ICs', Prentice Hall of India, 2nd edition, 1997.

MEC231 APPLIED THERMODYNAMICS 3 1 0 4

1. **BASIC CONCEPTS AND LAWS OF THERMODYNAMICS** **12**

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

2. IC ENGINES AND GAS TURBINES 8

Air standard cycles: Otto, diesel and dual cycles and comparison of efficiency – Working Principle of four stroke and two stroke engines - Working principle of spark ignition and compression ignition engines - Applications of IC engines - Normal and abnormal combustion - Working principle of four stroke and two stroke engines - Working principle of spark ignition and compression ignition engines - Applications of IC engines. Open and closed cycle gas turbines – Ideal and actual cycles - Brayton cycle - Cycle with reheat, intercooling and regeneration – Applications of gas turbines for aviation and power generation.

3. STEAM BOILERS AND TURBINES 8

Formation of steam - Properties of steam – Use of steam tables and charts – Steam power cycle (Rankine) - Modern features of high-pressure boilers – Mountings and accessories – Testing of boilers.Steam turbines: Impulse and reaction principle – Velocity diagrams – Compounding and governing methods of steam turbines (qualitative treatment only) - Layout diagram and working principle of a steam power plant.

4. COMPRESSORS, REFRIGERATION AND AIR CONDITIONING **8**

Positive displacement compressors – Reciprocating compressors – Indicated power – Clearance volume – Various efficiencies – Clearance ratio - Volume rate - Conditions for perfect and imperfect inter cooling - Multi stage with inter cooling – Rotary positive displacement compressors – Construction and working principle of centrifugal and axial flow compressors. Unit of refrigeration - Basic functional difference between refrigeration and air conditioning – Various methods of producing refrigerating effects (RE) – Vapour compression cycle: P-H and T-S diagram - Saturation cycles - Effect of sub cooling and super heating - (qualitative treatment only) – Air conditioning systems – Basic psychrometry - Simple psychrometric processes - Types of air conditioning systems - Selection criteria for a particular application (qualitative treatment only).

5. HEAT TRANSFER 9

One-dimensional Heat Conduction: Plane wall – Cylinder – Sphere - Composite walls – Critical thickness of insulation –Heat transfer through extended surfaces (simple fins). Convection: Free convection and forced convection - Internal and external flow - Empirical relations - Determination of convection heat transfer co-efficient by using Dittus–Baetter equation.Radiation: Black–Gray bodies - Radiation Shape Factor (RSF) - Cooling of electronic components: Thermoelectric cooling – Chip cooling.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. P.K. Nag, 'Basic and Applied Engineering Thermodynamics', Tata McGraw Hill, New Delhi, 2002.
2. B.K. Sachdeva, 'Fundamentals of Engineering Heat and Mass Transfer (SI Units)', New Age International (P) Limited, Chennai, 2003.

REFERENCES

1. Rogers and Mayhew, 'Engineering Thermodynamics – Work and Heat Transfer', Addision Wesley, New Delhi, 1999.
2. Eastop and McConkey, 'Applied Thermodynamics', Addison Wesley, New Delhi. 1999.
3. M.L. Mathur and F.S. Metha, 'Thermal Engineering', Jain Brothers, New Delhi, 1997.
4. B.K. Sankaar, 'Thermal Engineering', Tata McGraw Hill, New Delhi, 1998.

EIE401 TRANSDUCER LABORATORY 0 0 3 1

(Any TEN experiments)

LIST OF EXPERIMENTS.

1. Loading effect of potentiometer.
2. Strain gauge & load cell characteristics.
3. Capacitive transducers.
4. Photoelectric transducers.
5. Hall effect transducers.
6. Characteristics of LVDT.
7. Characteristics of thermocouple
8. Characteristics of RTD.
9. Piezoelectric transducers
10. Digital transducer – shaft angle encoder.
11. Characteristics of Thermistor
12. Magnetostrictive transducer.

EEE461 ELECTRICAL MACHINES LABORATORY 0 0 3 1

(Any TEN experiments)

(**Common to III Semester ECE & IV Semester EIE)**

1. Open circuit and load characteristics of separately excited and self excited D.C. generator
2. Open circuit and load characteristics of self-excited D.C. generator.
3. Load test on D.C. shunt motor.
4. Load test on D.C. series motor.
5. Speed control of D.C. shunts motor.
6. Load test on single phase transformer
7. Open circuit and short circuit test on single phase transformer
8. Load test on three-phase induction motor.
9. No load and blocked rotor tests on three phase induction motor (Determination of equivalent circuit parameters)
10. Load test on single-phase induction motor.
11. Stepper motor control

MEC422 THERMODYNAMICS AND FLUID MECHANICS LABORATORY

0 0 3 1

THERMODYNAMICS LAB

1. Valve timing and port timing diagrams for IC Engines.
2. Performance test on a Petrol Engine.
3. Performance test on a Diesel Engine.
4. Heat Balance test on an IC Engine.
5. Boiler – performance and Heat Balance Test.
6. Performance test on a Refrigerator (Determination of COP)
7. Determination of heat transfer Coefficient (Free and forced convection)

FLUID MECHANICS LAB

OBJECTIVES

At the end of this course the student shall be able to do hydraulic tests on pumps and turbines and should have developed the knowledge about the characteristics of hydraulic machines and their importance.

1. Flow measurements using venturi meter.
2. Test to estimate frictional losses in pipe flow.
3. Test on positive displacement pump for obtaining its characteristics curves and design flow parameters.
4. Test on centrifugal pump for obtaining its characteristics curves and design flow parameters.
5. Test on jet pump for obtaining its characteristics curves and design flow parameters.
6. Test on reaction turbine for obtaining the characteristics curves and to design values of specific speed, discharge, output and efficiency.
7. Test on impulse turbine to obtain its characteristics curves and hydraulic design values.

GHE 104 HUMAN EXCELLENCES – PROFESSIONAL VALUES 0 0 2 1

(Common to IV Semester all Branches)

1. Personality –Concepts, definitions -5 C's and 5 E's – Self development – Leadership Traits –IQ,EQ,SQ.
2. Time management-Practice –Cause and Effect –Professional Ethics –Values.
3. Quality Enhancement – Empowerment of mind – Passion for Excellence –Auto suggestions – Self control.
4. Simplified physical exercises.
5. Yoga Mudra.
6. Pachi Motasana.
7. Ustrasana.
8. Vakkarasana.
9. Salapasana.
10. Meditation

SEMESTER V

EIE104 INDUSTRIAL INSTRUMENTATION – I 3 0 0 3

1. MEASUREMENT OF FORCE, TORQUE AND VELOCITY 9

Electric balance – Different types of load cells – Magnets – Elastic load cells - Strain gauge load cell – Different methods of torque measurement – Strain gauge, relative regular twist – Speed measurement – Revolution counter – Capacitive tacho-drag cup type tacho – D.C and A.C tacho generators – Stroboscope.

2. MEASUREMENT OF ACCELERATION, VIBRATION, DENSITY 9

Accelerometers – LVDT, piezoelectric, strain gauge and variable reluctance type accelerometers – Mechanical type vibration instruments – Seismic instrument as an accelerometer and vibrometer – Calibration of vibration pick-ups – Units of density, specific gravity used in industries – Baume scale, API scale – Pressure head type densitometer – Float type densitometer – Ultrasonic densitometer – Bridge type gas densitometer.

3. MEASUREMENT OF HUMIDITY, MOISTURE AND VISCOSITY 9

Humidity terms – Dry and wet bulb psychrometers – Hot wire electrode type hygrometer – Dew cell – Electrolysis type hygrometer – Commercial type dew point meter – Moisture terms – Different methods of moisture measurement – Moisture measurement in granular materials, solid penetrable materials like wood, web type material – Viscosity terms – Saybolt viscometer – Rotameter type.

4. TEMPERATURE MEASUREMENT 9

Definitions and standards – Primary and secondary fixed points – Calibration of thermometer, different types of filled in system thermometer – Sources of errors in filled in systems and their compensation – Bimetallic thermometers – Electrical methods of temperature measurement – Signal conditioning of industrial RTDs and their characteristics – Three lead and four lead RTDs.

5. THERMOCOUPLES AND PYROMETERS 9

Thermocouples – Laws of thermocouple – Fabrication of industrial thermocouples – Signal conditioning of thermocouples output – Thermal block reference functions – Commercial circuits for cold junction compensation – Special techniques for measuring high temperature using thermocouples – Radiation methods of temperature measurement – Radiation fundamentals – Total radiation & selective radiation pyrometers – Optical pyrometer – Two colour radiation pyrometers

Total = 45

TEXT BOOKS

1. E.O. Doebelin, ‘Measurement Systems – Application and Design’, Tata McGraw Hill publishing company, 2004.
2. R.K. Jain, ‘Mechanical and Industrial Measurements’, Khanna Publishers, New Delhi, 1999.

REFERENCE BOOKS

1. D. Patranabis, ‘Principles of Industrial Instrumentation’, Tata McGraw Hill Publishing Company Ltd, 2008.
2. A.K. Sawhney and P. Sawhney, ‘A Course on Mechanical Measurements, Instrumentation and Control’, Dhanpath Rai and Co, 2004.
3. B.C. Nakra & K.K.Chaudary, ‘Instrumentation Measurement & Analysis’, Tata McGraw Hill Publishing Ltd, 2006.
4. S.K. Singh, ‘Industrial Instrumentation and Control’, Tata McGraw Hill, 2008.
5. D.P. Eckman’, Industrial Instrumentation’, Wiley Eastern Ltd., 2002.

EIE106 PROCESS CONTROL 3 0 0 3

AIM

The course is designed to know about process dynamics, different controllers and tuning of different controllers.

OBJECTIVES

- To know the procedure for modeling different processes.
- To study about various control actions.
- To get the exposure of final control elements.
- To know about the procedure for tuning controllers.
- To study about various complex control schemes.

PREREQUISITE

Control Engineering.

1. PROCESS DYNAMICS 9

Need for process control – Mathematical model of flow, Level, Pressure and Thermal processes – Interacting and non-interacting systems – Degrees of freedom – Continuous and batch processes – Self regulation – Servo and regulatory operations – Lumped and Distributed parameter models – Heat exchanger – CSTR – Linearization of nonlinear systems.

2.CONTROL ACTIONS 9

Characteristic of on-off, proportional, single speed floating, integral and derivative controllers – P+I, P+D and P+I+D control modes – Electronic PID controller – Auto/manual transfer - Reset windup – Practical forms of PID Controller.

3.FINAL CONTROL ELEMENTS 9

I/P converter - Pneumatic and electric actuators – Valve Positioner – Control Valves – Characteristic of Control Valves:- Inherent and Installed characteristics – Modeling of pneumatic control valve – Valve body:-Commercial valve bodies – Control valve sizing – Cavitation and flashing – Selection criteria.

4. CONTROLLER TUNING 9

Evaluation criteria – IAE, ISE, ITAE and ¼ decay ratio - Tuning:- Process reaction curve method, Continuous cycling method and Damped oscillation method – Determination of optimum settings for mathematically described processes using time response and frequency response approaches –Auto tuning.

5. MULTILOOP CONTROL 9

Feed-forward control – Ratio control – Cascade control – Inferential control - Split- range and introduction to multivariable control – Examples from distillation column and boiler systems – IMC– Model Predictive Control – Adaptive control – Introduction to Plant-wide Control – Controller design for a nonlinear process – Introduction to batch process control – P&ID diagram.

L = 45 TOTAL = 45

TEXT BOOKS

1. Bequette, B.W., "Process Control Modeling, Design and Simulation", Prentice Hall of India, 2004.
2. Stephanopoulos, G., "Chemical Process Control - An Introduction to Theory and Practice", Prentice Hall of India, 2005.

REFERENCE BOOKS

1. Seborg, D.E., Edgar, T.F. and Mellichamp, D.A., "Process Dynamics and Control", Wiley John and Sons, 2nd Edition, 2003.
2. Coughanowr, D.R., "Process Systems Analysis and Control", McGraw - Hill International Edition, 2004.

EIE107 MICROPROCESSOR AND MICROCONTROLLER 3 0 0 3

1. 8085 PROCESSOR 9

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

2. PROGRAMMING OF 8085 PROCESSOR 9

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

Possible cover 3 units in 8051, addressing, programming, combine 3, 4 and 5.with respect to 8051, not with 8085

3. PERIPHERAL INTERFACING 9

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

4. MICRO CONTROLLER 8051 9

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

5. MICRO CONTROLLER PROGRAMMING & APPLICATIONS 9

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

L = 45 T = 15 TOTAL: 60

TEXT BOOKS

1. R.S. Gaonkar, 'Microprocessor Architecture Programming and Application', Penran International publishing pvt ltd , 5th edition.
2. Muhammad Ali Mazidi & Janice Gilli Mazidi, 'The 8051 Micro Controller and Embedded Systems', Pearson Education, 5th Indian reprint, 2003.

REFERENCE BOOKS

1. N.K.Srinath, '8085 Microprocessor Programming and Interfacing', PHI Learning Pvt Ltd, 2010
2. V.Udayashankara, M.S Mallikarjunaswamy, 'MicroController Hardware, Software and Applications', Tata McGraw Hill Education Pvt Ltd, 2009

EIE 108 COMMUNICATION ENGINEERING 3 0 0 3

AIM

It provides an idea of different modulation principles and different types of communication systems.

OBJECTIVES

To understand the ways of modulation, methods of data transmission for communication.

1. AMPLITUDE MODULATION 9

Amplitude modulation:- Basic principle of AM – Frequency spectrum and Bandwidth, Modulation index, AM power distribution- AM modulator circuits – AM Transmitters-Low level transmitters and High level transmitters - AM Detection- AM Receivers-TRF- Super heterodyne receivers- Double conversion AM Receivers.

2. ANGLE MODULATION 9

Angle modulation:- FM and PM Modulations-Frequency Deviation-Narrow band and Wide band FM-Side band terms in FM-Bandwidth of FM- Frequency modulators and demodulators- Direct FM Transmitter- Indirect FM transmitters- FM Receivers-Noise in FM modulation system-Noise performance of FM with AM- Comparison between AM and FM.

3. PULSE COMMUNICATION SYSTEMS 9

Sampling Theorem-Nyquist rate-FDM and TDM Principles-PAM, PPM, PDM- PCM-T1 Digital Carrier System- Delta modulation- Differential PCM-Comparison of PCM.,DM and DPCM.

4. DATATRANSMISSION 9

ASK, FSK and PSK-QPSK-DPSK- Base band signal receiver:- Probability of Error-Optimum Filter- Matched Filter-Coherent System-Comparison of Probability Error of different systems.

5. SATELLITE AND OPTICAL FIBRE COMMUNICATIONS 9

Kepler's Laws-Orbital satellites- Geostationary satellites –Antenna Look angles-Satellite system Link models- - Link equations- Advantages of optical fibre communication - Light propagation through fibres –Optical fibre Classifications – Losses in optical fibre cables. - Light sources and Detectors.

L = 45 TOTAL = 45

TEXT BOOKS

1. Singh, R.P. and Sapre, S.D., "Communication Systems- Analog and Digital" Tata-McGraw-Hill Publishing Company Ltd., 2007.

2. Wayne Tomasi, 'Electronic Communication Systems', Pearson Education, 5th Edition, 2008

REFERENCE BOOKS

1. Herbert Taub, Donald Schilling, Goutam Saha, "Principles of Communication Systems", 3rd Edition, Tata- McGraw- Hill, 2007.

2. G. Kennedy, 'Electronic Communication Systems', McGraw Hill, 4th edition, 2007

3. Beasly.J.S. & Miller G.M., 'Modern Electronic Communication', Prentice Hall of India,2008

CHY107 ENVIRONMENTAL SCIENCE AND ENGINEERING 3 0 0 3

AIM

The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make him/her sensitive to the environment problems in every professional endeavour that he/she participates.

OBJECTIVE

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

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

UNIT II ECOSYSTEMS AND BIODIVERSITY 14

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

UNIT III ENVIRONMENTAL POLLUTION 8

Definition – Causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – Soil waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

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

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – Population explosion – Family Welfare Programme – Environment and human health – Human Rights – Value Education – HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health – Case studies.

Suggested field work

Visit to local area to document environmental assets- river/grassland/ hill/ mountain, visit to local polluted site- urban/ rural / industrial/agricultural, study of common plants, insects, birds, study of simple ecosystems-pond, river, hill slopes etc.,

TOTAL: 45

TEXT BOOKS

1. Deswal.S and Deswal.A, " A basic course in Environmental studies" Dhanpat Rai & Co, 2006.
2. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
3. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.

REFERENCES

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India, Email: mapin@icenet.net
2. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
5. Townsend C., Harper J and Michael Begon, " Essentials of Ecology", Blackwell science
6. Trivedi R.K and P.K. Goel " Introduction to Air pollution" Techno-science Pubications. Yamuna R.T " Environmental Science" Inter Publications

MAT106 PROBABILITY AND APPLIED STATISTICS 3 1 0 4
(COMMON TO BT, FT & TXT, EIE)

OBJECTIVES:

On completion of the course, the students are expected

- to know the use of measures of central tendency, dispersion and correlation for analysis of data.
- to understand the concepts of probability and random variables.
- to know about some standard distributions and their properties.
- to be able to test hypothesis using various tests for large and small samples.
- to analyse experiments based on one-way, two – way and Latin square classifications.
- to understand the basics of quality control using control charts.

UNIT I STATISTICAL MEASURES 9

Measures of central tendency: Mean Median and Mode **–** Measures of variation – Range, standard deviation, Mean deviation and coefficient of variation. Correlation and Regression: Karl Pearson's coefficient of correlation –Rank Correlation – Regression lines (Definitions and simple numerical problems only).

UNIT II PROBABILITY AND RANDOM VARIABLE 9

Axioms of probability - Conditional probability - Total probability – Baye's theorem - Random variable – Distribution function – properties - Probability function - Probability density function – moments and moment generating function – properties.

UNIT III STANDARD DISTRIBUTIONS 9

Binomial, Poisson and Normal distributions –properties- Fitting of Binomial, Poisson and normal distributions to data.

UNIT IV TESTING OF HYPOTHESIS 9

Testing of hypothesis for large samples (single mean, difference of means, single proportion, difference of proportions) – Small samples tests based on t and F istributions (single mean, difference of means, paired *t*- test and variance ratio test) – Chi-square test for independence and goodness of fit - Simple numerical problems only.

UNIT V DESIGN OF EXPERIMENTS AND QUALITY CONTROL 9

Analysis of variance – One way classification –Two way classification – CRD - RBD - Latin square – LSD Concept of process control - Control charts for variables – $\overline{X}$, R – charts – Control charts for attributes – p, np, c – charts – Tolerance limits.

L + T: 45 + 15 TOTAL: 60

TEXT BOOKS:

1. Veerarajan T., "Probability and Statistics", Tata McGraw-Hill, New Delhi, 2007 & 2nd Reprint 2004.
2. Gupta S. P, "Statistical Methods", Sultan Chand & Sons Publishers, 2004. (Unit - I)

REFERENCES

1. Johnson R. A., "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
2. Gupta S.C, and Kapur, J.N., "Fundamentals of Mathematical Statistics", Sultan Chand, Ninth Edition, New Delhi, 1996.
3. Walpole R. E., Myers S.L. & Keying Ye, "Probability and Statistics for Engineers and Scientists", Pearson Education Inc, 2002.
4. Arunachalam T., "Probability and Statistics", Inder Publications, Coimbatore, 2009

EIE403 MICROPROCESSOR & MICROCONTROLLER LABORATORY 0 0 3 1

(Any TEN experiments)

LIST OF EXPERIMENTS

8-bit Microprocessor

1. Simple arithmetic operations

Multi precision addition / subtraction .

2. Programming with Control instructions

Ascending / Descending order

3. Hex / ASCII / BCD code conversions.

4. Design of Traffic Light Controller with 8255 Interface

5. A/D Interface Experiments

6. Serial Communication using 8251 Interface

8-bit Micro controller

7. Demonstration of basic instructions with 8051 Micro controller execution, including:

Conditional jumps, looping

8. Stepper motor Interfacing with 8051 using port 1

9. Interface with D / A converter

10. Programming Exercise on RAM direct addressing

11. Programming Exercise on SFR Bit Addressing

12. Interface multiplexed display with 8051

EIE404 INTEGRATED CIRCUITS LABORATORY 0 0 3 1

(Any TEN experiments)

LIST OF EXPERIMENTS:

DIGITAL INTEGRATED CIRCUITS

1. Study of flip flop. (JK, RS, D)
2. Implementation of combination circuit 1.
3. Implementation of combination circuit 2.
4. Design and Implementation of counters.
5. Design and Implementation of shift registers.

LINEAR INTEGRATED CIRCUITS

6. op-Amp characteristics.
7. op-Amp Application 1.
8. op-Amp Application 2.
9. Application of IC 555.(astable, monostable)
10. Design and testing of low pass and high pass filter.
11. Application of IC voltage regulator.
12. Application of PLL.

ENG401 COMMUNICATION SKILLS LABORATORY 0 0 3 1

(COMMON TO ALL BRANCHES)

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students' overall capability apart from academic competence. Many students, particularly those non- English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre- employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the Industry environment, thus rendering them as prospective assets to Industries. The course will equip the student with the necessary communication skills that would go a long way in helping them in their profession

OBJECTIVES

- To equip students of engineering and technology with effective speaking and listening skills in English
- To help them develop their soft skills and people skills, which will make the transition from college to workplace smoother and help them to excel in their jobs.
- To enhance students' performance at Placement Interviews, Group Discussions and other recruitment exercises.

1. PC based session (weightage-40%) 24 periods

A, English Language Lab (18 Periods)

1. Listening Comprehension (6)
   Listening – Listening and sequencing of sentences – Filling in the Blanks – Listening and answering the question
2. Reading Comprehension and Vocabulary (6)
   Filling in the blanks – Cloze Exercises –Vocabulary building – Reading and Answering questions
3. Speaking: (6)
   Phonetics : Intonation – Ear Training – Correct Pronunciation – Sound Recognition exercises – Common Errors in English
   Conversations: Face to face Conversation – Telephone conversation - Role play Activities (Students take on roles and engage in conversation)

B, Career Lab (6 Periods)

(Samples are available to learn and practice in the class room session)

1. Resume / Report Preparation / Letter Writing (1)
   Structuring the resume / report – Letter writing / E-mail communication – Samples
2. Presentation Skills (1)
   Elements of an effective presentation – Structure of a presentation –Presentation Tools – Voice Modulation – Audience analysis – Body Language
3. Soft Skills (2)
   Time Management – Articulateness – Assertiveness – Innovation and Creativity – Stress Management & Poise
4. Group Discussion (1)
   Why is GD part of selection process? – Structure of a GD- Moderator-led and Other GDs – Strategies in GD – team work – Body Language –Mock GD
5. Interview Skills
   Kinds of Interviews –Required Key Skills – Corporate culture- Mock Interviews

II. Class Room Session	(welghtage-60%)	24 periods

1. Resume / Report Preparation /Letter writing : Students prepare their own resume and report. (2)
2. Presentation Skills : Students make presentations on given topics. (8)
3. Group Discussion : Students participate in group discussions (8)
4. Interview Skills : Students participate in Mock Interviews. (8)

Note: Classroom sessions are practice sessions

REFERENCES BOOKS:

1. Meenakshi Raman and Sangeetha Sharma, Technical Communication- Principles and Practice, Oxford University Press. New Delhi (2004)
2. Barker. A – Improve your communication skills – Kogan page India Pvt Ltd. New Delhi (2006)
3. Adrian Doff and Christopher Jones- Language in Use (Upper- Intermediate). Cambridge University Press. First South Asian Edition (2004)
4. John Seely, the Oxford Guide to writing and speaking, Oxford University Press, New Delhi (2004)
5. Customize yourself to corporate life Dr. K. Devadoss & P. Malathy Inder Publications, Coimbatore (2007)

CD's

1. Train2success series 1.Telephone Skills.2. Interviewing Skills 3. Negotiation Skills by Zenith Global Consultants Ltd. Mumbai
2. BEC Series
3. Look Ahead by Cambridge University Press

Total = 45

GHE105 HUMAN EXCELLENCE - SOCIAL VALUES 0 0 2 1

1. Evolution of man – Man in society.
2. Duties and Responsibilities, Duty to self, family, society and the world.
3. Disparity among human beings.
4. Social welfare – Need for social welfare – Pure mind for pure society.
5. Politics and society – Education and society-Case study and live examples.
6. Impact of science in society - social development & society upliftments by science.
7. Economics & society – role of economics in creating a modern society.
8. Central message of Religions.
9. Yogasanas-I
10. Meditation-II.[Thuriatheetham]

SEMESTER VI

EIE109 INDUSTRIAL INSTRUMENTATION – II 3 0 0 3

1. PRESSURE MEASUREMENT 9

Units of pressure - Manometers – Different types – Elastic type pressure gauges – Bourdon type bellows – Diaphragms – Electrical methods – Elastic elements with LVDT and strain gauges – Capacitive type pressure gauge – Piezo resistive pressure sensor – Resonator pressure sensor – Measurement of vacuum – McLeod gauge – Thermal conductivity gauges – Ionization gauge, cold cathode and hot cathode types – Testing and calibration of pressure gauges – Dead weight tester.

2. MECHANICAL TYPE FLOW METERS 9

Theory of fixed restriction valuable head type flow meters – Orifice plate – Venturi tube – Flow nozzle – Dall tube – installation of head flow meters – Piping arrangement for different fluids – Pitot tube.

3. QUANTITY METERS, AREA FLOW METERS AND MASS FLOW METERS 9

Positive displacement flow meters – Constructional details and theory of operation of mutating disc, reciprocating piston, oval gear and helix type flow meters – Inferential meter – Turbine flow meter – Rotameter – Theory and installation – Angular momentum mass flow meter – Coriolis mass flow meters – Thermal mass flow meters – Volume flow meter plus density measurement – Calibration of flow meters – Dynamic weighing method.

4. ELECTRICAL TYPE FLOW METER 9

Principle and constructional details of electromagnetic flow meter – Different types of excitation schemes used – Different types of ultrasonic flow meters – Laser doppler anemometer systems – Vortex shedding flow meter – Target flow meter – Solid flow rate measurement – Guidelines for selection of flow meter.

5. LEVEL MEASUREMENT 9

Gauge glass techniques coupled with photoelectric readout system – Float type level indication – Different schemes – Level switches, level measurement using displacer and torque tube – Bubble system. Boiler drum level measurement – Differential pressure method – Hydra step systems – Electrical types of level gauges using resistance, capacitance, nuclear radiation and ultrasonic sensors.

TEXT BOOKS Total = 45

1. E.O. Doeblin ‘Measurement Systems - Application and Design, Tata McGraw Hill Publishing company 2004
2. R.K. Jain, ‘Mechanical & Industrial Measurements’, Khanna publishers, New Delhi, 1999.

REFERENCE BOOKS include

1. A.K. Sawhney and P. Sawhney, ‘A Course on Mechanical Measurement, Instrumentation and Control’, Dhanpat Rai and Co, 2004.
2. D.P.Eckman, ‘Industrial Instrumentation’, Wiley Eastern Limited, 2002.
3. Alan S. Morris, ‘Principles of Measurement and Instrumentation’, Prentice Hall of India, 2003.
4. B.C. Nakra and K.K. Chaudry, ‘Instrumentation, Measurement and Analysis’, Tata McGraw Hill, 2006.
5. B.G.Liptak, ‘Instrument Engineers Hand Book (Measurement)’, Chilton Book Co., 1994.

6. D. Patranabis, ‘Principles of Industrial Instrumentation’, Tata McGraw Hill, New Delhi, 2008. in reference.

EIE110 ANALYTICAL INSTRUMENTS 3 0 0 3

1. COLORIMETRY AND SPECTROPHOTOMETRY 9

Spectral methods of analysis – Beer-Lambert law – Colorimeters – UV-Vis spectrophotometers – Single and double beam instruments – Sources and detectors – IR spectrophotometers – Types – Analysis using Attenuated total reflectance - Atomic absorption spectrophotometers – Sources and detectors – FTIR spectrophotometers – Flame emission photometers.

2. CHROMATOGRAPHY 9

Different techniques – Gas chromatography – Detectors – Liquid chromatographs – Applications – High-pressure liquid chromatographs – Applications

3. INDUSTRIAL GAS ANALYZERS AND POLLUTION MONITORING INSTRUMENTS 9

Types of gas analyzers – Oxygen, NO_2 and H_2S types, IR analyzers, thermal conductivity analyzers, analysis based on ionization of gases. Air pollution due to carbon monoxide, hydrocarbons, nitrogen oxides, sulphur dioxide estimation - Dust and smoke measurements.

4. pH METERS AND DISSOLVED COMPONENT ANALYZERS 9

Principle of pH measurement, glass electrodes, hydrogen electrodes, reference electrodes, selective ion electrodes, ammonia electrodes, biosensors, dissolved oxygen analyzer – Sodium analyzer – Silicon analyzer.

5.RADIOCHEMICAL AND MAGNETIC RESONANCE TECHNIQUES 9

Nuclear radiations – Detectors – GM counter – Proportional counter – Solid state detectors – Gamma cameras – X-ray spectroscopy – Detectors – Diffractometers – Absorption meters – Detectors. NMR – Basic principles – NMR spectrometer - Applications. Mass spectrometers – Different types – Applications.

Total = 45

TEXT BOOKS

1. H.H.Willard, L.L.Merritt, J.A.Dean, F.A.Settle, ‘Instrumental methods of analysis’, CBS publishing & distribution, 1995.
2. R.S. Khandpur, ‘Handbook of Analytical Instruments’, Tata McGraw Hill publishing Co. Ltd., 2003.

REFERENCE BOOKS

1. Robert D. Braun, ‘Introduction to Instrumental Analysis’, Pharma Book Syndicate, 2008.
2. G.W.Ewing, ‘Instrumental Methods of Analysis’, McGraw Hill, 1992.
3. DA Skoog and D.M.West, ‘Principles of Instrumental Analysis’, Holt, Saunders Publishing, 1985

EIE111 DIGITAL CONTROL SYSTEM 3 1 0 4

1. SAMPLED DATA CONTROL SYSTEM 9

Sampling process - system representation in terms of difference equations – realizations - z transform - inverse z transform - response of linear discrete system - z- transforms analysis of sampled data control system – z domain - s domain relationship – pulse transfer functions zero order hold - steady state error analysis

2. STABILITY ANALYSIS 9

Jury's stability test - bilinear transformation - z domain nyquist stability - stability analysis using root locus diagram – correlation between time response - root locus in the z plane - s plane

3. STATE VARIABLE METHOD 9

Discrete time state equations - similarity transformations – state diagrams - Realization of pulse transfer function – direct – cascade - parallel realizations - solution of discrete state equations -Controllability - observability of discrete systems - Pole placement - Lyapunov stability analysis

4. DESIGN AND COMPENSATION 9

Design of sampled data control system - Cascade compensation - DIR method - lead, lag - lag- lead compensator – Digital compensator design using root locus plots - Digital compensator design using Frequency response plots. PID controllers – Deadbeat algorithm.

5. APPLICATIONS 9

System models - control algorithms - their implementation for micro processor based position - temperature control systems – Operational features of stepper motors - Drive circuits - Interfacing of stepper motor to microprocessors

Total:45

TEXT BOOK

1. Gopal, M., "Digital Control and State Variable Methods", Tata McGraw - Hill, 2003.
2. Ogata, K., "Discrete-time Control Systems", 2nd Edition, Eastern Economy Edition, 2005.

REFERENCE

1. Kuo, B.C., "Digital Control Systems", 2nd Edition, the Oxford University Press, 2005.

EIE112 DIGITAL SIGNAL PROCESSING 3 1 0 4

(Common to EEE, EIE and IT)

1. SIGNALS AND REPRESENTATION 9

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

2. DISCRETE TIME SYSTEM ANALYSIS 9

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

3. DISCRETE FOURIER TRANSFORM & COMPUTATION 9

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

4. DESIGN OF DIGITAL FILTERS 9

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

5. PROGRAMMABLE DSP CHIPS 9

Architecture and features of TMS 320C54XX Processor - Introduction to MATLAB – Programming and realization using MATLAB - Representation of Basic signals, Linear and circular convolution of two sequences, Implementation of DFT and FFT.

TUTORIALS 15 TOTAL: 60

TEXT BOOKS

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

REFERENCE BOOKS

1. Alan V. Oppenheim, Ronald W. Schafer and John R. Buck, 'Discrete – Time Signal Processing', Pearson Education, New Delhi, 2003.
2. B. Venkataramani, M. Bhaskar, 'Digital Signal Processors, Architecture, Programming and Applications', Tata McGraw Hill, New Delhi, 2003.
3. Ramesh Babu, 'Digital Signal Processing', SciTech Publications (India) Pvt.Ltd.,2007
4. S. Salivahanan, A. Vallavaraj, C. Gnanapriya, 'Digital Signal Processing', Tata McGraw Hill, New Delhi, 2008

EIE113 REAL TIME EMBEDDED SYSTEM 3 0 0 3

1. INTRODUCTION TO EMBEDDED SYSTEM 9

Introduction to functional building blocks of embedded systems – Register, memory devices, ports, timer, interrupt controllers using circuit block diagram representation for each categories.

2. PROCESSOR AND MEMORY ORGANIZATION 9

Structural units in a processor; selection of processor & memory devices; shared memory; DMA; interfacing processor, memory and I/O units; memory management – Cache mapping techniques, dynamic allocation - Fragmentation.

3. DEVICES & BUSES FOR DEVICES NETWORK 9

I/O devices; timer & counting devices; serial communication using I^2C, CAN, USB buses; parallel communication using ISA, PCI, PCI/X buses, arm bus; interfacing with devices/ports, device drivers in a system – Serial port & parallel port.

4. I/O PROGRAMMING SCHEDULE MECHANISM 9

Intel I/O instruction – Transfer rate, latency; interrupt driven I/O - Non-maskable interrupts; software interrupts, writing interrupt service routine in C & assembly languages; preventing interrupt overrun; disability interrupts.
Multi threaded programming – Context switching, premature & non-premature multitasking, semaphores.
Scheduling – Thread states, pending threads, context switching, round robin scheduling, priority based scheduling, assigning priorities, deadlock, watch dog timers.

5. REAL TIME OPERATING SYSTEM (RTOS) 9

Introduction to basic concepts of RTOS, Basics of real time & embedded system operating systems, RTOS – Interrupt handling, task scheduling; embedded system design issues in system development process – Action plan, use of target system, emulator, use of software tools.

L = 45 Total = 45

TEXT BOOKS

1. Rajkamal,S ‘Embedded System – Architecture, Programming, Design’, Tata McGraw Hill, 2008.
2. Daniel W. Lewis ‘Fundamentals of Embedded Software’, Prentice Hall of India, 2004.

REFERENCE BOOKS

1. David E. Simon, ‘An Embedded Software Primer’, Pearson Education, 2004.
2. Frank Vahid, ‘Embedded System Design – A Unified hardware & Software Introduction’, John Wiley, 2002.
3. Sriram V. Iyer, Pankaj Gupte, ‘Embedded Real Time Systems Programming’, Tata McGraw Hill, 2004.
4. Steve Heath, ‘Embedded System Design’, II edition, Elsevier, 2003.

EIE405 INDUSTRIAL INSTRUMENTATION LABORATORY 0 0 3 1

(Any TEN experiments)

LIST OF EXPERIMENTS

1. Measurement of flow using Venturi meter and orifice meter.
2. Calibration of Pressure gauge.
3. Calibration of Temperature sensor.
4. Torque measurement.
5. Viscosity measurement.
6. Level measurement using d/p transmitter.
7. Measurement of pH, humidity and Conductivity
8. ECG analyzer.
9. Audio meter and Spiro meter
10. Blood Pressure measurement using Sphygmomanometer
11. UV –Visible Spectro photometer
12. IR Thermometer / flue gas analyzer

EIE 406 PROCESS CONTROL LABORATORY 0 0 3 1

(Any TEN experiments)

LIST OF EXPERIMENTS

1. Dynamic Characteristics of First Order System with and without transportation lag.
2. Dynamic Characteristics of Second Order System with and without transportation lag.
3. Dynamic characteristics of P+I+D controller
4. Dynamic characteristics of interacting and non-interacting systems.
5. Tuning of PID controller using open loop method (Cohen- Choon Method)
6. Tuning of PID controller using closed loop method (Zeigler – Nicholas Method)
7. Design and Implementation of controller for Level process
8. Design and Implementation of controller for Flow process
9. Design and Implementation of controller for Pressure process
10. Design and Implementation of controller for Temperature process
11. Design and Implementation of Multi loop System – Cascade Control.
12. Characteristics of different types of Control valves (Final Control Element)

EIE407 MINI PROJECT 0 0 0 1

The objective of this project is to provide opportunity for the students to implement their skills acquired in the previous semesters to practical problems. Students have to do a mini-project work during the summer holidays at the end of 2nd year for a period of 2 weeks; a report should be submitted at the beginning of 5th semester.

Guidelines

1. Selection of a topic or project title in consultation with a staff member.
2. Develop a project planning strategy.
3. If it is an industry – sponsored project, a concurrent letter from industry is required.
4. A maximum of 3 students per group will do the project.
5. The project may be done in one of the labs under the supervision of a guide or in the selected industry.
6. At the end of the project, a report will be written and a technical presentation along with demonstration will be made by the students.
7. The report, project demonstration and technical presentation will be evaluated by the internal and external examiners.

GHE106: HUMAN EXCELLENCE – NATIONAL VALUES 0 0 2 1

1. Citizenship- its significance-Enlightened citizenship.
2. Emerging India-it's glory today- Global perspective-other view about India.
3. Indian culture and it's greatness.
4. India and Peace.
5. India and Spirituality- Great spiritual leaders.
6. India's message to the world – it's role in global peace.
7. Service and sacrifice-Unity in diversity – case studies-live examples.
8. National values identification and practice.
9. Yogasanas -II.
10. Meditation III.[Nithyanandam& Nine Centre Meditation.

SEMESTER - VII

EIE 114 POWER PLANT INSTRUMENTATION 3 0 0 3

1. OVERVIEW OF POWER GENERATION 9

Importance of instrumentation in power generation – Methods of power generation – Hydro, thermal, nuclear, solar and wind power – Block diagram – Details of boiler processes - P&I diagram of boiler – Cogeneration.

2. MEASUREMENTS IN POWER PLANTS 9

Electrical measurements – Current, voltage, power, frequency, power factor etc. – Non electrical parameters – Flow of feed water, fuel, air and steam with correction factor for temperature – Steam pressure and steam temperature – Drum level measurement – Radiation detector – Smoke density measurement – Dust monitor.

3. ANALYSERS IN POWER PLANTS 9

Flue gas oxygen analyser – Analysis of impurities in feed water and steam – Dissolved oxygen analyser – Chromatography – pH meter – Fuel analyser – Pollution monitoring instruments.

4. CONTROL LOOPS IN BOILER 9

Combustion control – Air/fuel ratio control – Furnace draft control – Drum level control – Main steam and reheat steam temperature control – Super heater control – Air temperature – Deaerator control – Distributed control system in power plants – Interlocks in boiler operation.

5. TURBINE – MONITORING AND CONTROL 9

Speed, vibration, shell temperature monitoring and control – Steam pressure control – Lubricant oil temperature control – Cooling system.

L = 45 Total = 45

TEXT BOOKS

1. Sam G. Dukelow, 'The Control of Boilers', Instrument Society of America, 1991.
2. P.K. Nag, 'Power Plant Engineering', Tata McGraw Hill, 2001.

REFERENCE BOOKS

1. S.M. Elonka and A.L. Kohal, 'Standard Boiler Operations', Tata McGraw Hill, New Delhi,1994.
2. R.K.Jain, 'Mechanical and Industrial Measurements', Khanna Publishers, New
3. Krishnasamy & Ponnibala 'Power Plant Instrumentation', PHI, 2010.

EIE115 LOGIC AND DISTRIBUTED CONTROL SYSTEM 3 0 0 3

AIM

This Course is designed to know about different data networks, to know about various PLC languages. It also provides knowledge about distributed Control Systems.

OBJECTIVES

- To provide idea about various Data Networks.
- To get an exposure to SCADA.
- To learn about different PLC languages.
- To study about Industrial DCS.
- To have an exposure to HART and Fieldbus.

1. DATA NETWORK FUNDAMENTALS 9

Network hierarchy and switching – ISO/OSI Reference model – Data link control protocol:-HDLC – Media access protocol:-Command/response, Token passing and CSMA/CD - TCP/IP – Bridges – Routers – Gateways –Standard ETHERNET and ARCNET Configuration.

2. PLC AND SCADA 9

Evolutions of PLCs – Sequential and Programmable Controllers – Architecture – Comparative study of Industrial PLCs. – SCADA:- Hardware and software, Remote terminal units, Master station, Communication architectures and Open SCADA protocols.

3. PLC PROGRAMMING 9

PLC Programming:- Ladder logic, Functional block programming, timer & counter function Sequential function chart ,Arithmetic function chart program & Control Institution, Instruction list and Structured text programming.

4. DISTRIBUTED CONTROL SYSTEMS 9

Evolution - Different architectures - Local control unit - Operator Interface – Displays - Engineering interface.

5. HART AND FIELDBUS 9

Introduction- Evolution of signal standard – HART communication protocol – Communication modes – HART Networks – HART commands – HART applications – Fieldbus:- Introduction, General Fieldbus architecture, Basic requirements of Fieldbus standard, Fieldbus topology, Interoperability and Interchangeability – Introduction to OLE for process control (OPC).

TEXT BOOKS L = 45 TOTAL = 45

1. Petrezeulla, “Programmable Controllers”, McGraw-Hill, 2004.
2. Lucas, M.P., “Distributed Control System”, Van Nastrand Reinhold Company, New York, 1986.
3. Clarke, G., Reynders, D. and Wright, E., “Practical Modern SCADA Protocols: DNP3, 60870.5 and Related Systems”, Newnes, 1st Edition, 2004.

REFERENCE BOOKS

1. Hughes, T., “Programmable Logic Controllers”, ISA Press, 2000.
2. Bowden, R., “HART Application Guide”, HART Communication Foundation, 1999.
3. Mc-Millan, G.K., “Process/Industrial Instrument and Controls Handbook”, McGraw-Hill, NewYork, 1999.
4. Berge, J., “Field Buses for Process Control: Engineering, Operation, and Maintenance”, ISA Press, 2004.
5. Data Communication & Networking – Behrour A.Frouzan Tata Mc Graw Hill,2006.

EIE116 APPLIED SOFT COMPUTING 3 1 0 4

AIM

To understand neural network and Fuzzy logic controllers.

OBJECTIVE

- This course introduces the basics of neural network, fuzzy logic and its applications in control..

PREREQUISITE

Set theory and Boolean algebra

1. INTRODUCTION AND DIFFERENT ARCITECTURES OF NEURAL NETWORKS 9

Artificial neuron – Model of neuron – Network architecture – Learning process – Single layer perceptron – Limitations – Multi layer perceptron – Back propagation algorithm –Hopfield network, Kohnen's self organizing maps and adaptive resonance theory.

2. NEURAL NETWORKS FOR CONTROL 9

Schemes of Neuro-control – Identification and control of dynamical systems – Parameterized Neuro - Controller and optimization aspects – Adaptive neuro controller – Case studies.

3. INTRODUCTION TO FUZZY LOGIC 9

Fuzzy set theory – Fuzzy sets – Operation on Fuzzy sets – Fuzzy relations – Fuzzy membership functions – Fuzzy conditional statements – Fuzzy rules.

4. FUZZY LOGIC CONTROL SYSTEM 9

Fuzzy Logic controller – Fuzzification – Knowledge base – Decision making logic – Defuzzification – Design of Fuzzy logic controller – Adaptive fuzzy systems - Case study.

5. HYBRID CONTROL SCHEMES 9

Fuzzy Neuron – Fuzzification and rule base Using ANN – Introduction to GA – Optimization of membership function and rule base using Genetic Algorithm - Fuzzy transfer functions in neural networks - Elements of evolutionary computation – Case study.

L = 45 TOTAL = 45

TEXT BOOKS

1. Laurence Fausett, L., "Fundamentals of Neural Networks", prentice Hall, Englewood Cliffs, N.J., 2004
2. Ross, T.J., "Fuzzy Logic with Engineering Applications", John Wiley and Sons(Asia) Ltd., 2004.
3. David Goldberg, "Genetic Algorithm in Search, Optimization, and Machine Learning", Addison Wesley Publishing Company, Inc. 1989.

REFERENCE BOOKS

1. Bose and Liang , "Artificial Neural Networks", Tata McGraw-Hill, New Delhi, 1996.
2. Tsoukalas, L.H. and Uhrig, R.E., "Fuzzy and Neural Approach in Engineering", John Wiley and Sons, 1997.
3. Zurada, J.M., "Introduction to Artificial Neural Systems", Jaico Publishing House, Mumbai, 1997.
4. Millon, W.T., Sutton, R.S. and Webrose, P.J., "Neural Networks for Control", MIT Press, 1992.
5. Klir, G.J. and Yuan, B.B., "Fuzzy Sets and Fuzzy Logic", Prentice Hall of India, New Delhi, 1997.
6. Driankov, D., Hellendron, H. and Reinfrank M., "An Introduction to Fuzzy Control", Narosa Publishing House, New Delhi, 1996.
7. Zimmermann, H.J., "Fuzzy Set Theory and its Applications", Allied Publishers Ltd., 1996.
8. Haykin, S., "Neural Networks: A Comprehensive Foundation", 2nd Edition, Prentice Hall Inc., New Jersey, 1999.

EIE117 VLSI DESIGN 3 1 0 4

1. BASIC MOS TRANSISTOR 9

Enhancement mode & Depletion mode – Fabrication (NMOS, PMOS, CMOS, BiCMOS) Technology – NMOS transistor current equation – Second order effects – MOS Transistor Model.

2. NMOS & CMOS INVERTER AND GATES 9

NMOS & CMOS inverter – Determination of pull up / pull down ratios – Stick diagram – lamda based rules – Super buffers – BiCMOS & steering logic.

3. SUB SYSTEM DESIGN & LAYOUT 9

Structured design of combinational circuits – Dynamic CMOS & clocking – Tally circuits – (NAND-NAND, NOR-NOR and AOI logic) – EXOR structure – Multiplexer structures – Barrel shifter.

4. DESIGN OF COMBINATIONAL ELEMENTS & REGULAR ARRAY LOGIC 9

NMOS PLA – Programmable Logic Devices - Finite State Machine PLA – Introduction to FPGA.

5. VHDL PROGRAMMING 9

Introduction to VHDL -– Types – Operators – Packages – Sequential circuit – Sub-programs – Test bench Simulation - Programs on counters, flipflops, FSM, Multiplexers / Demltiplexers.

L = 45 Total = 45

TEXT BOOKS

1. D.A.Pucknell, K.Eshraghian, 'Basic VLSI Design', 3rd Edition, Prentice Hall of India, New Delhi, 2003.
2. Eugene D.Fabricius, 'Introduction to VLSI Design', Tata McGraw Hill, 1990.

REFERENCE BOOKS

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

EIE408 INSTRUMENTATION SYSTEM DESIGN LABORATORY 0 0 3 1

(Any TEN experiments)

1. Design and implementation of instrumentation amplifier.
2. Design and implementation of active filter.
3. Design of regulated power supply
4. Design and implementation of V/I and I/V converters.
5. Design and implementation of cold – junction compensation circuit for thermocouple.
6. Design and implementation of signal conditioning circuit for RTD.
7. Design of orifice plate and rotameter.
8. Design of control valve (sizing and flow – lift characteristic)
9. Design of PID controller using operational amplifier
10. Design of PID controller using microprocessor/PIC microcontroller
11. Piping and Instrumentation Diagram – case study.
12. Preparation of documentation of instrumentation project (process flow sheet, instrument index sheet and instrument specifications sheet).

EIE409 INDUSTRIAL AUTOMATION LABORATORY 0 0 3 1

(Any TEN experiments)

AIM

To study the concept of controlling the different continuous / discrete process using computers, DCS / PLC.

1. Simulation of first order system and second order system with and without dead time using Discretization method and Runge – Kutta method
2. Design and Implementation of Dead Beat algorithm & Dahlin's algorithms using Mat Lab Package
3. Design and Implementation of Kalman's algorithms using Mat Lab Package
4. Design and Implementation of Discrete P+I+D algorithm using Mat Lab Package
5. Design and Implementation of Fuzzy logic controller using Mat Lab Package
6. Design and Implementation of Multi loop Control using Mat Lab Package
7. Programming with PLC - Application 1
8. Programming with PLC - Application 2
9. Programming with Lab View - Application 1
10. Programming with Lab View - Application 2
11. Implementation of Distributed Control System for Different Processes.
12. Study of SCADA

GHE107: HUMAN EXCELLENCE – GLOBAL VALUES 0 0 2 1

1. Global values – understanding and identification – its importance.
2. Racial discrimination and solution – Ecological imbalance and solution.
3. Political upheavals and solution – Social inequality and solution – live case discussions and debate.
4. Cultural degradation and solution – live case discussions and debate.
5. Emergence of monoculture – solution.
6. Global terrorism – it's cause and effect – solution.
7. Economic marginalization and solution – it's impact in the globe.
8. Man is the cause and man is the solution.
9. All Meditations.
10. All Yogasanas.

SEMESTER VII

GSS104 PRINCIPLES OF MANAGEMENT AND TOTAL QUALITY MANAGEMENT 3 0 0 3

(Common to all Branches)

OBJECTIVE

Management is the process of achieving organizational goals by engaging in the four major functions of planning, organizing, leading, and controlling. After studying this course, students will be able to have a clear understanding of the managerial functions. The study provides the students with the comprehensive knowledge and understanding of the dynamics involved in managing in the modern organization.

1. HISTORICAL DEVELOPMENT 9

Definition of Management – Science or Art – Management and Administration – Development of Management Thought – Contribution of Taylor and Fayol – Functions of Management – Types of Business Organization.

2. PLANNING 9

Nature & Purpose – Steps involved in Planning – Objectives – Setting – Process of Managing by Objectives – Strategies, Policies & Planning Premises – Forecasting – Decision – making.

3. ORGANISING 9

Nature and Purpose – Formal and informal organization – Organization Chart – Structure and Process – Departmentation by difference strategies – Line and Staff authority – Benefits and Limitations – De-Centralization and Delegation of Authority – Staffing – Selection Process – Techniques – HRD – Managerial Effectiveness.

4. DIRECTING 9

Scope – Human Factors - Creatively and Innovation – Harmonizing Objectives – Leadership – Types of Leadership Motivation – Hierarchy of needs – Motivation theories – Motivational Techniques – Job Enrichment – Communication – Process of Communication – Barriers and Breakdown – Effective Communication – Electronic media in Communication.

5. CONTROLLING 9

System and process of Controlling – Requirements for effective control – The Budget as Control Technique – Information Technology in Controlling – Use of computers in handling the information – Productivity – Problems and Management – Control of Overall Performance – Direct and Preventive Control - Reporting – The Global Environment – Globalization and Liberalization – International Management and Global Theory of Management. **L = 45 Total = 45**

TEXT BOOKS

1. Harold Koontz & Heinz Weihrich “Essentials of Management – An International Perspective”, Seventh Edition Tata McGraw Hill, 2007.
2. Joseph L Massie “Essentials of Management”, Prentice Hall of India, (Pearson) Fourth Edition, 2003.

3. REFERENCES:

1. Tripathy PC and Reddy PN, “Principles, of Management”, Tata McGraw Hill, 1999.
2. Decenzo David, Robbin Stephen A, “Personnel and Human Reasons Management”,
3. JAF Stomer, Freeman R. E and Daniel R Gilbert Management, Pearson Education, Sixth Edition, 2004.
4. Fraidoon Mazda, “Engineering Management” , Addison Wesley, - 2000.

ELECTIVE –I

EIE118 POWER ELECTRONICS 3 0 0 3

1. POWER SEMI-CONDUCTOR DEVICES 9

Structure, operation and characteristics of SCR, TRIAC, power transistor, MOSFET and IGBT. Driver and snubber circuits for MOSFET - Turn-on and turn-off characteristics and switching losses.

2. PHASE-CONTROLLED CONVERTERS 9

2-pulse, 3-pulse and 6-pulse converters – Inverter operation of fully controlled converter - Effect of source inductance - Distortion and displacement factor – Ripple factor - Single phase AC voltage controllers.

3. DC TO DC CONVERTERS 9

Step-down and step-up choppers - Time ratio control and current limit control - Switching mode regulators: Buck, boost, buck-boost and cuk converter - Resonant switching based SMPS.

4. INVERTERS 9

Single phase and three phase (both 120^0 mode and 180^0 mode) inverters - PWM techniques: Sinusoidal PWM, modified sinusoidal PWM and multiple PWM - Voltage and harmonic control - Series resonant inverter - Current source inverters.

5. APPLICATIONS 9

Uninterrupted power supply topologies - Flexible AC transmission systems - Shunt and series static VAR compensator - Unified power flow controller- HVDC Transmission.

L = 45 Total = 45

TEXT BOOKS

1. Muhammad H. Rashid, ‘Power Electronics: Circuits, Devices and Applications’, Prentice Hall of India/Pearson Education, Third edition, 2004.
2. Bimbhra. P.S. “Power Electronics”, Khanna Publishers, 1998

REFERENCE BOOKS

1. Ned Mohan, Tore.M.Undeland, William.P.Robbins, ‘Power Electronics: Converters, applications and design’, John Wiley and sons, third edition, 2003.
2. Cyril.W.Lander, ‘Power Electronics’, McGraw Hill International, Third edition, 1993.
3. Bimal K. Bose, ‘Modern Power Electronics and AC Drives’, Pearson Education, 2003.
4. Mr. Jaganathan, ‘Introduction to Power Electronics’, Prentice Hall of India, 2004.

EIE119 ROBOTICS AND AUTOMATION 3 0 0 3

1. INTRODUCTION TO ROBOTICS 9

History of Robots – Classifications – Various fields of Robotics – Actuators – Sensors – Manipulators – End effectors – Application areas – Robot programming languages.

2. ROBOT KINEMATICS 9

Matrix representation – Homogeneous transformation – DH representation of standard robots – Inverse kinematics.

3. ROBOT DYNAMICS 9

Velocity kinematics – Jacobian and inverse Jacobian – Lagrangian formulation – Eulers Lagrangian formulation – Robot equation of motion.

4. TRAJECTORY PLANNING 9

Introduction – Path Vs trajectory – Joint-space Vs Cartesian-space descriptions – Basics of trajectory planning – Joint-space trajectory planning – Cartesian-space trajectories.

5. CONTROL AND APPLICATION OF ROBOTICS 9

Linear control of robot manipulation – Second-order systems – trajectory following control – Modeling and control of single joint – Architecture of industrial robotic controllers – Robot applications.

L = 45 Total = 45

TEXT BOOKS

1. Saced B. Niku, ‘ Introduction to Robotics Analysis, Systems, Applications’, Prentice Hall of India/Pearson Education, Asia, 2001.

2. Craig, ‘Introduction to Robotics Mechanics and Control’, Second edition, Pearson Education, Asia, 2004.

REFERENCE BOOKS

1. K.S. Fu & Co., ‘Robotics Control, Sensing, Vision and Intelligence’, McGraw Hill International
   Editions, Industrial Engineering Series, 1991.
2. R.D.Klafter, T.A. Chimielewski and M.Negin, ‘Robotic Engineering – An integrated Approach’, Prentice Hall of India, New Delhi, 2010.
3. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G. Odrey, ‘Industrial Robotics Technology Programming and Application’, McGraw Hill book company, 1986.

EIE120 INDUSTRIAL CHEMICAL PROCESS 3 0 0 3

1. MECHANICAL OPERATIONS 9

Unit operations - transport of liquids - solids - gases adjusting particle size of bulk solids – mixing processes – separation processes

2. MASS TRASFER OPERATIONS PROCESSES 9

Combustion processes – heat exchangers– evaporators – crystallization - Drying – distillation – refrigeration process – chemical reactions – energy balance and material balance for the above processes change this to 3rd unit

3. HEAT TRANSFER OPERATIONS 9

Radiation – conduction – convection -Total Balance - Heat Balance - Heat Effects - combustion reactions - Energy balances in manufacturing processes - optimum utilization of Energy – Heat Transfer Operations in Chemical reactors – equipments

4. CASE STUDY – I 9

Operations in the manufacture of paper and pulp – operations in steel industry

5. CASE STUDY – II 9

Operations in thermal power plant – operations in pharmaceutical industry - leather industry

TEXT BOOKS

1. Waddams, A.L., Chemicals from petroleum, Butler and Tanner Ltd., UK, 1968

4. Balchen, J.G. and Mumme, K.J., Process Control structures and applications, Van Nostrand Reinhold Co., New York, 1988

REFERENCES

1. Austin, G.T. and Shreve's, Chemical Process industries, McGraw-Hill International student edition, Singapore, 1985

2. Liptak, B.G., Process measurement and analysis, Chilton Book Company, USA, 1995

3. Luyben W.C., Process Modelling, Simulation and Control for Chemical Engineers, McGraw-Hill International edition, USA, 1989

CSE 202 OBJECT ORIENTED PROGRAMMING & C++ 3 0 0 3

1. **9**

Features of procedure oriented programming – Object oriented programming paradigm – Basic concepts of object oriented programming – Benefits of OOP – Object oriented languages – Applications of OOP – What is C++? – A simple C++ program – Structure of C++ program – Creating the source file.

2. **9**

Tokens, expressions and control structures – Functions in C++ – Library functions – Main function – Function prototyping – Call by reference – Return by reference – Default arguments – Constant arguments – Inline function – Function overloading.

3. **9**

Objects and classes – Constructors – Destructors – Objects as function arguments – Copy constructor – Returning objects from function – Structures and classes – Static class data – Const type member functions and objects.Arrays and strings – Array fundamentals, passing array as function argument – Array as class member data – Array of objects – C Strings – C++ String class.

4. **9**

Operator overloading – Unary operator, binary operator – Data conversion – Inheritance – Derived class and base class constructor – Overloading member function – Class hierarchies – Public and Private Inheritance – Multiple inheritance – Containership.

5. **9**

Memory management – Virtual functions – Friend functions – Static functions – Assignment & copy initialization – 'this' pointer. Streams and files – Stream classes – Disk file I/O with streams – File pointers – Command line arguments – Templates and exceptions.

TUTORIALS 15 **TOTAL: 60**

TEXT BOOKS:

1. E. Balagurusamy, "Object Oriented Programming with C++", TMH, 2007. (Unit 1 & II)

2. Robert Lafore, "Object Oriented Programming in C++", Galgotia publications pvt Ltd, Third edition (Unit III – V),1999

REFERENCE BOOKS:

1. K.R. Venugopal, Rajkumar, T. Ravishankar, "Mastering C++" Tata Mc Graw Hill Publishing Company Ltd, 2007.

2. Herbert Schildt, " C + + **:** The Complete Reference", Fourth Edition, Tata McGraw Hill Publishing Company Ltd, 2003.

ELECTIVE – II

EIE121 BIO–MEDICAL INSTRUMENTATION 3 0 0 3

1. PHYSIOLOGY AND TRANSDUCERS 9

Cell and its structure – Nervous system – CNS – PNS – Nerve cell – Synapse – Cardio pulmonary system Action and resting potential – Sodium pump- Potential propagation of action potential —, Medical Instrumentation system ,Transducers – Different types – Piezo-electric, ultrasonic, resistive, capacitive, inductive transducers.

2. ELECTRO – PHYSIOLOGICAL MEASUREMENTS 9

Electrodes – Micro, needle and surface electrodes – Amplifiers – Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier-Basic recording system Inkjet recorder-Instrumentation tape recorders.

ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms.

3. NON-ELECTRICAL PARAMETER MEASUREMENTS 9

Measurement of blood pressure – Cardiac output – Cardiac rate – Heart sound –

Respiratory rate –Blood PCO_2 & PO_2 Measurement - PH of blood– Plethysmography.

4. MEDICAL IMAGING AND PMS 9

X-ray machine - Radio graphic and fluoroscopic techniques – Computer tomography– MRI – Ultrasonography – Endoscopy – Thermography – Different types of biotelemetry systems and patient monitoring – Electrical safety.

5. ASSISTING AND THERAPEUTIC EQUIPMENTS 9

Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators –Diathermy – Heart – Lung machine – Audio meters – Dializers.

L : 45 Total : 45

TEXT BOOKS

1. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II Edition, Pearson Education, 2002 / PHI.
2. R.S.Khandpur, 'Handbook of Bio-Medical instrumentation', Tata McGraw HillPublishing Co Ltd., 2003.

REFERENCE BOOKS

1. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons, 1975.
3. J.Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
4. C.Rajarao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.

EIE122 INSTRUMENTATION IN IRON AND STEEL INDUSTRIES 3 0 0 3

UNIT – I **9**

Flow diagram and description of the processes: Raw materials preparation, iron making, blast
furnaces, stoves, raw steel making , basic oxygen furnace, electric furnace.

UNIT – II **9**

Casting of steel: Primary rolling, cold rolling and finishing.

UNIT – III **9**

Instrumentation: Measurement of level, pressure, density, temperature, flow weight, thickness and shape, graphic displays and alarms.

UNIT – IV **9**

Control and systems: Blast furnace stove combustion control system, gas and water controls
in BOF furnace . Sand casting old control.

UNIT – V **9**

Computer applications: Model calculation and logging, rolling mill control, annealing process control Computer (center utilities dispatch computer).

Text Books

1. Tupkary R.H, Introduction to Modern Iron Making , Khanna Publishers, New Delhi, 1986 - II Edition

2. Tupkary R.H., Introduction to Modern Steel Making, Khanna Publishers, New Delhi, 1989 – IV Edition.

Reference Books

1. Liptak B. G, Instrument Engineers Handbook, volume 2, Process Control, Third edition, CRC press, London, 1995

2. Considine D.M, Process / Industrial Instruments and Control Handbook, Fourth edition, McGraw Hill, Singapore, 1993 – ISBN-0-07-012445-0

EIE123: AUTOMOBILE AND AIRCRAFT INSTRUMENTATION 3 0 0 3

1. MEASURING DEVICES IN AUTOMOBILES 9

Selection of measuring instrument, requirements of measurement such as precision, accuracy, errors, sensitivity, readability and reliability – Devices to measure temperature and pressure of the working fluid, coolant, air and fuel flow into the engine - Indicatingand integrating instruments – Vibrometer, Accelerometer, vibration and pressure pickups, vibration test methods and counters.

2. SENSORS AND ACTUATORS 9

Introduction to basic sensor arrangement – types of sensors – Oxygen sensors, crankangle position sensors – Fuel metering / vehicle speed sensor and detonation sensor –Altitude sensor – Flow sensors – Throttle position sensors – Solenoids, stepper motors,relays – Electronic dash board systems – GPS.

3. INSTRUMENTATION FOR EMISSION MEASUREMENT 9

Test procedures – NDIR analyzers – Flame ionization detectors – Chemiluminescentanalyzers – Gas chromatograph – Smoke meters – Emission – Standards.

4. FLIGHT INSTRUMENTATION AND GYROSCOPIC INSTRUMENTS 9

Classification of aircraft instruments – Instrument displays, panels, cockpit layout –Altimeters – Airspeed indicators – Machmeters – Accelerometers – Gyroscopic theory –Directional gyro indictor – Artificial horizon – Turn and slip indicators.

5. AIRCRAFT COMPUTER SYSTEMS 9

Terrestial magnetism – Aircraft magnetism- Direct reading magnetic components –Compass errors – Gyromagnetic compass – Performance margin indicators – Safe take off indicators - Aircraft take off monitoring systems – Autopilot and navigation systems.

TOTAL = 45

REFERENCE BOOKS

1. Riddens.B, “Understanding Automotive Electronics”, 5th Edition, Butterworth, Heinemann Woburn, 1998.
2. Springer and Patterson, “Engine Emission”, Plenum Press, 1990.
3. Pallett E.H.J, “Aircraft Instruments – Principles and Applications”, Pitman and sons, 1981.
4. Robert C. Nelson, “Flight stability and Automatic control”, 2nd Edition, McGraw Hill International, 1998.

EIE 124 FIBRE OPTICS AND LASER INSTRUMENTS 3 0 0 3

1. OPTICAL FIBRES AND THEIR PROPERTIES 9

Principles of light propagation through a fibre - Different types of fibres and their properties, fibre characteristics – Absorption losses – Scattering losses – Dispersion – Connectors & splicers – Fibre termination – Optical sources – Optical detectors.

2. INDUSTRIAL APPLICATION OF OPTICAL FIBRES 9

Fibre optic sensors – Fibre optic instrumentation system – Different types of modulators – Interferometric method of measurement of length – Moire fringes – Measurement of pressure, temperature, current, voltage, liquid level and strain.

3. LASER FUNDAMENTALS 9

Fundamental characteristics of lasers – Three level and four level lasers – Properties of laser – Laser modes – Resonator configuration – Q-switching and mode locking – Cavity damping – Types of lasers – Gas lasers, solid lasers, liquid lasers, semiconductor lasers.

4. INDUSTRIAL APPLICATION OF LASERS 9

Laser for measurement of distance, length, velocity, acceleration, current, voltage and Atmospheric effect – Material processing – Laser heating, welding, melting and trimming of material – Removal and vaporization.

5. HOLOGRAM AND MEDICAL APPLICATIONS 9

Holography – Basic principle - Methods – Helographic interferometry and application, Holography for non-destructive testing – Holographic components – Medical applications of lasers, laser and tissue interactive – Laser instruments for surgery, removal of tumours of vocal cards, brain surgery, plastic surgery, gynaecology and oncology.

L= 45 Total = 45

TEXT BOOKS

1. J.M. Senior, ‘Optical Fibre Communication – Principles and Practice’, Prentice Hall of India, 1985.
2. J. Wilson and J.F.B. Hawkes, ‘Introduction to Opto Electronics’, Prentice Hall of India, 2001.

REFERENCE BOOKS

1. Donald J.Sterling Jr, ‘Technicians Guide to Fibre Optics’, 3rd Edition, Vikas Publishing House, 2000.
2. M. Arumugam, ‘Optical Fibre Communication and Sensors’, Anuradha Agencies, 2002.
3. John F. Read, ‘Industrial Applications of Lasers’, Academic Press, 1978.

Monte Ross, ‘Laser Applications’, McGraw Hill, 1968

5. G. Keiser, ‘Optical Fibre Communication’, McGraw Hill, 1995. Mr. Gupta, ‘Fiber Optics Communication’, Prentice Hall of India, 2004.

ELECTIVE – III

EIE125 ADVANCED CONTROL SYSTEMS 3 0 0 3

1. INTRODUCTION 9

Features of linear and non-linear systems –State variable representation – Solution of state equations – Conversion of state variable models to transfer functions – Eigen values – Eigen vectors – **Concepts of controllability and observability - Common physical non-linearities – Methods of linearising nonlinear systems.

2. PHASE PLANE ANALYSIS 9

Concept of phase portraits – Singular points – Limit cycles – Construction of phase portraits – Phase plane analysis of linear and non-linear systems – Isocline method.

3. DESCRIBING FUNCTION ANALYSIS 9

Basic concepts, derivation of describing functions for common non-linearities – Describing function analysis of non-linear systems – Conditions for stability – Stability of oscillations.

4. STABILITY ANALYSIS 9

Introduction – Liapunov's stability concept – Liapunov's direct method – Lure's transformation – Aizerman's and Kalman's conjecture – Popov's criterion – Circle criterion.

5. CONTROLLER SYNTHESIS FOR NON-LINEAR SYSTEMS 9

Linear design and non-linear verification – Non-linear internal model control – Parameter optimization – Model predictive controller – Optimal controller – State feedback and observer.

TEXT BOOKS

1. E. Jean-Jacques, 'Slot line, Applied Non-linear Control', Pearson Education.
2. Torkel Glad & Lennart Ljung, 'Control Theory – Multi Variable and Non-linear Methods', Taylor's & Francis Group, 2002.

REFERENCE BOOKS

1. Peter A. Cook, 'Non-linear Dynamical Systems', Pearson Education.
2. I.J. Nagrath & M. Gopal, 'Control System Engineering', New Age International Publishers, 2003.
3. S. Hasan Saeed, 'Automatic Control Systems', S.K. Kataria & Sons, 2002.
4. George J. Thaler, 'Automatic Control Systems', Jaico Publishing house, 1993.
5. Ronald R. Mohler, 'Non-linear Systems, Vol. – I, Dynamics & Control', Pearson Education, 1998.
6. Hassan K. Kahalil, 'Non-linear Systems', Pearson Education, 2002.

EIE126 ADAPTIVE CONTROL 3 0 0 3

1. INTRODUCTION 9

Introduction to adaptive control - Effects of process variations – Adaptive control schemes – Adaptive control problem – Non-parametric identification – Step response method – Impulse response method – Frequency response method.

2. PARAMETRIC IDENTIFICATION 9

Linear in parameter models - ARX – ARMAX – ARIMAX – Least square estimation – Recursive least square estimation – Extended least square estimation – Maximum likelihood estimation – Introduction to non-linear systems identification - Pseudo random binary sequence.

3. SELF-TUNING REGULATOR 9

Deterministic in-direct self-tuning regulators – Deterministic direct self-tuning regulators – Introduction to stochastic self-tuning regulators – Stochastic indirect self-tuning regulator.

4. MODEL REFERENCE ADAPTIVE CONTROLLER 9

The MIT rule – Lyapunov theory – Design of model reference adaptive controller using MIT rule and Lyapunov theory – Relation between model reference adaptive controller and self-tuning regulator.

5. TUNING OF CONTROLLERS AND CASE STUDIES 9

Design of gain scheduling controller - Auto-tuning of PID regulator – Stability analysis of adaptive controllers – Application of adaptive control in chemical reactor, distillation column and variable area tank system.

L = 45 Total = 45

TEXT BOOK

1. Karl J. Astrom & Bjorn Wittenmark, ‘Adaptive Control’, Pearson Education (Singapore), Second Edition, 2003.

REFERENCE BOOKS

1. T. C.H.A. Hsia, ‘System Identification’, Lexington books, 1974.

2. Stephanopoulis G. ‘Chemical Process Control’, Prentice Hall of India, New Delhi, 1990.

EIE127 OPTIMAL CONTROL 3 0 0 3

1. INTRODUCTION 9

Statement of optimal control problem – Problem formulation and forms of optimal control – Performance measures for optimal control – Selection of performance measure – Various methods of optimization – Linear programming – Non-linear programming – Dynamic programming.

2. DYNAMIC PROGRAMMING 9

Principle of optimality – Recurrent relation of dynamic programming for optimal control problem – Computational procedure for solving optimal control problems – Characteristics of dynamic programming solution – Hamilton Jacobi Bellman equation – Application to a continuous linear regulator problem.

3. CALCULUS OF VARIATIONS 9

Fundamentals concepts – Functional of a single function – Functional involving several independent functions – Piecewise smooth extremals – Constrained extrema.

4. VARIATIONAL APPROACH TO OPTIMAL CONTROL 9

Necessary conditions for optimal control – Linear regulator problems – Pontryagin's minimum principle and state inequality constraints.

5. APPLICATIONS OF PONTRYAGIN'S MINIMUM PRINCIPLE 9

Minimum time problem – Minimum control effort problems: minimum fuel problem, minimum energy problem – singular intervals in optimal control problems. **L = 45 Total = 45**

TEXT BOOKS

1. Donald E. Kirk, 'Optimal Control Theory – An introduction ', Pearson Education, 1970.

2. M. Gopal, 'Modern Control System Theory', New Age International Ltd., 2002.

REFERENCE BOOKS

1. Kemin Zbou, J.C. Doyle, 'Robust & Optimal Control', Pearson Education, 1996

2. B. Sarkar, 'Control System Design – The Optimal Approach', Wheeler Publishing, New Delhi, 1997.

3. Anderson and boon "optimal control"

EIE 128 SYSTEM IDENTIFICATION 3 0 0 3

1. Nonparametric Identification: 9

Transient and frequency analysis methods, impulse and step response methods, correlation method, spectral analysis.

2. Parametric identification: 9

Steps in identification process, determining model structure and dimension, Linear and nonlinear model structures, Input signals: commonly used signals, spectral properties, persistent excitation.

3. Parametric estimation: 9

Linear regression, least square estimation, statistical analysis of LS methods, Minimizing prediction error- identifiability, bias, Least squares, relation between minimizing the prediction error and the MLE, MAP, Convergence and consistency, asymptotic distribution of parameter estimates, Instrumental Variable Method.

4. Recursive estimation: 9

Forgetting Factor method, Kalman Filter interpretation Identification in practice: Aliasing due to sampling, closed loop data, model order estimation, robustness considerations, model validation.

5. MIMO System Identification Techniques 9

Off line - On line methods - Recursive least squares - Modified recursive least squarestechniques - Fixed memory - RLS algorithm - Maximum likelihood - Instrumental variable.Stochastic approximation techniques.

Text Books:

1. Ljung .L, *System Identification: Theory for the user,* Prentice Hall, Englewood Cliffs, 1987.

2. Torsten Soderstrom, Petre Stoica, *System Identification*, Prentice Hall International (UK) Ltd. 1989.

3. Juang, Jer-Nan, *Applied System Identification*, Prentice Hall PTR, Englewood Cliffs, New Jercy, 1994.

ELECTIVE - IV

EIE129 INDUSTRIAL DATA NETWORKS 3 0 0 3

AIM

To introduce the concepts, terminologies and technologies associated with industrial
Data Networks.

OBJECTIVE

- To make the students to get familiarized with different Buses such as Profibus, Modbus, Fieldbus, AS-I interface and Devicenet.

PREREQUISTE

Not Requird

1. RS – 232 AND RS – 485 **9**

ISO-OSI model – EIA 232 interface standard – EIA 485 interface standard – EIA 422 interface standard - 20mA current loop – Serial interface converters.

2. MODBUS, DATA HIGHWAY (PLUS) AND HART PROTOCOLS **9**

MODBUS protocol structure – Function codes – Troubleshooting – Data highway (plus)protocol – Review of HART Protocol.

3. AS – INTERFACE (AS-i) AND DEVICENET **9**

AS interface:- Introduction, Physical layer, Data link layer and Operating characteristics. Devicenet:- Introduction, Physical layer, Data link layer and Application layer.

4. PROFIBUS PA/DP/FMS AND FF **9**

Profibus:- Introduction, Profibus protocol stack, Profibus communication model, Communication objects, System operation and Troubleshooting – Foundation fieldbus versus Profibus.

5. INDUSTRIAL ETHERNET AND WIRELESS COMMUNICATION **9**

Industrial Ethernet:- Introduction, 10Mbps Ethernet and 100Mbps Ethernet - Radio and wireless communication:- Introduction, Components of radio link, the radio spectrum and frequency allocation and Radio modems – Comparison between various industrial networks.

L = 45 TOTAL = 45

TEXT BOOKS

1. Mackay, S., Wrijut, E., Reynders, D. and Park, J., "PracticalIndustrial Data Networks Design, Installation and Troubleshooting", Newnes Publication, Elsevier, 1st Edition, 2004.
2. Buchanan, W., "Computer Busses", CRC Press, 2000.

REFERENCE BOOKS

1. Tanenbaum, A.S., "Modern Operating Systems", Prentice Hall of India Pvt. Ltd., 2003.
2. Rappaport,T.S., "Wireless Communication: Principles and Practice" 2nd Edition, Prentice Hall of India, 2001.
3. Stallings, W., "Wireless Communiction and Networks", 2nd Edition, Prentice Hall of India, 2005.

EIE130 ADVANCED MICROPROCESSORS & MICROCONTROLLERS 3 0 0 3

AIM

To learn the architecture and programming of advanced Intel family microprocessors and microcontrollers.

OBJECTIVES

• To introduce the concepts in internal programming model of Intel family of microprocessors.
• To introduce the programming techniques using MASM, DOS and BIOS function calls.
• To introduce the basic architecture of Pentium family of processors.
• To introduce the architecture programming and interfacing of 16 bit microcontrollers.
• To introduce the concepts and architecture of RISC processor and ARM.

1. ADVANCED MICROPROCESSOR ARCHITECTURE 9

Internal Microprocessor Architecture-Real mode memory addressing – Protected Mode Memory addressing –Memory paging - Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions- Arithmetic and Logic Instructions.

2. MODULAR PROGRAMMING AND ITS CONCEPTS 9

Modular programming –Using keyboard and Video display –Data Conversions-Disk files- Interrupt hooks- using assembly languages with C/ C++

3.PENTIUM PROCESSORS 9

Introduction to Pentium Microprocessor – Special Pentium registers- Pentium memory management – New Pentium Instructions –Pentium Processor –Special Pentium pro features – Pentium 4 processor

4.16-BIT MICRO CONTROLLER 9

8096/8097 Architecture-CPU registers –RALU-Internal Program and Data memory Timers-High speed Input and Output –Serial Interface-I/O ports –Interrupts – A/D converter-Watch dog timer –Power down feature –Instruction set- External memory Interfacing –External I/O interfacing.

5. RISC PROCESSORS AND ARM 9

The RISC revolution – Characteristics of RISC Architecture – The Berkeley RISC – Register Windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – The ARM processors – ARM registers – ARM instructions – The ARM built-in shift mechanism – ARM branch instructions – sequence control – Data movement and memory reference instructions.

TOTAL : 45

TEXT BOOK :

1. Barry B.Brey, The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium,
2. Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and interfacing, Prentice Hall of India Private Limited, New Delhi, 2003. (UNIT I, II and III)
3. John Peatman, Design with Microcontroller McGraw Hill Publishing Co Ltd, New Delhi. (UNIT IV) Alan Clements, "The principles of computer Hardware", Oxford University Press, 3rd Edition, 2003. (UNIT V)

REFERENCES :

1. Rajkamal, The concepts and feature of micro controllers 68HC11, 8051 and 8096; S Chand Publishers, New Delhi.

EIE131 COMPUTER ARCHITECTURE 3 0 0 3

1. DATA REPRESENTATION, MICRO-OPERATIONS AND ORGANIZATION AND DESIGN 9

Data representation: Data types, complements, fixed–point representation, floating-point representation, other binary codes, error detection codes.

Register transfer and micro operations: Register transfer language, register transfer, bus and memory transfers, arithmetic micro-operations, logic micro-operations, shift micro-operations, arithmetic logic shift unit.

Basic computer organization and design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input-output and interrupt. Complete computer description, design of basic computer, design of accumulator logic.

2. CONTROL AND CENTRAL PROCESSING UNIT 9

Micro programmed control: Control memory, address sequencing, micro-program example, design of control unit.Central processing unit: General register organization, stack organization, instruction formats, addressing modes, data transfer and manipulation, program control, reduced instruction set computer.

3. COMPUTER ARITHMETIC, PIPELINE AND VECTOR PROCESSING 9

Computer arithmetic: Addition and subtraction, multiplication algorithms, division algorithms, floating-point arithmetic operations, decimal arithmetic unit, decimal arithmetic operations.

Pipeline and vector processing: Parallel processing, pipelining, arithmetic pipeline, instruction pipeline, RISC pipeline, vector processing array processors.

4. INPUT-OUTPUT ORGANIZATION 9

Input-output organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of transfer, priority interrupt, direct memory access, input-output processor, serial communication.

5. MEMORY ORGANIZATION 9

Memory organization: Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, virtual memory, memory management hardware.

L = 45 T=15 Total = 60

TEXT BOOK

1. Morris Mano, 'Computer System Architecture', 3rd Edition, Pearson Education, 2002 / PHI. REFERENCE BOOKS

1. Vincent P.Heuring and Harry F.Jordan, 'Computer Systems Design and Architecture', Pearson Education Asia Publications, 2002.

2. John P.Hayes, 'Computer Architecture and Organization', Tata McGraw Hill, 1988.

3. Andrew S.Tanenbaum, 'Structured Computer Organization', 4th Edition, Prentice Hall of India/Pearson Education, 2002.

4. William Stallings, 'Computer Organization and Architecture', 6th Edition, Prentice Hall of India/Pearson Education, 2003.

EIE 132 INSTRUMENTATION IN PETROCHEMICAL INDUSTRIES

3 0 0 3

(Qualitative treatment only)

1. PETROLEUM PROCESSING 9

Petroleum exploration – Recovery techniques – Oil – Gas separation - Processing wet gases – Refining of crude oil.

2. OPERATIONS IN PETROLEUM INDUSTRY 9

Thermal cracking – Catalytic cracking – Catalytic reforming – Polymerisation – Alkylation – Isomerization – Production of ethylene, acetylene and propylene from petroleum.

3. CHEMICALS FROM PETROLEUM PRODUCTS 9

Chemicals from petroleum – Methane derivatives – Acetylene derivatives – Ethylene derivatives – Propylene derivatives – Other products.

4. MEASUREMENTS IN PETROCHEMICAL INDUSTRY 9

Parameters to be measured in refinery and petrochemical industry – Selection and maintenance of measuring instruments – Intrinsic safety of Instruments.

5. **CONTROL LOOPS IN PETROCHEMICAL INDUSTRY 9**

Process control in refinery and petrochemical industry – Control of distillation column – Control of catalytic crackers and pyrolysis unit – Automatic control of polyethylene production – Control of vinyl chloride and PVC production.

L = 45 Total = 45

TEXT BOOKS

1. A.L. Waddams, 'Chemicals from Petroleum', Butter and Janner Ltd., 1968.
2. J.G. Balchan. and K.I. Mumme, 'Process Control Structures and Applications', Van Nostrand Reinhold Company, New York, 1988.

REFERENCE BOOKS

1. Austin G.T. Shreeves, 'Chemical Process Industries', McGraw Hill International Student edition, Singapore, 1985.

2. B.G Liptak, 'Instrumentation in Process Industries', Chilton Book Company, 1994.

GSS 101 - PROFESSIONAL ETHICS 3 0 0 3

OBJECTIVES

- To create an awareness on Engineering Ethics
- To instill Moral and Social Values and Loyalty
- To understand the professional rights of oneself

1. **ENGINEERING ETHICS AND THEORIES (9)**

Definition, Moral issues, Types of inquiry, Morality and issues of morality, Kohlberg and Gilligan's theories, consensus and controversy, Professional and professionalism, moral reasoning and ethical theories, virtues, professional responsibility, integrity, self respect, duty ethics, ethical rights, self interest, egos, moral obligations etc.,

2. SOCIAL ETHICS AND ENGINEERING AS SOCIAL EXPERIMENTATION(9)

Engineering as social experimentation, codes of ethics, Legal aspects of social ethics, the challenger case study, Engineers duty to society and environment, Gandhian Principles of corporate trusteeship.

3. SAFETY (9)

Safety and risk – assessment of safety and risk – risk benefit analysis and reducing risk – the Three Mile Island and Chernobyl case studies. Bhopal and tragedy.

4. RESPONSIBILITIES AND RIGHTS OF ENGINEERS (9)

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – Intellectual Property Rights (IPR) – discrimination.

5. LOBAL ISSUES AND ENGINEERS AS MANAGERS, CONSULTANTS AND LEADERS (9)

Multinational Corporations – Environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – Engineers as trend setters for global values, IT Industry (cultural aggression)

TEXT BOOKS TOTAL: 45

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering". (2005) McGraw-Hill, New York.
2. John R. Boatright, "Ethics and the Conduct of Business", (2003) Pearson Education, New Delhi.
3. Bhaskar S. "Professional Ethics and Human Values", (2005) Anuradha Agencies, Chennai.

REFERENCES

1. Charles D. Fleddermann, "Engineering Ethics", 2004 (Indian Reprint) Pearson Education / Prentice Hall, New Jersey.
2.
3. Charles E. Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and cases", 2000 (Indian Reprint now available) Wadsworth Thompson Leatning, United States.

GSS 105 – ENTREPRENEURSHIP DEVELOPMENT 3 0 0 3

Objectives:

1. To study the factors affecting Entrepreneurship growth and their problems.
2. To understand the importance of Entrepreneurial Development programmes.
3. To study the projects identification, selection and formulation
4. To understand the role of government in entrepreneurial development
5. To understand the basis of intellectual property rights in India.

UNIT I

(9)

Entrepreneur –Entrepreneurship and economic development – its importance – Entrepreneur Qualities, nature, types, traits of entrepreneur. Similarities and differences between entrepreneur and manager – factors affecting entrepreneurship growth- Problems of entrepreneurs

UNIT II **(9)**

Entrepreneurial promotion: Motivation: Theories and factors – Entrepreneurial development programmes – need, objectives, phases and evaluation - Training and developing - occupational mobility - factors in mobility - Role of consultancy organizations is promoting entrepreneurs.

UNIT III **(9)**

Project Management: Project identification and selection – project formulation – Report preparation – evaluation: marketing - technical and financial.

UNIT IV **(9)**

Role of government in entrepreneurial development – District Industry Centre and its role – Government incentives – financial and non-financial – Sectoral reservation for SSI and tiny sector.

UNIT V **(9)**

Property-definition and ownership-kinds of property-types of intellectual property-patent-trade marks – industrial design-need for protection for IP-WIPO and its activities-TRIPS Agreement-evoluation of IPR in India.

TEXT BOOK:

Total - 45

1.Entrepreneurial Development by S S Khanka, S. Chand & Co: 2008 ISBN: 81-219-1801-4

2.Intellectual Property Rights Text and Case, by Dr. R. Radhakrishnan and Dr. S. balasubramanian, Excel Books – 2008, ISBN: 978-81-7446-609-9

REFERENCE BOOKS

1. Vasanth Desai “Dynamics of Entrepreneurial Development and Management” Himalaya Publishing House.
2. N.P.Srinivasan & G.P. Gupta “Entrepreneurial Development” Sultanchand & Sons.

3. P.Saravanavelu “Entrepreneurship Development” Eskapee publications.
4. S.S.Khanka “Entrepreneurial Development” S.Chand & Company Ltd.,
5. Satish Taneja, Entrepreneur Development ; New Venture Creation

GSS 106 - GOVERNANCE IN INDIA 3 0 0 3

UNIT – I CONSTITUTION 9

Constitution of India – Objectives enshrined in Preamble, fundamental rights & duties, directive principles of state policy – Union executive, legislative and judiciary – state governments – Federal features and unitary bias-Different types of governments in the world.

UNIT – II LEGISLATURE AND JUDICIARY 8

Parliament – Lok Sabha and Rajya Sabha – Legislative procedure – Union judiciary – State legislature – State judiciary – Parliamentary democracy.

UNIT – III CENTRAL POLITICAL EXECUTIVE 9

Roles of President, Vice President, Prime Minister, Council of Ministers, Cabinet Committees – Role of Central Secretariat – Boards and Commissions – Ministries and Departments.

UNIT – IV STATE ADMINISTRATION 9

Roles of Governor, Chief Minister, Council of Ministers, State secretariat – Administration of law and order – District administration – Panchayati Raj – Municipal administration – Autonomy of local bodies.

UNIT – V E – GOVERNANCE 10

Overview – E-governance evolution – Global trends – Models of digital governance – E-Readiness – Infrastructural needs – Evolutionary stages in E-governance – NICNET – CARD project – Computerization of urban local bodies – E-governance in secretariat – Land records management software – IT in Indian judiciary – Rural e-seva.

TOTAL: 45 HOURS

TEXT BOOKS:

1. Vishnoo Bhagwan and Vidya Bhushan, "Indian Administration", S-Chand & Co., 2005.

2. C.S.R. Prabhu, "E-Governance - Concepts and Case Studies", Prentice-Hall of India 2005.
   (for Unit-V only)

REFERENCES:

1. M. Laxmikanth, 'Public Administration', 5th edition, 2009.
2. *www.india.gov.in,* National portal of India.
3. Kiran Bedi and others, "Government @ net", Sage Publications, New Delhi 2001.
4. *www.nisg.org,* 'Architecting e-government' website of National Institute of Smart Government.

GSS 107 - INDIAN ECONOMY 3 0 0 3

OBJECTIVES:

1. To understand the fundamentals of Macro Economics and National Income of India.
2. To study the importance of planning and economic growth in India.
3. To understand the importance of infrastructural development in the economy.

4. To know the causes of unemployment and different employment schemes for educated and uneducated.
5. To study the basis of Indian Banking system and its importance.

UNIT – I: FUNDAMENTALS OF MACRO-ECONOMICS (9)

Economics – economic activity -factors of production – factor income and circular flow of income. Concept of national income- definition of GNP, GDP – National Income of India - Growth and structure.

UNIT – II : PLANNING AND ECONOMIC GROWTH (9)

Indian planning – Planning commission – Five year plans – objectives and achievements – Industry policies – public sector understandings – private sector – SSIs Recent trends in SSIs, SME and SEZ – Economic reforms and globalization – IT and IT enable service in India.

UNIT – III : INFRASTRUCTURE OF INDIAN ECONOMY (9)

Infrastructure and Economic development – power and energy – Transport: road, rail – and civil aviation. Urban infrastructure – international transport system – sea and air.

UNIT – IV : LABOUR AND UNEMPLOYMENT (9)

Population –size and growth – demographic transition – age composition – education and its issues. Employment – nature of unemployment its causes – Employment schemes for educated and uneducated.

UNIT - V: INDIAN BANKING SYSTEM AND CREDIT (9)

Reserve Bank of India: its basic functions – commercial banks – its functions: deposit acceptance and lending – types of deposit – types of loans and advances –other banking services.

TEXT BOOKS: TOTAL-45

1. Indian Economy by Ruddar Datt and KPM Sundaram, S. Chand and Co – 2004 ISBN: 81-219-2045-0
2. Macro Economics by H.L. Ahuja, S. Chand and Co – 2008, ISBN: 81-219-0433-1

REFERENCE BOOKS:

1. Indian Economy, Mishra, S. K. and V. K. Puri; Himalaya Publishing House, 2003, 21st revised edition.
2. Economics by Samuelson and Nordhaus, Tata – MyGraw Hill, 2007.