M.Sc. (Applied Electronics) **Prospectus No. 111734**
I to IV Semester

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

अभ्यासक्रमिका
(FACULTY OF ENGINEERING & TECHNOLOGY)

PROSPECTUS

Prescribed for
Two Year Post Graduate
Degree Course
Master of Science
(Applied Electronics)
I to IV Semester
Examinations, 2010-11
(Semester Pattern)
Credit Grade System

2010
Visit us at www.sgbau.ac.in

Price Rs. **12/--**

PUBLISHED BY
Dineshkumar Joshi
Registrar
Sant Gadge Baba
Amravati University,
Amravati 444 602

SANT GADGE BABA AMRAVATI UNIVERSITY AMRAVATI

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinances Booklet the various conditions/ provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevent extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Inprovement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevent extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.
Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.

Ordinance No. 6/2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba
Amravati University.

DIRECTION

No. 13/2009 Date : 11/06/2009

Subject : Examinations leading to the Degree of Master of Science in Applied Electronics (Two-Year Course ....Semester Pattern)

Whereas the draft Ordinance and the schemes of teaching & examinations of Ist to IVth Semesters of Master of Science in Applied Electronics course were accepted by the Academic Council vide Item No. 22 (A) (R-1) in its meeting held on 05-05-2009 as per the Credit Based System as per the guidelines given by the University Grants Commission, New Delhi,

AND

Whereas the Academic Council has referred the draft Ordinance along with Schemes of Examinations to the Ordinance Committee,

AND

Whereas admissions to the Two Year Post Graduate Degree Course in Master of Science (Applied Electronics) are to be made in the Academic Session 2009-2010,

AND

Whereas the matter for admission of the students at the examinations is required to be regulated by an Ordinance,

AND

Whereas the schemes of teaching & examinations of Ist & IInd Semesters of Master of Science in Applied Electronics course are to be implemented from the academic session 2009-2010,

AND

Whereas the schemes of teaching & examinations are required to be regulated by the Regulation,

AND

Whereas the process of making an Ordinance and the Regulation is likely to take some time,

AND

Whereas syllabus for Ist & II Semesters of Master of Science in Applied Electronics course is to be sent for printing.

Now, therefore, I, Dr.Ku.Kamal Singh, Vice-Chancellor of Sant Gadge Baba Amravati University in exercise of powers confirmed upon me under sub section (8) of Section 14 of the Maharashtra Universities Act, 1994, hereby direct as under :

1. This Direction may be called "Examinations leading to the Degree of Master of Science in Applied Electronics (Two - Year Course .... Semester Pattern), Direction, 2009.
2. This Direction shall come into force w.e.f. the Academic session :-
   i) 2009-2010 for Ist & IInd Semester M.Sc. (Applied Electronics), &

   ii) 20010-2011 for IIIrd & IVth Semester M.Sc. (Applied Electronics)
3. In this Direction the letters, words, figures:-
   a) "B.Sc." means B.Sc. of this University with Physics or Electronics or Computer Science with Mathematics at +2 level as one of the subjects or Bachelor of Computer Science.

   OR

   Degree of any other Statutory University recognized by Sant Gadge Baba Amravati University as equivalent thereto.
   b) "University" means Sant Gadge Baba Amravati University.
4. The Degree of Master of Science in Applied Electronics shall be awarded to an examinee who, in accordance with the provisions of this Direction qualifies himself/ herself for the Degree.
5. (i) The duration of the course shall be two academic years
   (ii) There shall be four semester examinations leading to the Degree of Master of Science (Applied Electronics) (First, Second, Third and Fourth Semester M.Sc.).
   (iii) The main examination of first and third semester of M.Sc. shall be held by the university in winter and supplementary examination in summer every year. And main examination of second and fourth semester of M.Sc. will be held in summer and the supplementary examination in winter every year.
6. For purpose of instruction and examination the student shall study sequentially.
7. The Period of Academic session / Term shall be such as may be notified by the University.
8. The examination referred to in para (5) above shall be held at such places and on such dates as may be notified by the university.
9. Subject to his/ her compliance with provisions of this Direction and of other Ordinances (Pertaining to examinations in General) in force from time to time, the applicant for admission, at the end of the course of a particular term(s) shall be eligible to appear if:
   i) he /she satisfied the conditions in the Table I.
   ii) he / she has prosecuted a regular course of study in the University/ College affiliated to the University
   iii) he /she has in the opinion of the Head of the Department / Principal shown satisfactory progress in his / her studies.

TABLE I

Name of Exam	The student should have passed the examination of	The student should have completed the session / term satisfactorily
First SemesterM.Sc.	B.Sc. or equivalent	—
Second SemesterM.Sc.	——	First SemesterM.Sc.
Third Semester M.Sc.	——	Second SemesterM.Sc.
Fourth Semester M.Sc.	——	Third SemesterM.Sc.

10. The system of evaluation will be as follows: As a part of internal assessment, each assignment/test/viva-voce/minor project/design/ report will be evaluated in terms of marks. The marks for separate assignments and the final (semester-end) examination will be added together and then converted into a grade and later a grade point average. Results will be declared for each semester and the final examination will give total grades and grade point average.
11. A ten point grade system for the evaluation of the performance of the examinee will be followed for M.Sc. in Applied Electronics course. The conversion of marks obtained by the examinee into grade points is detailed in examination scheme.
12. Based on grade points obtained in each subject in the semester, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed and described in examination scheme.
13. Marks will be given for all examinations; they will be converted into grades. The relationship among marks obtained, grade and grade points is explained in the scheme and syllabus through tables, equations and illustrative example. The semester and final grade sheets and transcripts will have only grades and grade points average. For computation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average), the correspondence between Final grade points and letter grades will be as shown in Table II

TABLE II

Correspondence between Grade Points and Grades

Grade Points	Final Grade
9.00-10.00	A+
8.00 – 8.99	A
7.00-7.99	B+
6.00-6.99	B
5.50 – 5.99	C+
5.00 – 5.49	C
4.00 – 4.99	D
0	F

14. If the GPA (Grade Point Average) is higher than the indicated upper limit in the three decimal digit, then the student be awarded higher final grade (e.g. a student getting GPA of 5.991 shall be awarded 'B').
15. i) The scope of the subject shall be indicated in the syllabus.
    ii) The medium of instruction and examination shall be English
16. There shall be no classification of examinees successful in First Semester, Second Semester, Third and Fourth Semester M.Sc. examination, separately.

17. To pass, a student shall have to get minimum 4 Grade points in each theory subject and 5 Grade Points in each practical/Laboratory work.
18. Internal Assessment answer books may be shown to the students concerned.
19. Any candidate who wishes to improve his/her Division/Grade at the M.Sc. examination of this University shall be eligible to appear for the examination again under this Direction in the same subject or group of subjects as the case may be for improving the Division/ Grade. In such case, the provision of Ordinance relating to the improvement of Division/Grade shall apply.
20. The provision of Ordinance relating to the condonation of deficiency of marks for passing examination and Ordinance relating to exemption and compartment shall apply to the examinations under this Direction.
21. An examinee who does not pass or who fails to present himself/ herself for the examination shall be eligible for readmission to the same examination, on payment of fresh fees and such other fees as may be prescribed.
22. As soon as possible after the examinations, the Board of Examinations shall publish a result of the examinee. The result of Final M.Sc. examinations shall be classified as above and merit list shall be notified as per Ordinance No.6.
23. Notwithstanding anything to the contrary in this Direction no one shall be admitted to an examination under this Direction, if he/she has already passed the same examination or an equivalent examination of any statutory University.
24. i) The examinees who have passed in all the subjects prescribed for all the examinations shall be eligible for award of the Degree of Master of Science in Applied Electronics
    ii) The Degree Certificate in the prescribed form, shall be signed by the Vice-chancellor.
25. The schemes of teaching & examinations for M.Sc. (Applied Electronics) course, Computation of SGPA & CGPA and Illustrative Example for Results in Grade Point System shall be as provided under Appendices A, B and C appended with this Direction.

Sd/-
Dr. Kamal Singh
Vice-Chancellor

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SYLLABUS PRESCRIBED FOR TWO YEAR P.G. DEGREE COURSE MASTER OF SCIENCE (APPLIED ELECTRONICS)

SEMESTER PATTERN

SEMESTER : FIRST

1AE1 ELECTRICAL ENGINEERING AND NETWORK ANALYSIS

Unit I : Fundamentals of Electrical Engineering

Basic concept of voltage, current, work, power and energy, relationships between them, Resistance, resistivity, conductivity, Ohm's law, series and parallel connections of resistors, voltage and current division, Star to delta and delta to star transformations, Kirchoff's laws applied to dc circuits, single phase AC Circuits (sinusoidal waveforms only), R-L-C series circuits and parallel circuits, phasor diagram, impedance triangle, active reactive power.

Unit II : Single phase transformer

Principle of operation, construction, EMF equation of transformer, voltage transformation ratio, transformer on no load, transformer on load, losses in transformer, voltage regulation of transformer, efficiency of transformer, condition for maximum efficiency.

Basic Network Elements and sources

Network elements, circuit components, assumptions for circuit analysis, voltage and current sources, Standard input signals, source transformations, mesh and node analysis.

Unit III : Graph theory and network equations

Graph of a network, Trees, co trees and loops, Incidence matrix, Cut-set matrix, Tie set matrix and loop currents, possible trees, analysis of a network using Kirchoff's laws, network equilibrium equation and Duality network transformations.

Unit IV : Laplace Transformation and its applications

Laplace transformations, basic theorems, Laplace transform of some important functions, initial and final value theorem, gate function, impulse function, Solutions of linear differential equations with constant coefficients, Heaviside's partial fraction expansion.

Unit V : Network Theorems

Introduction, Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem applied to DC and AC circuits.

Unit VI : Two-Port Network

Open circuit impedance parameters, short circuit admittance parameters, Transmission or chain parameters, Hybrid parameters, Interrelationships between the parameters, Interconnection of two port networks, Input impedance in terms of two port parameters, Output impedance in terms of two port parameters.

Text Books:

1) De Carlo Lin : Linear Circuit Analysis, 2e, Oxford University Press
2) D. Roy Choudhary : Network and Systems (New Age International/ Wiley eastern ltd)
3) V .N. Mittle : Basic Electrical Engineering, (TMGH)

Reference Books:

1) M.E. Van Valkenburg : Network analysis 3rd Ed. (PHI)
2) Iskv Iyer : Circuit Theory, (TMGH)
3) Edminister : Electric Circuits, Schaum Outline Series

1AE2 ELECTRONIC DEVICES AND CIRCUITS

Unit I : P-N Junction diode theory, Rectifiers - Half wave, full wave and bridge, Linear wave shaping using RC circuits, Filters-C, LC and their analysis, analysis of clipping and clamping circuits using diodes and switching transistors, Zener diode and its application.

Unit II : Theory and Analysis of Bipolar Junction transistor, Configurations, transistor as a switch, 'Q' and stability factor, Methods of biasing, their needs, 'h' Parameter (CE,CB,CC analysis)

Unit III : FETs (JFET & MOSFET): Types, Characteristics and parameters (μ , gm, Rds), Biasing of FET, MOS capacitor, Equivalent circuits of JFET and MOSFETs, CMOS characteristics

Unit IV : Study of typical transistor amplifier circuits:

BJT: RC coupled amplifier, Transformer coupled amplifier, Direct coupled amplifier, Cascode stage, Emitter follower, Darlington emitter follower, Bootstrap emitter follower, Feedback amplifiers.

FET Amplifier-Common Source & Common Drain.

Unit V : Class 'A', 'B', 'AB' and 'C' amplifiers, Calculations of power gain, efficiency, power dissipation and distortion, Oscillators, their criteria, Hartley, Colpitts and R-C Oscillators, Crystal Oscillator.

Unit VI : Theory, Construction and applications of Schottky diode, Tunnel diode, Varactor diode, LED, Photo diode, Phototransistor, PIN diode.

Text Books:

1) David A.Bell : Electronic Devices and Circuits, Oxford University Press
2) Millman and Halkias : Electronic Devices and Circuits, TMGH
3) Millman and Grabel : Microelectronics (TMGH)
4) Millman and Taub : Pulse, Digital and Switching wave forms (TMGH)

Reference Books:

1) Sedra/Smith : Microelectronics Circuits 5e, Oxford University Press
2) R.L.Boylestad & L.Nashelsky : Electronic Devices & Circuit Theory (6^{th} Edition,) , Pearson Education.
3) Aloke K.Dutta : Semiconductor Devices and Circuits, Oxford University Press
4) Millman & Halkias : Integrated Electronics (TMGH)

1AE3 OBJECT ORIENTED PROGRAMMING C++

Unit-I : Introduction to object oriented programming, comparison with structured programming object oriented terminology data abstraction , Inheritance , polymorphism.

Unit-II : New keywords, type compatibility, scope operator, function in c++, function prototype, In line function, Default argument, Overloading, Operator overloading, Unary operator, Binary operator.

Unit-III : Class: definition, Object, Data member and instance variable methods, Implicit object, class scope, Access specifier, Operator method, Constructor, Copy constructor, Destructor, Assignment calls, Static member, Dynamic objects, Array of objects, Friend functions, Pointer to member.

Unit-IV : Inheritance and polymorphism**:** simple inheritance, constructor and destructor in inheritance, protected access specifier, class conversions, multiple inheritance, multiple base classes, and virtual base classes.

Unit-V : Polymorphism**:** Virtual function, abstract base classes, Using polymorphism with example, Generic function, generic classes.

Unit-VI : Stream in c++: Inserter, Extractor, Formatting, Manipulator, Error handling, user defined streams, defining Insertion and extractor operator.

TEXT BOOKS

1) Object oriented Programming with C++, Sahay, Oxford University Press
2) Programming with ANSI C++, Trivedi, Oxford University Press
3) Object Oriented Programming with C++ by E. Balaguruswamy, Tata Mc-Graw Hill publishing Co.Ltd., New Delhi,1995.

REFFERENCE BOOKS:

1) Object Oriented Programming in Turbo C++ by Rober Lofore, Galgotia Publications Pvt.Ltd., New Delhi,1995
2) The C++ Programming Language by Bjame Stroustrup Pub.Co.,New York, 1995 (Addison Wesley)
3) C++ Primer by Lipman Stanley B., New York, Addison Wesely Pub. Company, 1995
4) Data Structure using c and C++ by Langsam, Augenstein and Tenenbaum; PhI, NewDelhi.
5) Joyce Farrell - Object Oriented Programming using C++, Cengage Learning Pub. Company

1AE4 ELECTRIC AND MAGNETIC FIELDS

Unit-I Coordinate systems and Transformations**:** Scalars and vectors, unit vector, vector addition and subtraction, vector multiplication, components of a vector, orthogonal coordinate systems and their transformations, differential length, Area, and Volume, Del operator, Gradient, curl, divergent of a vector.

Unit-II Electrostatic: Coulomb's law and Electric field intensity, Electric flux density, Gauss's law, divergent theorem, Electric vector potential, Electric energy stored in static electric field, potential gradient.

Unit-III Magneto static**:** current density and continuity equation, Biot-Savert's law, stokes theorem, Ampere's circuital law and applications, magnetic flux density, scalar and vector magnetic potential, Energy stored in static magnetic field, Maxwell equations for steady fields.

Unit-IV Maxwell equation and boundary conditions**:** Maxwell equation for time varying fields, Electric boundary conditions for conductor-dielectric interface, magnetic boundary condition for two different magnetic materials.

Unit-V Electromagnetic waves**:** Electromagnetic wave equation in homogeneous medium, wave propagation in a perfect dielectric(free space), solution of electromagnetic wave equation, Intrinsic impedance, Poynting vector and Poynting theorem, Reflection and Refraction of plane waves, Field

analysis of transmission lines, characteristic impedance.

Unit-VI Radiation: Retarded potential, Electric and magnetic fields due to oscillating dipole (Alternating current element), power radiated and radiation resistance, linear arrays, End fire and broad side array, pattern multiplication.

TEXT BOOK:

1. Matthew N.O. Sadiku.: "Elements of Electromagnetic", Oxford University Press(Fourth Edition,2008
2. Jordan E.C. and Balman K.C. : " Electromagnetic Waves and Radiating system" Prentice Hall of India Private Limited, (Second Edition), 1985.

REFFERENCE BOOKS:

1. Hayt W.H.: " Engineering Electromagnetics", Tata Mc-Graw Hill
2. Krauss J.D. : Electromagnetics", Mc-Graw Hill Books co. (Third Edition), 1984

1AE5 COMMUNICATION SKILLS

Unit I : Comprehension - word study:-
Synonym, antonym, meanings, matching words, adjectives, adverbs, prefix and suffix, correct forms of commonly misspelled words, understanding of the given passage.
Skimming for general ideas, Contextual vocabulary, Error detection, Note making and Location of argument from text, Ability to answer inferential, factual and personal response.

Unit-II Comprehension - Structure study :-
Simple and compound sentences, types of conjunctions, singular and plural, tenses and their effect on verb forms, Use of - not only - but also, if clause, since, may, can, could, would, too etc. Active and passive forms, negative and interrogative, punctuation and capitalization.

Unit III Theoretical background - importance of communication, its process, model of communication its components & barriers. Types of written communication, organization of a text (Titles, summaries, headings, sequencing, signaling, cueing etc.), important text factors (length of paragraph, sentences, words, clarification and text difficulty). Evaluation of written communication for its effectivity and subject content.

Unit IV Specific formats for written communication like - business correspondence, formal reports, technical proposals, research papers and articles, advertising and graphics. Format for day-to-day written communication like applications, notices, minutes, quotations, orders, enquiries etc. Letter writing,

Preparation of Curriculum – Vitae, Composing messages-telegrams, telex,fax and e-mail Writing memos, agendas and notices of meetings, Preparing advertisements.

Unit-V Oral communications - Important objectives of interpersonal skills, Verbal communication, its significance, face to face communications, group discussion and personal interviews. Voice modulation and logical argument, Comprehension of text at normal reading speed. Listening skill and timely response, Participation and contribution to discussion, Command over language Formal and informal style of communication, Body language.

Unit-VI Non-verbal communication, types of graphics and pictorial devices. Meaning and purpose of meetings, seminars, symposia, conference and workshop. Methodology of conduction of meetings, seminars, symposia, conference and workshop. Brochure preparation for seminars, symposia, conference and workshop. Preparation of minutes of meeting.

TEXT BOOKS :

1) Technical Communication-Principles and Practice, Raman, Oxford University Press
2) Technical Communications-English Skills for Engineers, Raman, Oxford University Press

REFERENCE BOOKS :

1) Curriculum Development Centre, TTTI WR, Bhopal : A Course in Technical English, Somaiya Publication Pvt. Ltd.
2) F.Frank Candlin : General English for Technical Students, University of London Press Ltd
3) Krishna Mohan, Meera Banerjee : Developing Communication Skills, MacMillan India Limited.
4) Chrissie Wright (Editor) : Handbook of Practical Communication Skills, Jaico Publishing House.

1AE6 ELECTRICAL ENGINEERING & NETWORK ANALYSIS LABORATORY

Minimum 10 experiments based on the syllabus of 1AE1, that are preferably uniformly distributed over the syllabus

1AE7 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Minimum 10 experiments based on the syllabus of 1AE2, that are preferably uniformly distributed over the syllabus

1AE8 OBJECT ORIENTED PROGRAMMING C++ LABORATORY

Minimum 10 experiments based on the syllabus of 1AE3, that are preferably uniformly distributed over the syllabus

1AE9 COMMUNICATIONS SKILLS LABORATORY

Objective :

On completion of this laboratory the candidate should be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit the evidence of vocabulary building. Candidates should be assessed through continuous monitoring and evaluation.

The sample list of experiments is given below. This list can be used as guideline for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Assignments and tests for vocabulary building
2. Technical report writing
3. Group discussions
4. Interview techniques
5. Projects and tasks such as class news letter
6. Writing daily diaries and letters
7. Interactive language laboratory experiments.

Text Book : Norman Lewis : Word Power Made Easy
http://www.teachingenglish.org.uk

1AE101 ENGINEERING MATHEMATICS

Unit I : Linear Algebra: Matrices, Vectors, Determinants, Linear Systems Matrices, Vectors: Addition and Scalar Multiplication, Matrix Multiplication, Linear Systems of Equations. Gauss Elimination, Linear Independence. Rank of a Matrix. Vector Space, Solutions of Linear Systems: Existence, Uniqueness, For Reference: Second- and Third-Order Determinants, Determinants. Cramer's Rule, Inverse of a Matrix. Gauss-Jordan Elimination, Vector Spaces, Inner Product Spaces. Linear Transformations, Linear Algebra: Matrix Eigenvalue Problems, Eigenvalues, Eigenvectors, Some Applications of Eigenvalue Problems, Symmetric, Skew-Symmetric, and Orthogonal Matrices, Eigenbases. Diagonalization. Quadratic Forms, Complex Matrices and Forms.

Unit II : Vector Differential Calculus. Grad, Div, Curl, Vectors in 2-Space and 3-Space, Inner Product (Dot Product), Vector Product (Cross Product), Vector and Scalar Functions and Fields. Derivatives, Curves. Arc Length. Curvature. Torsion, Calculus Review: Functions of Several Variables. Gradient of a Scalar Field. Directional derivative, Divergence of a Vector Field, Curl of a Vector Field, Vector Integral Calculus. Integral Theorems, Line Integrals, Path Independence of Line Integrals, Calculus Review: Double Integrals. Optional, Green's Theorem in the Plane, Surfaces for Surface Integrals, Surface Integrals, Triple Integrals. Divergence Theorem of Gauss, Further Applications of the Divergence Theorem Stokes's Theorem

Unit III : Laplace Transforms, inverse transform, linearity, s-shifting, transforms of derivatives and integrals, ODEs, unit step function, t-shifting, short impulse, Dirac's Delta function, partial fractions, convolution, integral equations, Differentiation and Integration of transforms, Systems of ODEs, Laplace transforms: general formulas, Fourier Series, Integrals, and Transforms

Unit IV : Fourier Series, Functions of Any Period, Even and Odd Functions. Half-Range Expansions, Complex Fourier Series. Forced Oscillations, Approximation by Trigonometric Polynomials, Fourier Integral, Fourier Cosine and Sine Transforms, Fourier Transform. Discrete and Fast Fourier Transforms, Tables of Transforms , Wavelets, wavelets as functions, multi-resolution analysis, Daubechies wavelets and the Cascade algorithm, Properties of Daubechies wavelets, Dilation equation for Daubechies wavelets, Wavelet filters: high pass and low pass filtering, how filters arise from wavelets

Unit V : Numerics in General, Introduction, Solution of Equations by Iteration, Interpolation, Spline Interpolation, Numeric Integration and Differentiation, Linear Systems: Gauss Elimination, LU-Factorization, Matrix Inversion, Solution by Iteration, Ill-Conditioning, Norms Least Squares Method, Matrix Eigenvalue Problems: Introduction, Inclusion of Matrix Eigenvalues, Power Method for Eigenvalues, Tridiagonalization and QR-Factorization

Unit VI : Data Analysis. Probability Theory, Data Representation. Average. Spread, Experiments, Outcomes, Events, Probability, Permutations and Combinations, Random Variables. Probability Distributions, Mean and Variance of a Distribution, Binomial, Poisson, and Hypergeometric Distributions, Normal Distribution, Distributions of Several

Random Variables, Mathematical Statistics, introduction to random sampling, point estimation of parameters, confidence intervals, testing hypotheses, Decisions, Quality Control, Acceptance Sampling, Goodness of fit test, Nonparametric tests, regression, fitting straight lines, correlation

Textbook : Advanced Engineering Mathematics, 9th Edition, Ervin Kreyszig, John Wiley & Sons Inc, 2006

Reference Book: Advanced Engineering Mathematics, 3rd Edition, Merle C. Potter, J. L. Goldberg and Edward F. Aboufadel, Oxford University Press, 2005

1AE102 EMBEDDED C

UNIT I : Programming embedded systems in C

Introduction What is an embedded system Which processor should you use Which programming language should you use Which operating system should you use How do you develop embedded software Introducing the 8051 microcontroller family Introduction What's in a name The external interface of the Standard 8051 Reset requirements Clock frequency and performance Memory issues I/O pins Timers Interrupts Serial interface Power consumption Introduction Installing the Keil software and loading the project Configuring the simulator Building the target Running the simulation Dissecting the program Building the hardware

UNIT II : Reading switches

Introduction Basic techniques for reading from port pins Example: Reading and writing bytes Example: Reading and writing bits (simple version) Example: Reading and writing bits (generic version) The need for pull-up resistors Dealing with switch bounce Example: Reading switch inputs (basic code)Example: Counting goats Adding structure to your code Introduction Object-oriented programming with C The Project Header (MAINH)The Port Header (PORTH) Example: Restructuring the 'Hello Embedded World' example: Restructuring the goat-counting example Further examples

UNIT III : Meeting real-time constraints

Introduction Creating 'hardware delays' using Timer 0 and Timer 1 Example: Generating a precise 50 ms delay Example: Creating a portable hardware delay Why not use Timer 2The need for 'timeout' mechanisms Creating loop timeouts Example: Testing loop timeouts Example: A more reliable switch interface Creating hardware timeouts Example: Testing a hardware timeout Conclusions

UNIT IV : Creating an embedded operating system

Introduction The basis of a simple embedded OS Introducing sEOS Using Timer 0 or Timer 1Is this approach portable Alternative system architectures Important design considerations when using sEOS Example: Milk pasteurization

UNIT V : Multi-state systems and function sequences

Introduction Implementing a Multi-State (Timed) system Example: Traffic light sequencing Example: Animatronic dinosaur Implementing a Multi-State Input/Timed) system Example: Controller for a washing machine

UNIT VI : Using the serial interface

Introduction What is RS-232Does RS-232 still matter The basic RS-232 protocol Asynchronous data transmission and baud rates Flow control The software architecture Using the on-chip UART for RS-232 communications Memory requirements Example: Displaying elapsed time on a PC The Serial-Menu architecture Example: Data acquisition Example: Remote-control robot Case study: Intruder alarm system Introduction The software architecture Key software components used in this example Running the program

Text Book:

1) Embedded C, Michael J Pont ,Pearson Education Limited 2002

Reference Book :

1) Barnett, O'Cull & Cox- Embeded "C" Programming and Atmel AVR, Cengage Learning Pub. Company.

1AE103 COMPUTER ORGANIZATION AND ARCHITECTURE

UNIT I : Organization and architecture, structure and function, Computer evolution and performance: Brief history of computer, designing for performance , computer components, computer function , bus interconnection, PCI

UNIT II : External devices, I/O modules, I/O Channels and lOPs, SCSI and firewire interfaces, operating system overview, memory management, swapping, partitioning , paging , virtual memory.

UNIT III : ALU: Machine instruction characteristics , operand types, operation types, Addressing modes, instruction formats, CPU structure, processor organization register organization, instruction cycle, instruction pipelining.

UNIT IV : RISC machine, instruction execution characteristics, register file concept, compiler based register optimization , RISC architecture, RISC pipelining, RISC vs CISC, case study of power PC 620.

UNIT V : Control unit operation: Micro operation, control of processor.

Hardwired implementation, micro program control : Concepts, microinstructions sequencing and execution, application of microprogramming.

UNIT VI : Multiple processor organizations, symmetric multiprocessors, Mainframe SMP, Cache coherence and MESI protocol , clusters . Non uniform memory access. Vector computation

Text books:

1) William Stalling" Computer organization and architecture". 6/e (Pearson education)
2) Parhami, Computer Architecture, Oxford University Press
3) Alan Clements, Principles of Computer Hardware, 4/e, Oxford University Press
4) A.S. Tanenbaum" Structured computer organization" 4/e McGraw Hill (ISE)

Reference Books:

1) C. Hamecher, R. Zaky Computer Organization. 5/e McGraw Hill (ISE)
2) J.P. Hayes Computer architecture and organization. 4/e McGraw Hill (ISE)
3) M. Mano & Kime Logic & Computer design fundamentals, 2/e (Pearson education)

1AE104 FUNDAMENTALS OF VLSI TECHNOLOGY

UNIT I Structure and properties of Si, Ge and GaAs. Preparation,purification by zone refining and single crystal growth by CZ method for Si, Ge and GaAs.Cutting of crystal, cementing of slices and ingots, lapping and polishing.

UNIT II Epitaxy: types, epitaxial evaluation, Oxidation, Lithography

UNIT III Reactive plasma Etching, Dielectric and polysilicon film deposition,

UNIT IV Diffusion, ion implantation, metallization

UNIT V VLSI Process integration: IC processing, NMOS, CMOS, MOS Memory, Bipolar IC Technology, IC fabrication, Analytical Techniques

UNIT VI Basics of Assembly Techniques and packaging of VLSI Devices, Yield and Reliability.

Text Book:

1) S.M. Sze. : VLSI technology, Tata McGraw-Hill

Reference Books:

1) S.K.Gandhi : VLSI Fabrication principles, 'Silicon and Gallium Arsenide'
2) Dr.A.A.Ghatol : Semiconductor Devices Technology.

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SEMESTER : SECOND

2AE1 LINEAR INTEGRATED CIRCUITS

Unit I : Operational Amplifier:
Differential amplifier: gain expression using H parameters, transfer-characteristics, constant current source, level shifting, block diagram of op-amp, frequency response, frequency compensation methods, study of IC , measurement of parameters of op-amp, off set nulling and their importance.

Unit II : Linear Applications of Op-amp
Inverting and non inverting amplifiers, voltage followers (AC-DC), integrator, differentiator, Differential amplifier, bridge amplifier, Instrumentation amplifiers, precision rectifier, RMS to DC converter, voltage to current converter, sinusoidal RC oscillators, constant voltage sources, frequency to voltage and voltage to frequency converter.

Unit III : Non-Linear Applications of Op-Amp and Filter Circuits
Clipping and clamping circuits, comparator, astable, monostable and bistable multivibrator, Schmitt Trigger, voltage sweep generator, active filters: Butterworth, Chebyshev filters using op-amp,

Unit IV : Voltage Regulator
Transistorized series and shunt voltage regulators, Block schematic of regulator IC 723, regulated power supply using IC 723, short circuit protection, switch mode power supply, dual tracking regulators, regulator using 78xx, 79xx, and LM 317.

Unit V : Timers:
Block schematic of regulator IC 555, application of timer 555 as astable, monostable and bistable multivibrator, Delayed timer, sawtooth generators, function generator using 8038, Sample & Hold circuit

Unit VI : Phase Locked Loops
Operation of phase lock loop system, transfer characteristics, lock range and capture range, study of PLL IC-LM 565 and its application as AM detector, FM detector and Frequency translator.

Text Books:

1) Gayakwad R.A. : Op-Amps and Linear Integrated Circuits, Prentice Hall of India Pvt. Ltd., New Delhi (2nd edition)

2) Robert F. Coughlin : Operational Amplifiers & Linear Integrated Circuits, and F.F.Driscoll Pearson Education

Reference Book: Sedra/Smith : Microelectronics Circuits, 5e, Oxford University Press

2AE2 COMMUNICATION ENGINEERING

Unit I : Signal and Noise

Audio signals, frequency range for speech and music, sound intensity, loudness, loudness level, frequency response, band width, bandwidth requirement for different types of signals such as telegraph, telephone, speech, music, video.

External noise -Atmospheric, Extraterrestrial, Industrial, Internal noise- Thermal agitation, shot, Transit-time, miscellaneous noise, addition of noise due to several sources and several amplifiers in cascade, definition of noise figure, calculation of noise figure, noise figure from equivalent noise resistance, noise figure from measurement, noise temperature.

Unit II : Wave Propagation

Electromagnetic waves, sky waves, ground waves, space waves, ionosphere, critical frequency, maximum usable frequency, virtual height, fading, duct propagation and skip distance.

Unit III : Antenna

Principle of radiation, isotropic radiator, resonant antenna, non resonant antenna, , Half wave dipole antenna, folded dipole, parasitic reflector, parasitic director, antenna arrays, Yagi-Uda antenna, antenna power gain, Beam width, Polarization, radiation resistance.

Unit IV : AM transmitters

Communication systems, modulation, need for modulation, AM modulation, Frequency Spectrum, Principles of DSB-FC, DSB-SC, SSB-SC, modulation and their Comparison, Generation of DSB-SC by using Balanced modulators (FET & Diodes), DSB-SC Transmitter. Generation of SSB-SC by phase shift method.

Unit V : AM receivers

TRF Receivers, Super heterodyne receiver, RF Amplifier, Oscillator, IF Amplifier, Diode detector.

Mixer: Principle, Need and Types of AGC, Characteristics such as selectivity, sensitivity, fidelity, Communication Receiver.

Unit VI : FM transmitter

FM Modulation, Frequency Spectrum, pre–emphasis. and De-emphasis , Narrow Band and Wide Band FM, direct FM Generation using FET and varactor diode, indirect FM generation.

FM receivers

FM receiver, amplitude Limiter, Balanced slope detector, Analysis of Foster Seeley Discriminator, ratio detectors.

Text Book:

1) Kennedy G. : Electronic communication system (Mc-Graw Hill) 4th Ed
2) Lathi B.P.: Modern digital & analog Communication Systems, 3rd Ed. Oxford \ University press.

Reference Book:

1) Dennis Roddy & John Coolen : Electronic communication (PHI) 4th Ed

2AE3 DIGITAL INTEGRATED CIRCUITS

Unit I : Number systems, Gray codes, Arithmetic operations, 2's complements, floating point arithmetic and its representation, Logic gates, Boolean algebra, standard form of logical function, K-map up to five variables, Quine Mc-Clusky method, Don't care conditions and their effects, Synthesis using AND- OR gates

Unit II : Study and analysis of digital logic families: TTL, ECL, MOS, CMOS and their characteristics, Tri-state logic, TTL and CMOS IC series , Latches, Flip-Flops R-S, J-K, Master slave J-K, D-type, T-type, registers and counters, Adders and subtractors using logic gates.

Unit III : Combinational Logic Design using 74/54 MSI chip series concerning to multiplexers, De-multiplexers, decoders, encoders, comparators, code converters, priority encoders, parity generator/ checker & BCD-to-seven segment decoder.

Unit IV : Combinational Logic Design using ROM array, PLA, PAL, Preliminary design concepts using FPGAs, N-bit binary adder using 7480. carry Look ahead adder construction.

Unit V : Types of semiconductor memories, sequential memories, 2 and 4 phase ratio-less shift registers, CMOS registers stages, static shift registers, implementation of ROM (ROM, PROM, EPROM, EEPROM) BJT RAM cell, MOS-RAM, CCD memories.

Unit VI : Design of sequential networks: Analysis of clocked sequential networks, General models of sequential machines,

Equivalence and minimization networks, Deviation or state graph and tables, reduction of state assignments, S.M. chart.

Text Books:

1) M. Mano. : Digital Design 3rd ed (Pearson Education)
2). R.P.Jain : Modern Digital Electronics 3rd ed (TMH)
3) Ken Martin : Digital Integrated Circuit Design, Oxford University Press

Reference Book:

1) Sedra/Smith : Microelectronics Circuits, 5e, Oxford University Press

2AE4 MICROPROCESSOR AND MICROCONTROLLER

Unit I : An introduction to 8085: Address decoding technique, 8085 architecture, Register structure,, memory addressing and addressing modes. Instruction set of 8085 microprocessor time diagrams, ALP using data transfer, arithmetic, logic, branch instruction, stack subroutines, Interrupt system of 8085.

Unit II : Architecture, modes, and programming of PPI 8255, DMA data transfer concepts. DMA controller 8257: Internal architecture, interfacing of 8237 with 8085 & Programming. USART8251 Internal architecture, interfacing with 8085, Interfacing standards of RS-232C and IEEE 488 GPIB. (9 Periods)

Unit III : Analog to digital and digital to analog conversion techniques and its interfacing with 8085: Case study of ADC0809 and ADC1210, Case study of DAC 0808 and DAC 1008. Applications of ADC for measurement of temp., weight and light. Application of DAC for generating different waveforms. (10 Periods)

Unit IV : An introduction to 8051 : Overview of the 8051 family, Architecture of 8051, Signal description of 8051, Internal Memory, Internal RAM, External Memory, Register structure, stack and stack pointer, SFR, I/O port structure, Timer structure and their modes. serial data input and output, serial data transmission and reception. (10 Periods)

Unit V : Instruction set of 8051, Addressing modes of 8051, Data moves, PUSH, POP, and Data exchange instruction, Logical bit and Byte level operation, Arithmetic operation ,Jump and Call instruction, time delay generation and calculation , Interrupts and returns , programming using 8051, Timer / counter programming, serial communication programming & Interrupt programming. (10 Periods)

Unit VI : 8051 interfacing to external memory, Interfacing of Analog to digital converter, Digital to Analog converter, LCD & stepper motor with 8051, Interfacing of seven segment display to 8051 and programming .Interfacing of keyboard to 8051.

TEXTBOOKS:

1) Han-Way Huang, Using the MCS-51 Microcontroller, Oxford University Press
2) K.J.Ayala: "The 8051 Microcontroller", Penram Int. Pubs., 1996
3) Mazidi & Mazidi: "8051 Micro-controller & Embedded System",Pearson Edu., 2 Edition.
4) Rajkamal: Arch. Prog. Interfacing & system design. Pearson Edu.

REFERENCE BOOKS :

1) A. K. Ray and K. M. Burchandi : Advanced Microprocessor and Peripherals, Architecture Programming and Interfacing, Tata McGraw Hill Publishing Co. Ltd., New Delhi (TMH)

2AE51 JAVA

Unit I : Introduction to Java

Importance and features of Java, Concepts of Java Virtual machine (JVM) Keywords, Constants, Variables and data types, operators and expressions, Control statements, Conditional statements, loops and iterations Class definition, adding variables and methods, creating objects, constructors, defining methods, calling methods, method overloading Creating an array, one and two dimensional array, string array and methods String and String Buffer classes, Wrapper classes

Unit II : Inheritance

Basic types, super classes, Multilevel hierarchy abstract and final classes, object class, Packages and interfaces, Access protection, extending Interfaces, Exception handling, Fundamental exception types, uncaught exception, throw, throws, final methods, creating own exceptions

Unit III : Multithreaded programming

Review of fundamentals, Java thread model, synchronization, messaging, thread class, Run able interface, inter thread communication, Monitors, Deadlock, Producer/ Consumer problems, Wait() and notify(), Performance issues

Unit IV : Input/Output

Basics, Streams, Byte and Character Streams, predefined streams, reading and writing from console and files, using Java packages Networking in Java Networking fundamentals,

Client/server model, Internet addresses, Sockets, networking classes and interfaces, using Javanet package, TCP/IP and data gram programming, HTTP protocol and URLs

Unit V : Event Handling

Different mechanism, the delegation event model, classes, Event Listener Interfaces, Adapter and Inner classes, Working with windows, graphics and text, using AWT controls, Layout managers and menus, handling Image, animation, sound and video Java Applet

Unit VI : Programming Graphical System:

Reading and writing images, Image manipulation, Printing graphics, Print Services, Stream print service, Classes and interfaces for Data transfer, Building transferable image transferring java objects via system clipboard

Text Book:

1. "Java –2 The Complete Reference" Patrick Naughton and Herbertz Schidt, 2nd Ed

References:

1 "Programming with Java" E Balaguruswamy, Second edition, TMH

2 "HTML 4 Unleashed" Rick Dranell, Second edition, Tec media publication

3 "Dynamic web publishing Unleashed" Shelley Powers, Second edition, Tec media

4 Cay S Horstmann and Gary Cornell, Java 2 Vol I and II-Sun Micro Systems-2001

2AE52 PCB DESIGN USING ORCAD

Unit I : INTRODUCTION TO PCB DESIGN AND CAD

Computer-Aided Design and the OrCAD Design Suite, Printed Circuit Board Fabrication, PCB cores and layer stack-up, PCB fabrication process, Photolithography and chemical etching, Mechanical milling, Layer registration, Function of OrCAD Layout in the PCB Design Process, Design Files Created by Layout, Layout format files (MAX), Postprocess (Gerber) files, PCB assembly layers and files

Unit II : INTRODUCTION TO THE PCB DESIGN FLOW BY EXAMPLE

Overview of the Design Flow, Creating a Circuit Design with Capture, Starting a new project, Placing parts, Wiring (connecting) the parts, Creating the Layout netlist in Capture, Designing the PCB with Layout, Starting Layout and importing the netlist, Mking a board outline, Placing the parts,

Autorouting the board, Manual routing, Cleanup, Locking traces, Performing a design rule check, Postprocessing the board design for manufacturing

Unit III : PROJECT STRUCTURES AND THE LAYOUT TOOL SET

Project Setup and Schematic Entry Details, Capture projects explained, Capture part libraries explained, Understanding the Layout Environment and Tool Se, Board technology files, The AutoECO utility, The session frame and Design window, The toolbar, Controlling the autorouter, Postprocessing and layer details

Unit IV : MAKING AND EDITING CAPTURE PARTS

The Capture Part Libraries, Types of Packaging, Homogeneous parts, Heterogeneous parts, Pins, Part Editing Tools, The Select tool and settings, The pin tools, The graphics tools, The zoom tools, Constructing Capture Parts, Method 1: Constructing Parts Using the New Part Option (Design Menu), Design example for a passive, homogeneous part, Design example for an active, multipart, homogeneous component, Assigning power pin visibility, Design example for a passive, heterogeneous part

Unit V : MAKING AND EDITING LAYOUT FOOTPRINTS

Introduction to the Library Manager, Introduction to Layout's Footprint Libraries and Naming Conventions, Layout's footprint libraries, Naming conventions, The Composition of Footprints, Padstacks, Obstacles, Text, Datums and insertion origins, The Basic Footprint Design Process, Working with Padstacks, Accessing existing padstacks, Editing padstack properties from the spreadsheet, Saving footprints and padstacks, Footprint Design Examples, Design example 1: a surface-mount footprint design, Design example 2: a modified through-hole footprint design,

Unit VI : PCB DESIGN EXAMPLES

Overview of the Design Flow, Example 1: Dual Power Supply, Analog Design, Initial design concept and preparation, Project setup and design in Capture, Defining the board requirements, Importing the design into Layout, Setting up the board, Prerouting the board, Autorouting the board, Finalizing the design, connections to digital and analog parts , Connecting separate analog and digital grounds to a split plane, Using busses for digital nets,

Text Book :

1 Complete PCB Design Using OrCAD Capture and Layout *By Kraig Mitzner, Elsevier Inc, 2007*

2AE53 **CONTROL SYSTEMS**

Unit I : Basic definitions, Closed and open loop systems, transfer functions, block diagrams, Derivation of transfer functions (only electrical systems), signal flow graphs, basic control action.

Unit II : Time response Analysis, Impulse response function, Analysis of first, second and higher order system, stability of control system, Routh Hurwitz's stability criterion, static and dynamic errors coefficients, error criteria

Unit III : Root locus method, introduction, root locus plots, rules for constructing root loci, Root locus analysis of control systems, effect of zeros, derivative control and velocity feed back.

Unit IV : Frequency response, Bode Plots, Determination of static Position, Velocity and acceleration error coefficients. Polar plots, Nyquist stability criterion, stability analysis, relative stability.

Unit V : State space representation of systems, solutions of state equations, transition matrix, diagonalisation, controllability and observability.

Unit VI : Sampled data control system; Introduction, difference equations, Z-transform and properties, Inverse Z-transforms. Analysis of sampler and Zero-order hold, transfer function of sampled data systems (Block diagrams)

TEXT BOOKS:

1) I.J. Nagrath & M. Gopal (3/e) : Control systems Engineering (WEL)
2) Stefani, Shahian, Savant, Hostetter : Design of Feedback Control Systems, 4e, Oxford University Press
3) B.C. Kuo (7/e):Automatic Control Systems (PHI)
4) Ogata : Modern Control Engineering (PHI)

2AE54 **BLUETOOTH APPLICATION PROGRAMMING WITH JAVA APIS**

Unit I : **Introduction Bluetooth Wireless Technology**

Introduction, Wireless Connectivity What Is Bluetooth Wireless Technology, History of Bluetooth Wireless Technology Bluetooth Vision, Bluetooth Specification Overview of Bluetooth Stack Architecture, Bluetooth Protocols Bluetooth Profiles Bluetooth Qualification What Is JAVA ME Configurations Profiles Optional Packages

Why JAVA Technology for Bluetooth Devices? Java Community Process SM (JCP) and JSR-82What about Java SE?

Unit II : **An Overview of JABWT**

Goals Target Devices Keeping up with the Bluetooth Profiles JABWT Use Cases

API Characteristics and Hardware Requirements JABWT Specification characteristics

Java ME Device Requirements Bluetooth System Scope

Unit III : **High-Level Architecture**

Architecture of JABWT CLDC, MIDP, and JABWT Java Packages Client and Server Model Device Properties Bluetooth Control Center Conflict Resolution Modifying Device Properties User Interaction BCC on Devices with No User Interface Simple JABWT Application Development Sample Application

Unit IV : **RFCOMM**

Overview API Capabilities Programming with the API Establishing a Server Connection Establishing a Client Connection

Unit V : **OBEX**

Overview Use Cases Protocol Description Example Session API Programming with the API Establishing a Connection Manipulating OBEX Headers Sending a Request to the Server Receiving a Request from a Client Using OBEX Authentication

Unit VI : **Device Discovery Overview**

API Capabilities Programming with the API Accessing the Local Device Discovery via Inquiry Retrieving Information from a Remote Device Using the Device Class

Text Book : BLUETOOTH_ APPLICATION PROGRAMMING WITH THE JAVA APIs ESSENTIALS EDITION ,TIMOTHY J THOMPSON PAUL J KLINE, Elsevier 2008

2AE6 **INTEGRATED CIRCUITS LABORATORY**

Minimum 10 experiments based on the syllabi of 2AE1: Linear Integrated Circuits and 2AE3: Digital Integrated Circuits, that are preferably uniformly distributed over the syllabi.

2AE7 **PROFESSIONAL ELECTIVE LABORATORY**

Minimum 10 experiments each based on the syllabus of subjects included in 2AE5x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

2AE51 **Java**

2AE52 **PCB Design using OrCAD**

2AE53 **Control Systems**

2AE54 **Bluetooth Application Programming with Java APIs**

Text Book : JOHN G. PROAKIS-CONTEMPORARY COMMUNICATION SYSTEMS USING MATLAB, 2ND ED,

2AE8 MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Minimum 10 experiments based on the syllabus of 2AE4, that are preferably uniformly distributed over the syllabus.

2AE9 BASIC ELECTRONICS WORKSHOP

Minimum 10 Experiments will be based on the following.

1. Understanding transformers, Calculation of value of Resistor/ Capacitor from its colour/bar code, Identification of Electronic passive components Resistors, Capacitors, inductors- types. Testing of these devices
2. Identification and Testing of devices - diode, zener diode, Tunnel diode, LED, Silicon Controlled Rectifier, bipolar junction transistor, FET, MOSFET, etc.
3. Switches and relays- types, specifications, applications and testing.
4. Fuses, Cables and connectors - types, construction, specifications, testing and applications.
5. PCB layout design using any standard software package (ORCAD/ PROTEL)

2AE101 POWER ELECTRONICS

Unit I : SCR, Triac, Diac-construction, characteristics & applications, two transistor analogy for turning ON-OFF SCR, turn ON mechanism, different methods of turning ON-OFF SCR, turn OFF mechanism, Thyristor firing circuits. Introduction to GTO, power transistor, power MOSFET & IGBT & their construction & characteristics.

Unit II : Series parallel operation of SCR's, static & dynamic equalizing circuits., equalization of current in parallel connected SCR's, string efficiency, derating factor, Protection of SCR's against di/dt, dv/dt, radio freq., interference, over voltage, over current.

Unit III : Principle of phase control, half wave controlled rectifier, half controlled bridge & fully controlled bridge rectifier for resistive and RL load derivation for output voltage and current, effect of free wheeling diode, single phase dual converters.

Three phase half controlled bridge and fully controlled bridge rectifier. (only descriptive approach)

Unit-IV : Classification of circuits for forced commutation, series inverter, improved series inverter, parallel inverter, out put voltage and waveform control, principle of operation for three phase bridge inverter in 120 degrees and 180 degrees Mode, PWM Techniques, (sinusoidal PWM techniques, hysteresis control PWM)

Unit-V : Basic principles of chopper, time ratio control and current limit control techniques, voltage commutated chopper circuits, Jones chopper, step-up chopper and AC chopper. Basic principle of cyclo converters, single phase to single phase cyclo converter.

Unit-VI : Speed control of DC series motors using chopper, speed control of DC shunt motor using phase controlled rectifiers, speed control of three phase induction motor by stator voltage control, v/f control and slip power recovery scheme. Static circuits breaker, UPS, fan speed regulator, Application of HVDC transmission

TEXT BOOKS :

1. Moorthi, Power Electronics, Oxford University Press
2. Krein, Elements Of Power Electronics, Oxford University Press

REFERENCES:

1) M . Ramamoorthy - Thyristor and their application.
2) M.H.Rashid - Power Electronics Circuits., Devices and Application.
3) G. K. Dubey, S.R.Doradia, A.Joshi, R.M.K. Sinha - Thyristorised Power controller.
4) M.D.Singh & K.B.Khanchandani - Power Electronics, Tata Mc Graw Hill.
5) Bimal K. Bose, - Modem Power Electronics & AC drive: Pearson Education

2AE102 INTRODUCTION TO MATLAB

UNIT I : **Matrices and Matrix Operations**

Referencing individual entries Matrix operators Matrix division (slash and backslash) Entry-wise operators Relational operators Complex numbers Strings other data types Sub-matrices and Colon Notation Generating vectors Accessing sub-matrices

UNIT II : **MATLAB Functions**

Constructing matrices Scalar functions Vector functions and data analysis Matrix functions The linsolve function The find function Control Flow Statements The for loop The

while loop The if statement The switch statement The try/ catch statement Matrix expressions (if and while) Infinite loops

UNIT III : M-files

M-file Editor/Debugger window Script files Function files Multiple inputs and outputs Variable arguments Comments and documentation MATLAB's path Advanced M-file Features Function handles and anonymous functions Name resolution Error and warning messages User input Performance measures Efficient code

UNIT IV : Calling from MATLAB

Calling C from MATLAB : A simple example C versus MATLAB arrays A matrix computation in C MATLAB mx and mex routines Online help for MEX routines Calling Fortran from MATLAB: Solving a transposed system A Fortran mexFunction with %val Calling Java from MATLAB: A simple example Encryption/decryption MATLAB's Java class path Calling your own Java methods Loading a URL as a matrix

UNIT V : Two and Three Dimensional Graphics

Planar plots Multiple figures Graph of a function Parametrically defined curves Titles, labels, text in a graph Control of axes and scaling Multiple plots Line types, marker types, colors Subplots and specialized plots Graphics hard copy Three-Dimensional Graphics Curve plots Mesh and surface plots Parametrically defined surfaces Volume and vector visualization Color shading and color profile Perspective of view Advanced Graphics Handle Graphics, introduction to Graphical user interface Images

UNIT VI : Advanced Topics

Sparse Matrix Computations Storage modes Generating sparse matrices Computation with sparse matrices Ordering methods Visualizing matrices Calculus Variable precision arithmetic Numeric and symbolic substitution Algebraic simplification Two-dimensional graphs Three-dimensional surface graphs Three-dimensional curves Symbolic matrix operations Symbolic linear algebraic functions Solving algebraic equations Solving differential equations

TEXT BOOK:

1 Getting Started with MATLAB 7, Rudra Pratap, Oxford University Press

2. MATLAB Primer Seventh Edition, BY Timothy A Davis Kermit Sigmon

2AE103 FUNDAMENTALS OF INSTRUMENTATION AND MEASUREMENT

Unit I : Measurement Instrumentation

General introduction and definitions, Measurement-Instrumentation-Metrology, Instrument modeling, Model of a measurement instrument, Dynamic characteristics ,Instrument performance , Implementing measurement acquisition, Principles and methodology of measurement , Analyzing measurements obtained by an instrument, Base definitions, Electronic instrumentation, Electronic instrumentation functionality ,The role of instrumentation in quality control.

Unit II : General Principles of Sensors

Basic definitions, Metrological characteristics of sensors, Systematic errors, analyzing random errors and uncertainties, Standard deviations. , Variances, Decisions about random uncertainties. Reliability, accuracy, precision Sensor calibration. Simple calibration, Linking international measurement systems, Band pass and response time, Harmonic response, Passive sensor conditioners, Conditioners for active sensors, Direct reading, Using operational amplifiers

Unit III : Physical Principles of Optical, Thermal and Mechanical Sensors

Optical sensors, Luminous flux ,The relative luminous efficiency curve of the human eye, The black body: a reference for optical sensors, Black body radiation, Darkness currents, Spectral and total sensitivities, Sources of fundamental noise sources in optical sensors, Photoconductor cells , Principle of photodiode, fabrication, Photodiode equation, Force and deformation sensors, Resistive gauges, Piezoelectric effect,. Piezoelectricity and pyroelectricity, Construction of piezoelectric sensors, Thermal sensors, Concepts related to temperature and thermometry, Contact temperature measurement of solids, Resistive thermometers.

Unit IV : Real-time Data Acquisition and Processing Systems

Electronic devices for signal sampling and quantification, Nyquist sampling, Quantification noise, Over-sampling and reconstruction, Under-sampling, Analog-to-digital converters, Real-time digital analysis by a specialized processor, Fixed point and floating point analysis, General structure of a DSP, Multiplication/accumulation structure, Using standard filtering Algorithms. General structure of a real-time filtering program, The FIR filter and simple Convolutions, IIR filters.

Unit V : Instruments and Measurement Chains

Measurement devices : Intensity measurements, Oscilloscopes, Spectrum analyzers, Sweeping analyzers, FFT analyzers, Network analyzers, Impedance analyzers, Measurement with a network analyzer, The parallel bus IEEE488 Serial buses, Description of PC buses External acquisition cards: the VXI system, Functions of the VXI bus, Description of the VXI bus

Unit VI : Intelligent Sensors

Architecture of an intelligent system. Processing and performances. Improving performances with sensors, Reliability and availability of information, intelligent distance sensors in cars, Field bus networks, Towards a system approach

Text Book:

Dominique Placko ,"Fundamentals of Instrumentation and Measurement", ISTE Ltd, 2007

2AE104 COMPUTER NETWORKS

Unit I : Introduction

Uses of computer networks, Network Architectures, The OSI Reference model, TCP/IP reference model, Network examples, Data communication network examples.

Unit II : The Medium Access Control Sublayer, The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, Data Link Layer Switching

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Unit III : The Network Layer

Network layer design issues, Routing Algorithm, Congestion control algorithm, internetworking, the network layer in the internet

Unit IV : The transport layer: Services provided to the session layer, Quality of service, Transport service primitives, transport protocol, elements of transport protocols, the internet transport protocols, UDP, TCP, performance issues

Unit V : Application layer: Application Layer design issues, DNS, e-mail, www, multimedia

Unit VI : Network security, cryptography, symmetric key algorithms, public key algorithms, digital signatures, management of public keys, communication security, authentication protocols, e-mail security, web security

Text Book:

1) Andrew S. Tanenbaum : Computer Networks, 4 e, Pearson Education/ Prentice Hall

THIRD SEMESTER

3AE1 DIGITAL COMMUNICATIONS

Unit I : DIGITAL COMMUNICATION SYSTEM

Elements of digital communication System, advantages of digital communication System, source encoder, decoder, Channel encoder, decoder, modulator, demodulator, clock synchronization and carrier synchronization.

Unit II : PROBABILITY, INFORMATION THEORY and COMMUNICATION CHANNEL

Definitions, Probability of random events, Laws of probability, joint & conditional probability, relationships involving joint, marginal & conditional probabilities, Baye's rule, statistical independence, Binary communication channel, discrete communication channel, information content, rate of information, joint entropy & conditional entropy,

Source Encoding, Shannon's Encoding algorithm, Huffman encoding algorithm, Shannon's theorem on channel capacity.

Unit III : DIGITAL MODULATION AND TECHNIQUES

Digital carrier modulation Schemes, Binary ASK, PSK, FSK coherent schemes, bandwidth consideration and probability of errors(only theoretical concept), comparison of digital modulation systems, Basics of DPSK, QPSK, MSK.

Unit IV : ERROR CONTROLLING AND CODING

Introduction to error controlling and coding, Methods of controlling errors, type of errors and codes, linear block codes, Matrix description of linear block code, error detection and error correction capabilities of linear block code.

Unit V : BASE BAND TRANSMISSION

Base band PAM system, inter symbol interference, Nyquist criterion, pulse shaping, equalization, eye diagram, scrambler and unscrambler, Duo binary signaling scheme.

Unit VI : MODERN TECHNIQUES OF COMMUNICATION

Multiple access schemes: TDMA, FDMA, CDMA, spread spectrum communication, D.S. spread spectrum, frequency hopping spread spectrum, comparison.

Text Books:

1) Shanmugam K.S. Digital & analog Communication Systems, John Willey & Sons, New York
2) Lathi B. P. Modern Digital and Communication Systems Oxford University Press

Reference books:

1) Simon Haykin Digital Communication John willey & sons
2) J.G. Proakis Digital Communication MGH 4TH ED
3) Taub,Herbert, Principles of Communication Systems, Mc-Graw Hill International Schilling D.L. Book Co., Tokiyo.
4) Glover and Grant Digital Communication, Prentice Hall Publication.

3AE2 DIGITAL SIGNAL PROCESSING

Unit I : Introduction to DSP, Frequency domain description of signals & systems, Discrete time sequences systems, Linearity, unit sample response, Convolution, Time invariant system, Stability criteria for discrete time systems, Solution of linear difference equations.

Unit II : Introduction to Fourier transform of Discrete Time Signal and its properties, Inverse Fourier transform, Sampling of continuous time signal, Reconstruction of continuous time signal from sequences, Z-Transform and its properties, complex Z-plane, ROC, Determination of filter coefficients, relationship between Fourier transform and Z-Transform, Inverse Z-Transform.

Unit III: DFT and its properties, Circular convolution, linear convolution from DFT, FFT, and Decimation in time and frequency algorithm, and Introduction to wavelet transform.

Unit IV: Filter categories, Direct form I, Direct form II, Cascade and parallel structure for IIR and FIR Filter, Frequency sampling structures for F.I.R. filter, Steps in Filter Design, Design by pole zero placements, FIR filter design by Windowing method, Rectangular, Triangular and Blackman window

Unit V: Analog filter types: Butterworth, Elliptic and Chebyshef filter, Filter Specifications, formulae, filter order, Methods to convert analog filter into digital filters, Mapping of differential, impulse invariant, Bilinear, Matched Z transformation.

Unit VI: Multi rate DSP, Introductory concept of multi rate signal processing, Design of practical sampler, Rate converters, Decimators and Interpolator, Filter bank application and examples

Text books:

1. Proakis and Manolakis:Digital Signal Processing, 3/e, Pearson Education
2. S. Salivahan, A. Vallavaraj: Digital Signal Processing (TMH)

Reference Book:

B. P. Lathi: Signal Processing and Linear Systems, Oxford University Press

3AE3 VLSI DESIGN

Unit I : Digital Design Fundamentals: Review of techniques of using a truth table, canonical forms to develop the AND/OR or OR/AND combinational circuit models, minimization techniques, Hazards and Hazard free circuits. Difference between combinational and sequential circuits. General model of sequential machine, timing and triggering considerations.

Unit II : Basic HDL Constructs: VLSI Design flow, Overview of different modeling styles in VHDL, Data types and data objects in VHDL, Dataflow Modeling, Behavioral Modeling, using VHDL for combinational Circuits and sequential Circuits.

Unit III : Hardware Description Language: Structural Modeling, Subprograms, Packages and Libraries, Generics, Configurations, attributes. Comparison of various Hardware Description Languages.

Unit IV : Programmable Logic Devices: Introduction to CPLDs: Function block architecture, input/output block, switch matrix, Study of architecture of CPLDs of Altera /Xilinx. Introduction to FPGAs: Configurable logic block, input/output block and interconnect, Study of architecture of FPGAs of Xilinx /Actel /Altera.

Unit V: CMOS Circuits: Different logic families, MOS Transistor, CMOS as an inverter, propagation delay, power consumption/ dissipation issues, simple circuits using CMOS.

Unit VI: CMOS Processing & Digital Circuit Verification: CMOS Fabrication: Different steps of fabrication, CMOS p-well, n-Well and twin tub processes, CMOS Layout and Design rules. Simple Test Bench, Simulation and Synthesis issues, case study of ALU/ Sequence Detector.

Text Books:

1) Neil H.Weste and Kamran Eshraghin, “Principles of CMOS VLSI design”.
2) J Bhasker,” VHDL Primer”. Addison Wesley
3) Douglas Perry,” VHDL” TaTa McGraw HILL
4) William I. Fletcher “An Engineering approach to Digital Design”, Prentice Hall India.
5) Digital Integrated Circuit Design, K. Martin, Oxford University Press

Reference Books:

1) Stephen Brown and Zvonko Vranesic, “*Fundamentals* of Digital Logic with VHDL
2) Design”. Tata McGRAW HILL

3) Wayne Wolf: "VLSI Technology"
3) Allen & Homberg : "CMOS design"
4) Basics of CMOS cell design by Sicord & Bhendiya
5) John Yarbrough, BROOKS /COLE, "Digital Logic Applications and Design".

3AE4x PROFESSIONAL ELECTIVE#1

3AE41 EMBEDDED SYSTEMS DESIGN

Unit I : **Introduction to an embedded systems design:** Introduction to Embedded system, Embedded System Project Management, ESD and Co-design issues in System development Process, Design cycle in the development phase for an embedded system, Use of target system or its emulator and In-circuit emulator, Use of software tools for development of an ES.

Unit II : **RTOS & its overview 1:** Real Time Operating System: Task and Task States, tasks and data, semaphores and shared Data Operating system

Unit III : **RTOS & its overview 2:** Services-Message queues-Timer Function-Events-Memory Management, Interrupt Routines in an RTOS environment, basic design Using RTOS

Unit IV : **Microcontroller:** Role of processor selection in Embedded System (Microprocessor V/s Micro-controller), 8051 Microcontroller: Architecture, basic assembly language programming concepts, Instruction set, Addressing Modes, Logical Operation, Arithmetic Operations, Subroutine, Interrupt handling, Timing subroutines, Serial data transmission, Serial data communication

Unit V : Embedded system development: Embedded system evolution trends Round - Robin, robin with Interrupts, function-One-Scheduling Architecture, Algorithms Introduction to-assembler, compiler-cross compilers, Integrated Development Environment (IDE), Object Oriented Interfacing, Recursion, Debugging strategies, Simulators

Unit VI : **Networks for Embedded Systems:** The I^2C Bus, The CAN bus, SHARC link Ports, Ethernet, Myrinet, Internet, and Introduction to Bluetooth: Specification, Core Protocol, and Cable replacement protocol, IEEE 11491 (JTAG) Testability: Boundary Scan Architecture

Textbooks:

1 Embedded Systems by Raj Kamal, TMH
2 The 8051 Microcontroller by KJ Ayala, Penram International
3 J B Peatman, Design with PIC Microcontrollers, Prentice Hall

Reference books:

1 An Embedded Software Primer by David E Simon, Pearson Education
2 Designing Embedded Hardware by John Catsoulis, O'reilly
3 Embedded System Design by Frank Vahid, Tony Givargis,", John Wiley & Sons, Inc
4 Building Embedded Linux Systems by Karim Yaghmour, O'reilly
5 Programming Embedded Systems by Michael Barr, O'reilly
6 Real-time systems & software by Alan C Shaw, John Wiley & sons, Inc
7 Computers as Components by Wayne Wolf, Harcourt India Pvt Ltd
8 Embedded System Design by Peter Marwedel, Kluwer Academic Pub
9 Programming and Customizing the AVR Microcontroller by Dhananjay Gadre, MGH
10 Fundamental of Embedded software by Daniel W Lewis, PHI
11 Bluetooth Technology by CSR Prabhu & A P Reddi, PHI
12 John B Peat man "Design with Microcontroller ", Pearson education Asia, 1998
13 Burns, Alan and Wellings, Andy, "Real-Time Systems and Programming Languages", Second Edition Harlow: Addison-Wesley-Longman, 1997
14 Raymond JA Bhur and Donald LBialey, " An Introduction to real time systems: Design to networking with C/C++ ", Prentice Hall Inc New Jersey, 1999
15 Grehan Moore, and Cyliax, " Real time Programming: A guide to 32 Bit Embedded Development Reading " Addison-Wesley-Longman, 1998
16 Heath, Steve, "Embedded Systems Design ", Newnes 1997

3AE42 VISUAL BASIC

Unit I: Exploring Toolbar and the Properties Window. Visual Basic 6.0 - Properties, Methods and Events Naming conventions. Data types, Variables, Procedures and Operators in VB 6.0 Control structures (If...Then , Select Case)Control structures continued... (Do While...Loop, While... end,....)Control structures continued... (Exit For, Exit Do, With...End With)

Unit II: Arrays in VB6.0User-Defined Data Types Constants, Data Type Conversion, Visual Basic Built-in Functions Date and Time Functions Working with controls in VB6 Workingwith controls in VB6 Using a Text Box, Label, Command Button, Option Button Working with controls in VB6. Using List Box and Combo Box Controls Working with controls in VB6. Using a Scroll Bar

Unit III: Control Arrays in Visual Basic Working with controls in VB6 Files, controls in Visual Basic 6.0,Working with controls in VB6, Using a Check Box control, working with Forms in VB6, Working with Menus in VB6, Multiple Document Interface in VB6 ,Visual Basic Functions. Input Box function, Visual Basic functions. Message Box function, Mouse events. Positioning a control

Unit IV: Graphical Mouse Applications. Mouse Move application in Visual Basic 6.0, Error-Handling, Debugging and File, Input/ Output in Visual Basic 6.0, Error Handling Part 2

Unit V: Database Access Management Using ADO: Introduction and Example Exercises, Database Access Management Using ADO Part 1, Data Base Access Management Using ADO - Part 2.

Unit VI: Dynamic Link Libraries and the Windows API in Visual Basic 6.0,Writing Code that Validates User Input, Creating ActiveX Controls, Creating Active Document, Internet Programming with IIS/Web class and DHTML Applications

Text Books:
1. Microsoft Visual Basic Programming for the Absolute Beginner, Vine, PHI
2. Programming Visual Basic 2005, Jesse Liberty, O'Reilly Media Inc

3AE43 ORACLE ESSENTIALS

Unit I: **Introducing Oracle: The** Evolution of the Relational Database The Oracle Database Family Summary of Oracle Database Features Database Application Development Features Database Connection Features Distributed Database Features Data Movement Features Database Performance Features Database Management Features Database Security Features Oracle Development Tools Embedded Databases

Unit II: **Oracle Data Structures:** Data types Basic Data Structures Additional Data Structures Extended Logic for Data, Data Design Constraints Triggers Query Optimization Understanding the Execution Plan SQL Advisors Data Dictionary Tables

Unit III: **Managing Oracle:** Manageability Features Oracle Enterprise Manager Fragmentation and Reorganization Backup and Recovery Working with Oracle Support Security Auditing Compliance

Unit IV: **Oracle Performance: Performance** Tuning Basics Oracle and Disk I/O Resources Oracle and Parallelism Oracle and

Memory Resources Oracle and CPU Resources Database Resource Manager

Unit V: **Oracle Multi-user Concurrency: Basics** of Concurrent Access Oracle and Concurrent User Access Oracle's Isolation Levels Oracle Concurrency Features How Oracle Handles Locking Concurrent Access and Performance Workspaces

Unit VI: **Oracle and Transaction Processing**: OLTP Basics Oracle's OLTP Heritage Architectures for OLTP Oracle Features for OLTP High Availability Oracle Streams and Advanced Queuing Object Technologies and Distributed Components

Textbook: Oracle Essentials *Oracle Database 11g, 4e, Rick Greenwald, Robert Stackowiak, and Jonathan Stern, 2007,* O'Reilly Media, Inc.,

3AE44 PROGRAMMING PIC MICROCONTROLLER WITH MBASIC

Unit I: ***MBasic Compiler and Development Boards:*** The Compiler Package BASIC and Its Essentials Development Boards, Programming Style, Building the Circuits and Standard Assumptions Pins, Ports and Input/Output Pseudo-Code and Pin Architectures LED Indicators, Switching Inductive Loads, Low Side Switching, Isolated Switching, Special Purpose Switching, Fast Switching, Sound from a PIC, Switch Bounce and Sealing Current, Isolated Switching Reading a Keypad

Unit II: ***Assembler:*** The Basics Op Codes, *In-Line Assembler,* Adding Assembler to MBasic Programs, Bolt-In Assembler Functions, *Interrupt Handlers*, ISRASM, MBasic's Gateway to Assembler, Interrupt Service Routines, Program Examples.

Unit III: ***LCD Modules, Seven-Segment LED Displays and Reading Switch :*** Selecting a Display, VFD Displays, Connection to PIC, Hello World LCD Module, Memory, Shifts and Lines, Font Selection, Custom Characters, LED Display Selection, Circuit Design, Pin Saving Techniques, Rotary Encoders, Reading a Relative Encoder, Dual Encoders and LCD.

Unit IV: ***Introductory Stepper Motors and DC Motor Control: Stepper*** Motor: Basics Programs, Introduction to Control Theory, Measure Motor Speed (Tachometer Output Pulse Width), Target Width–Measured Width, the Control Algorithm, Motor Control Programs.

Unit V: ***RS-232Serial Interface:*** Interrupts and Timers: Overview Interrupts, Timers, Capture and Compare, How to Connect to Your PC, Voltage Levels in RS-232 and Level Conversion, Standard Pin Connections, Asynchronous Transmission, Start Bits , Stop Bits and Bit Order , MBasic's Procedures for Serial Communications, Programs.

Unit VI: ***Analog-to-Digital Conversion and Digital-to-Analog Conversion: Introduction*** to Analog-to-Digital Conversion: Resolution and Accuracy, Self-Contained DVM, DS18B20 Temperature Sensor, DS1302 Real-Time Clock, Combination Date, Time and Temperature, Introduction to Digital-to-Analog Conversion: Resolution, Accuracy and Signal-to-Noise Ratio, Sampling Theorem, DAC Circuit Design, Alternative Analog Output Solutions.

TEXT BOOK: 1, Programming the PIC Microcontroller with MBasic, by Jack R Smith

3AE5x **PROFESSIONAL ELECTIVE#2**

3AE51 NEURAL NETWORK AND PATTERN RECOGNITION

Unit I: Statistical Pattern Recognition, Classification and regression, Pre-processing and feature extraction, The curse of dimensionality, Polynomial curve fitting, Model complexity, Multivariate non-linear functions, Bayes' theorem, Decision boundaries, Minimizing risk, Probability Density Estimation, Parametric methods, Maximum likelihood , Bayesian inference, Sequential parameter estimation, Non-parametric methods, Mixture models

Unit II: Single-Layer Networks, Linear discriminant functions, Linear separability, Generalized linear discriminants, Least-squares techniques, The perceptron, Fisher's linear discriminant, The Multi-layer Perceptron, Feed-forward network mappings, Threshold units, Sigmoidal units, Weight-space symmetries, Higher-order networks, Projection pursuit regression, Kolmogorov's theorem, Error back-propagation, The Jacobian matrix, The Hessian matrix

Unit III: Radial Basis Functions, Exact interpolation, Radial basis function networks, Network training, Regularization theory , Noisy interpolation theory, Relation to kernel regression, Radial basis function networks for classification, Comparison with the multi-layer perceptron, Basis function optimization, Supervised training,

Unit IV: Error Functions, Sum-of-squares error, Minkowski error, Input-dependent variance, Modeling conditional distributions, Estimating posterior probabilities, Sum-of-squares for classification, Cross-entropy for two classes, Multiple independent attributes, Cross-entropy for multiple classes, Entropy, General conditions for outputs to be probabilities

Unit V: Parameter Optimization Algorithms, Error surfaces, Local quadratic approximation, Linear output units, Optimization in practice, Gradient descent, Line search, Conjugate gradients, Scaled conjugate gradients, Newton's method, Quasi-Newton methods, The Levenberg-Marquardt; algorithm

Unit VI: Pre-processing and Feature Extraction, Pre-processing and post-processing, Input normalization and encoding, Missing data, Time series prediction, Feature selection, Principal component analysis, Invariance and prior knowledge, Learning and Generalization, Bias and variance, Regularization, Training with noise, Soft weight sharing, Growing and pruning algorithms, Committees of networks, Mixtures of experts, Model order selection, Vapnik-Chervonenkis dimension

Textbook: Neural Networks for Pattern Recognition, Christopher M. Bishop, Oxford University Press

3AE52 **DATABASE MANAGEMENT**

Unit I: **Basic concepts:** Database & database users, characteristics of the database, database systems, concepts and architecture, date models, schemes & instances, D B M S chitecture & data independence, database languages & interfaces, data modeling using the entity relationship approach, Overview of hierarchical, Network & Relational Data Base Management Systems.

Unit II: **Relational model, languages & systems-1:** Relational data model & relational algebra: relational model concepts, relational model constraints, relational algebra, SQL- a relational database language: date definition in SQL, view and queries in SQL, specifying constraints and indexes in sql, relational database management systems.

Unit III: **Relational model, languages & systems-2:**DB2DB2 Architecture, Logical Data Structures ,Physical Data Structure, Instances, Table Spaces, Types of Table spaces, Internal Memory Structure, Background Processes, Data

Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers.

Unit IV: **Relational data base design:** Function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF,3NF & BCNF), lossless join and dependency preserving decomposition.

Unit V: **Concurrency control & recovery techniques:** Concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery techniques: recovery concepts, database backup and recovery from catastrophic failures.

Unit VI: **Object Oriented and Distributed Data Base Systems:** Concepts of object oriented database management systems, Distributed Data Base Management Systems.

Textbook: 1) Desai, B, "An introduction to database concepts", Galgotia publications

Reference Books:

1) Date, C J, "An introduction to database systems", 7th Edition, Addison Wesley
2) Date, C J, "An introduction to database systems", 3rd Edition, Narosa Publishing House
3) Elmsari and Navathe, "Fundamentals of database systems", Addison Wesley
4) Ullman, J D, "Principals of database systems", Galgotia publications
5) DB2 Manuals

3AE53 WEB ENGINEERING

Unit I : Web Engineering and Web Applications Development, Introduction , Web Application Development: Challenges and the Role of Web Engineering .

Unit II : The Web as an Application Platform, Web Design Methods, Overview of Design Issues for Web Applications Development.

Unit III: Applying the OOWS Model-Driven Approach for Developing Web Applications. The Internet Movie, Database Case Study, Modeling and Implementing Web Applications with OOHDM.

Unit IV: UML-Based Web Engineering, Designing Multichannel Web Applications as "Dialogue Systems": The IDM Model.

Unit V: Designing Web Applications with WebML and WebRatio, Hera.

Unit VI: WSDM: Web Semantics Design Method, an Overview of Model-Driven Web Engineering and the MDA.

TEXTBOOK: Scar Pastor, Daniel Schwabe, Luis Olsina,"Web Engineering: Modeling and Implementing Web Applications", Springer-Verlag London Limited, 2008

REFERENCE BOOKS:

Joel Sklar, "Principles of Web Design", Cengage Learning

James L. Mohler and Jon M. Duff, "Designing Interactive Web Sites", Cengage Learning

3AE54 SIX SIGMA FOR ELECTRONICS DESIGN AND MANUFACTURING

Unit I: **The Nature of Six Sigma and Other Quality Tools:** Historical Perspective, Why Six Sigma? , The Definitions of Six Sigma , Increasing the Cp Level to Reach Six Sigma, Definitions of Major Quality Tools and How They Effect Six Sigma, Mandatory Quality Tools, Quality Function Deployment (QFD), Design for Manufacture (DFM), Design of Experiments (DoE), Other Quality Tools, Process mapping .

Unit II: **The Elements of Six Sigma:** The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk, The Statistical quality control (SQC) methods, the relationship of control charts and six sigma, the process capability index (Cp) , Six sigma approach, The Cpk Approach Versus Six Sigma, Cpk and process average shift, Negative Cpk , Choosing six sigma or Cpk , Setting the process capability index , Calculating Defects Using Normal Distribution , Relationship between *z* and Cpk , Example defect calculations and Cpk .

Unit III: **Six Sigma and the Manufacturing Control Systems :** Manufacturing Variability Measurement and Control , The Control of Variable Processes and Its Relationship with Six Sigma, Variable control chart limits ,Control chart limits calculations, Alternate methods for calculating control limits, Control chart guidelines, out-of-control conditions, and corrective action procedures and examples, Examples of variable control chart calculations and their relationship to six sigma, Attribute charts and their Relationship with Six Sigma

Unit IV: **Manufacturing Yield and Test Strategy:** Determining Units of Defects, Example of calculating yield in a part with multiple

operations Determining assembly yield and PCB and product test levels in electronic products, PCB yield example ,Operations or Design Specifications, Determining first-time yield at the electronic product turn-on level, Example of yield calculations at the PCB assembly level, DPMO methods for standardizing defect measurements, DPMO charts , Critique of DMPO methods ,PCB test strategy , PCB test strategy example .

Unit V: **Quality and Manufacturing Costs of Electronics Products:** The Overall Electronic Product Life Cycle Cost Model , The use of the quality and cost model to achieve world-class cost and quality, Developing the background information cost estimating of electronic products, Determination of costs and tracking tools for electronic products, The Quality and Cost Relationship , The quality loss function (QLF) , Quality loss function example ,Printed circuit board (PCB) fabrication technologies, Printed circuit board (PCB) design, fabrication cost, and quality issues. PCB fabrication cost and quality alternative example.

Unit VI: **Implementing Six Sigma in Electronics Design and Manufacturing:** Six Sigma Design Project Management Models ,Axioms for creating six sigma within the organization, Cultural Issues with *the Six Sigma Based System ,Design Process, Key Processes to Enhance the Concurrent Product Creation* Process, Six sigma phased review process ,Six sigma quality advocacy and the quality systems review, Six sigma manufacturability assessment and tactical plans in production, Tools to Support Suggested Processes.

TEXT BOOK: Sammy G. Shina, "Six Sigma for Electronics Design and Manufacturing", McGraw-Hill, 2002

3AE6 DIGITAL SIGNAL PROCESSING LABORATORY

Minimum 10 experiments based on the syllabus of 3AE3, that are preferably uniformly distributed over the syllabus.

3AE7 PROFESSIONAL ELECTIVE#1 LABORATORY

Minimum 10 experiments each based on the syllabus of subjects included in 3AE4x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

3AE41 Embedded System Design

3AE42 Visual Basic
3AE43 Oracle Essentials
3AE44 Programming PIC Microcontrollers with MBasic

3AE8 PROJECT AND SEMINAR

Project (including 4AE8).The project work should be either hardware and/or software based. A project report should be submitted in three copies. Every student has to submit seminar report and deliver a seminar on advance state-of-the-art topics.

3AE9x FREE ELECTIVE (AUDIT)

3AE91 ARTIFICIAL INTELLIGENCE

Unit I: Artificial Intelligence: History and Applications, definitions, fundamental issues, challenges, growth of AI, current trends in appliedAI

Unit II: Knowledge Representation: Reasoning, Issues, and Acquisition, propositional calculus, predicate calculus, rule-based knowledge representation, basic knowledge representation issues

Unit III: Heuristic Search, search as a problem-solving technique, techniques for heuristic search, hill climbing heuristic, best-first search, evaluation of heuristic functions, State space search, strategies, implementation of graph search, depth-first search, breadth first search, representation of reasoning with predicate calculus using state space, application of search technique in game playing and planning

Unit IV: Expert Systems, features, characteristics, development of ES technology, architecture, goals, basic activities, advantages, difference between ES and conventional methods, stages in the development of ES, ES tools, difficulties in developing ES, applications of expert systems

Unit V: Artificial Neural Networks, introduction, supervised learning, feed-forward neural networks, recurrent neural networks, Elman backpropagation neural network, Hopfield neural network, features of artificial neural networks, functional link neural network, Fuzzy systems, foundations, crisp set to fuzzy set, representing fuzzy elements, basic terms and operations, properties of fuzzy sets, fuzzy measures, measures of fuzziness, fuzzification, fuzziness and probability theory, membership function shape analysis, defuzzification methods, fuzzy logic in control and decision making applications, hardware realization of the analog fuzzy controller

Unit VI: Genetic Algorithms, procedures of GA, representations, initialization and selection, genetic operators, mutation, natural inheritance operators, logic behind GA, GA applications, applicability of Gas, evolutionary programming, working of evolutionary programming, swarm intelligent systems, background of ant intelligent systems, ant colony paradigm, applications of ant colony intelligence in static and dynamic combinatorial optimization problems, particle swarm intelligent systems, engineering applications of particle swarm intelligent systems

Text Book: Artificial Intelligence and Intelligent Systems, Padhy, Oxford Univ Press

3AE92 HUMAN COMPUTER INTERACTION

Unit I: **Humans in HCI:** Introduction: The Evolution of HCI, Perceptual-Motor Interaction: Some Implications for HCI, Human Information Processing: An Overview for HCI Mental Models in Human-Computer Interaction, Emotion in Human-Computer Interaction, Cognitive Architecture, An Introduction to Captology.

Unit II: **Computers in HCI:** Input Technologies and Techniques, Sensor and Recognition-Based Input for Interaction, Nonspeech Auditory Output, Network-Based Interaction, Wearable Computers.

Unit III: **Designing Human-Computer Interactions :**Visual Design: Principles for Usable Interfaces, Global/Intercultural User Interface Design , Conversational, Speech Interfaces and Technologies, Multimedia User Interface, Design Multimodal Interfaces, Adaptive Interfaces, Mobile Interaction, Human-Centered Design of Decision-Support Systems, Human-Computer Interaction in Aerospace.

Unit IV: **Designing for Diversity;** The Role of Gender in Human-Computer Interaction, Information Technology and Older Adults, HCI for Kids, Information Technology for Cognitive Support, Physical Disabilities and Computing Technologies: An Analysis of Impairments, Perceptual Impairments: New Advancements, Design, and Testing, Computing Technologies for Deaf and Hard of Hearing Users

Unit V: **Design and Development:** Putting Persons to Work: Using Data-Driven Person as to Focus Product Planning, Design and Development, Prototyping Tools and Techniques. Scenario-based Design, Participatory Design: The Third Space in HCI, Survey Design and Implementation in HCI.

Unit VI: **Evaluation and Emerging Issues:** Inspection-based Evaluations, Model-Based Evaluation, Future Trends in Human-Computer Interaction, Technology Transfer, Augmenting Cognition in HCI: 21st Century Adaptive System Science and Technology.

TEXT BOOK: Andrew Sears, Julie A. Jacko," The Human–Computer Interaction Handbook ", 2nd Edition, *Georgia Institute of Technology*, 2008 by Taylor & Francis Group.

3AE93 INDUSTRIAL MANAGEMENT

Unit I: Principles and Techniques of Management : Meaning of and differences among business, management, administration and organisation, Principles of management, functions of management, planning, organisation structure and relationships, direction, co-ordination, control, motivation, delegation and decentralisation, communication, leadership and decision making.

Unit II: Market and Materials Management : A) Marketing strategy, market research, consumer behaviour, advertising and sales promotion, channels of distribution, pricing of products.
B) Classes of material, scope of material control, scope of purchasing department, purchasing procedures, order procedures, inventroy control, introduction to production, planning and control.

Unit III: Personnel Management : Meaning and functions of personnel management, recruitment, selection, promotion, wages and salary administration, training and development, functions and scope of trade unions in Indian industries. Welfare of labour, Problems of labour turn over & retention.

Unit IV: Project and Financial Management :
A) Case studies of project report, preparation of profit and loss statement and balance sheet, ratio analysis.
B) Principles of costing, cost sheet preparation, variance analysis, meaning and application of various budgets, types of budgets and their importance.

Unit V: Quality Control :Concept of quality and quality control, elements of quality, factors controlling quality of design and conformance, process control, inspection planning and scheduling, 7QC (Seven Quality Control) techniques, vendor inspection, sampling inspection, sampling plans, Quality audit system.

Unit VI: Quality Management : Concepts and applications of Kaizen, quality circle, ISO 9000 series, just-in-time, quality planning and total quality management, elements of TQM, Quality Circles.

TEXT BOOKS :

1) Koontz H., O'Donnel C. and Whierich : Principles of Management, Tata McGraw Hill Puslishing Co. Ltd., New Delhi.
2) Khanna O.P. : Industrial Engineering and Management.
3) Mody Suresh M. : Total Quality Management, D.L.Shah and Trust, Mumbai
4) Sherlekar S.A. : Business, Organisation and Management, Himalaya Pub. House Ltd., Mumbai.
5) Gupta P.B. & Sharma P.B. : Industrial Management & Managerial Economics, Ratnasagar Pvt. Ltd., New Delhi.
6) Khanka : Entrepreneurial Development, S.Chand & Co., New Delhi.
7) Mahajan S.M. : Statistical Quality Control.

3AE94 IPR AND PATENTS

Unit I: **Introduction to Patents and Other Intellectual Property:** Patent and , Types of Patents, Novelty and Unobvious ness Requirement, Patent Filing Deadlines, The Scope of the Patent, Value of a Patent, Offensive Rights, Alternative and Supplementary Offensive Rights, Intellectual Property, Trademarks , Copyright, Trade Secrets, Various Types of Intellectual Property, Invention Exploitation Flowchart

Unit II: **Documentation and the PPA:** Introduction, Documents Are Vital to the Invention Process, Documentation is Vital to Prove Inventorship, Trade Secret Considerations, Record Conception and the Building and Testing of Your Invention, Record Your Invention, Record Conception or Building and Testing the Invention Disclosure, Provisional Patent Application— A Substitute for Building and Testing.

Unit III: **Patentability:** Patentability Compared to Commercial Viability, Legal Requirements for a Utility Patent, Requirement #1: The Statutory Classes, Requirement #2: Utility, Requirement #3: Novelty, Requirement #4: Unobvious ness, The Patentability Flowchart.

Unit IV: **Specification and Initial Drawings:** What Happens When Your Application Is Received by the PTO, Preliminary Work, Flowchart, Writing Your Patent Specification to Comply With the Full Disclosure Rules, Software, Computer-Related Inventions, and Business Methods, First Prepare Sketches

and Name Parts, Drafting the Specification, Review and Abstract, Checklist, Specification of Sample Patent Application

Unit V: **Marketing Your Invention:** Perseverance and Patience Are Essential, Overview Profit, Your Invention, Demonstrate a Working Model of Your Invention to Potential Customers, Finding Prospective Manufacturers/Distributors, The "NIH" Syndrome, The Waiver and Precautions in Signing It, , Presenting Your Invention by Correspondence, Making an Agreement to Sell Your Invention, Manufacturing and/or Distributing the Invention Yourself .

Unit VI: **Patent Issues: Use, Maintenance, and Infringement:** Issue Notification, Press Release, Check Errors, Patent Number Marking, Advertising, Maintenance Fees, Patent Infringement, Product Clearance, Citing Prior Art Against Patent Applications and Patents, The Court of Appeals for the Federal Circuit (CAFC), Using the Reexamination Process to Reduce the Expense of Patent Infringement Suits, JuryTrials, Arbitration, Tax Deductions and Income, Patent Litigation Financing.

TEXTBOOK: Patent It Yourself, 13th Edition, By Patent Attorney David Pressman, Nolo, 2008

3AE10 INDUSTRIAL VISIT/TOUR

After visiting electronics/instrumentation/allied industry, Every student shall have to submit a detailed report to the department, based on his/her observations about the organization, working, major equipments, software, engineering/technology involved, raw materials/components, products and deliverables, research and development, etc.

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FOURTH SEMESTER

4AE1 MICROWAVE ENGINEERING

Unit I: Microwave tubes: Electromagnetic frequency spectrum, noise in conventional tubes, Two cavity Klystron, Reflex Klystron, Traveling Wave Tube, Magnetron (cylindrical type).

Unit II: Microwave solid state devices: Tunnel diode, negative resistance amplifier, Gunn diode, parametric amplifier, PIN diode, TRAPATT, IMPATT, introduction to MASER.

Unit III: Transmission of microwaves: Rectangular wave guide, TE, TM, wave propagation, cut-off frequency, cut-off wave length, group and phase velocity, wave impedance, Circular wave guide, types of strip lines, strip line characteristics.

Unit IV: Microwave Passive Components: Microwave terminations, Attenuator, Phase shifter, Faraday's rotation, Devices employing faraday's rotation (Isolator and Circulator), Directional couplers, scattering matrix formulation of N-port junction.

Unit V: Microwave Resonator and Filter: Basic RLC resonant circuit (series and parallel), Quality factor, Rectangular cavity resonator and their Q, TEmnp, TMmnp mode propagations, Re-entrant cavity, and Circular cavity resonator.

Unit VI: Microwave communication system: Microwave link carrier chain, Troposphere scatter link using frequency diversity, LOS(Line Of sight)communication system, microwave absorption(Fading), Noise in microwave communication system.

TEXT BOOKS:

1) M.L. Sisodiya and G.S. Raghuwanshi: "Microwave Circuits and Passive devices", (WEL)
2) K.C. Gupta: " Microwave engineering"(WILEY)
3) M. Kulkarni: "Microwave and Radar Engineering" Umesh Publication

REFERENCE BOOKS:

1) Liao, Samual Y. : "Microwave devices & circuits" Tata McGraw Hill Co.Ltd., New Delhi
2) Collin, Robert E.: "Foundations for microwave Engineering" McGraw Hill, New York.
3) Pozar: Microwave Engg, Wiley Eastern

4AE2 OPTICAL FIBER COMMUNICATIONS

Unit I: Optical fiber wave-guide:
Total internal reflection, Snell's law, Theory of circular wave guide, Modes in optical fibers, Single mode fiber, Multimode fiber, N.A., Power flow

Unit II: Transmission Characteristics of Fiber:
Attenuation, Absorption losses, scattering losses, bending losses, dispersion, and intra modal - inter modal dispersion, bandwidth, and nonlinear effects in single-mode fiber.

Unit III: Optical Sources:
Optical emission from semiconductors, LED, efficiency, double hetero junction LED, Basic concept of Lasers, Semiconductor injection lasers.

Unit IV: Optical Fibers:
Manufacturing, fiber splicing and connectors, different manufacturing techniques, different splicing techniques and connectors.

Unit V: Detectors:
Optical detection principle, absorption, quantum efficiency, responsivity, PIN photo diode, APD and noise in photodiode.

Unit VI: Optical Electronic System:
Optical transmitter, receiver, digital system planning consideration, power budgeting coherent and noncoherent systems, modulation demodulation scheme, wavelength division multiplexing.

Text Books:

1. Senior J.M.: "Optical Fiber Communication and Application", Prentice Hall of India Pvt Ltd. New Delhi
2. G.Keiser: "Optical Fiber Communication", Mc-Graw Hill International Book Common. New York
3. R. P. Khare: Fiber Optics and Optoelectronics, Oxford University Press

Reference Books:

1) Gowe : Optical Communication System, Prentice Hall

2) D.K.Mynbaev L.I.Scheiner : Fiber Optic Communication Technology, LPE, Pearson Education

4AE3 **MOBILE COMMUNICATIONS**

Unit I: Introduction to Cellular Mobile System: Evolution of cellular mobile systems (1st, 2nd, 3rd generation), A basic cellular system, cell shape, concept of frequency reuse, hand off strategies, power control operation of cellular systems, Example of cellular calls.

Unit II: Cellular radio system design fundamentals: Frequency assignments, channel assignment strategies, co-channel and non-co-channel interference, cellular system capacity, performance criteria, improving coverage and capacity in cellular system, multiple access schemes.

Unit III: Mobile Radio propagation & Antennas : Radio propagation mechanism, path loss modeling and signal coverage, multi path propagation, fading, Doppler shift, fast and slow fading, control of fading in mobile systems, Antennas at cell site, mobile antenna, diversity.

Unit IV: Digital Cellular Systems: GSM: system architecture, radio subsystem, channel types, frame structure, signal processing in GSM, CDMA (IS 95): frequency and channel specifications, forward & reverse CDMA channel.

Unit V: Cordless systems and WLL: Introduction to cordless systems, CT2 and DECT
standards, DECT architecture, DECT Frame format and radio link, DECT operation.
WLL: role of WLL, propagation considerations for WLL, LMDS and MMDS.

Unit VI: Wireless LAN: Overview of wireless LAN, wireless LAN technologies; infrared, spread-spectrum, narrow band microwave LAN, mobile data networks: CDPD, GPRS, WAP. Bluetooth: overview, radio specification, base band specification, link manager specifications.

TEXT BOOKS:

1) William CY Lee : "Mobile Cellular Telecommunications"(second Edition) McGraw Hill Inc. (1995)
2) Theodore S. Rappaport : "Wireless Communications: Principles & Practice 2nd Edition, Pearson education.

REFERENCE BOOKS:

1) William Stallings: "Wireless Communications and Networks" Pearson Education Asia Publication (2002)
2) K.Pahlavan and P.Krishnamurthy: "Principles of Wireless Networks", Pearson Education Asia Publication (2002)
3) Jochen Schiller: "Mobile Communications", Pearson Education Asia Publication (2002)
4) Andy Dornam : "The Essential Guide to Wireless Communication Applications", Pearson Education Asia Publication.
5) Rajkamal : "Mobile computing " Oxford university press"

4AE4x **PROFESSIONAL ELECTIVE#1**

4AE41 **DSP with TMS 320C54xx**

Unit I: Architectural overview of TMS 320C5X (I):
TMS320 Family overview, History, Development and advantages of TMS320 DSP, Key features of TMS320C5X, Bus structure, CPU, Central Arithmetic Logic Unit, Parallel logic unit, Auxiliary register arithmetic unit, registers in TMS3205X and on chip peripherals of TMS320C5X.

Unit II: Architectural overview of TMS 320C5X (II):
Program controller, Program counter hardware stack, program memory address generation, status and control registers, conditional operations, single instructions repeat functions, block repeat functions, interrupts, reset and power down mode.

Unit III: Pipeline and Memory structure of TMS320C5X:
Pipeline structures, pipeline operations, normal pipeline operations, pipeline operation on branch and subroutine call, pipeline operation on ARAU memory mapped registers, pipeline operation on external memory conflict, Memory space overview, program memory, local data memory, global data memory, input output space, direct memory access, memory management.

Unit IV: Addressing modes in TMS320C5X:
Direct addressing, indirect addressing options, bit reverse addressing, immediate addressing, short and long immediate addressing, dedicated register addressing using contents of BMAR, dedicated register addressing using contents of DBMR, memory map register addressing, circular addressing.

Unit V: Instruction set of TMS320C5X (I):
Accumulator memory reference instructions: ABS, ADCB, ADD, ADDT, AND, BSAR, CRGT, EXAR, LACB, LAMM, NORM, ORB, SAMM, SBB, SFRB, SUB, SUBT, XORB, ZALR, ZAP etc.
Auxiliary register and data memory page pointer instructions:

ADRK, CMPR, LAR, LDP, MAR, SAR, SBRK, LT.

Parallel logic unit (PLU) Instructions: APL, CPL, OPL, SPLK, XPL, LPH

Unit VI: Instruction set of TMS320C5X (II):

TREGO, PREG, AND, MULTIPLY INSTRUCTION: LTA, MAC, MACD, MPY, SPL, SQRS, ZPR, MPYU, SPH, LTD, LTP, etc

Branch and Call Instructions: B, BACC, BANZ, CALA, CALL, INTR, NMI, RET, TRAP, XC, etc.

I/O and Data memory, control instructions: IN, OUT, BLDP, LMMR, BIT, LST, PUSH, POP, RPT, RPTZ, SETC, SST, etc.

Text Book : TMS320C5X User's guide: Texas Instruments Inc.

4AE42 LOW POWER VLSI DESIGN

Unit I: **Need for low power VLSI chips :** Sources of power dissipation on Digital Integrated circuits Emerging Low power approaches Physics of power dissipation in CMOS devices Device & Technology Impact on Low Power Dynamic dissipation in CMOS, Transistor sizing & gate oxide thickness, Impact of technology Scaling, Technology & Device innovation

Unit III: **Low Power Design:** Circuit level: Power consumption in circuits Flip Flops & Latches design, high capacitance nodes, low power digital cells library Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic

Unit IV: **Low power Architecture & Systems:** Power & performance management, switching activity reduction, parallel architecture with voltage reduction, flow graph transformation, low power arithmetic components, low power memory design

Unit V: **Low power Clock Distribution:** Power dissipation in clock distribution, single driver Vs distributed buffers, Zero skew Vs tolerable skew, chip & package co design of clock network

Unit VI: **Algorithm & architectural level methodologies:** Introduction, design flow, Algorithmic level analysis & optimization, Architectural level estimation & synthesis

Textbook:

1) Gary K Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
2) Rabaey, Pedram, "Low power design methodologies" Kluwer Academic, 1997

Reference Book:

1) Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000

4AE43 DIGITAL IMAGE PROCESSING WITH MATLAB

Unit I: Introduction, Background, digital image processing, background on MATLAB and the Image Processing Toolbox , The MATLAB Working Environment

Unit II: Fundamentals, Digital Image Representation, Reading, Displaying and Writing Images, Data Classes, Image Types, Converting between Data Classes and Image Types, Array Indexing, Some important standard arrays, introduction to M-function programming

Unit III: Intensity Transformation an Spatial Filtering, intensity transformation functions, histogram processing and function plotting, spatial filtering, image processing toolbox standard spatial filters.

Unit IV: Frequency domain processing, the 2-D Discrete Fourier Transform, computing and visualizing the 2-D DFT in MATLAB, Filtering in the frequency domain, obtaining frequency domain filters from spatial filters, generating filters directly in the frequency domain, sharpening frequency domain filters

Unit V: Image restoration, a model of the image degradation/ restoration process, noise models, restoration in the presence of noise only- spatial filtering, periodic noise reduction by frequency domain filtering, modeling the degradation function, direct inverse filtering, Wiener filtering

Unit VI: Color image processing, color image representation in MATLAB, converting to other color spaces, the basics of color image processing, color transformations, spatial filtering of color images

Textbook: Digital Image Processing Using MATLAB, Rafael C. Gonzalez, Richard Woods, Steven Eddins, Pearson Education, 2004

4AE44 LAB VIEW BASED VIRTUAL INSTRUMENTATION

Unit I: Virtual Instrumentation: Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming

Unit II: Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming VI programming techniques: VIS and

sub-VIS, loops and charts,

Unit III: Arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web

Unit IV: Data acquisition basics: Introduction to data acquisition on PC, Sampling fundamentals,Input/Output techniques and buses ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements

Unit V : Chassis requirements Common Instrument Interfaces: Current loop, RS 232C/RS485, GPIB Bus Interfaces: USB, PCMCIA, VXI, SCSI, PCI, PXI, Fire wire PXI System controllers, Ethernet control of PXI Networking basics for office & Industrial Applications, VISA and IVI

Unit VI: Toolsets, Distributed I/O modules Application of Virtual Instrumentation: Instrument Control, Development of process database management system, Simulation of systems Using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control

TEXTBOOKS:

1) Gary Johnson, Lab VIEW Graphical Programming, Second edition, McGraw Hill, Network, 1997

2) Lisa K wells & Jeffrey Travis, Lab VIEW for everyone, Prentice Hall, New Jersey,1997

REFERENCE BOOK:

1) Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes, 2000

4AE5x PROFESSIONAL ELECTIVE#2

4AE51 SMART SENSORS

Unit I: **Smart Sensor and the Nature of Semiconductor Sensor Output:** Mechanical-Electronic Transitions in Sensing, Nature of Sensors, Integration of Micromachining and Microelectronics, Sensor Output Characteristics, Wheatstone bridge, Piezoresistivity in Silicon, Semiconductor Sensor Definitions, Static versus Dynamic Operation, Noise/ Interference Aspects.

Unit II: **Sensing Technologies:** Capacitive Sensing, Piezoelectric Sensing, Hall Effect, Chemical sensors, Improving Sensor Characteristics, Digital Output Sensors, Incremental Optical Encoders, Digital Techniques, Low-Power, Low-Voltage

Sensors, Combined Solution: Micromachining and Microelectronics.

Unit III: **Getting Sensor Information into the MCU :** Amplification and Signal Conditioning, Instrumentation Amplifiers, Switched-Capacitor Amplifier , Barometer Application Circuit , 4- to 20-mA Signal Transmitter , Inherent Power-Supply Rejection,Separate Versus Integrated Signal Conditioning , Integrated Passive Elements , Integrated Active Elements , Digital Conversion , A/D Converters , Performance of A/D Converters , Implications of A/D Accuracy and Errors.

Unit IV: **MCUs/DSPs to Increase Sensor IQ :** MCU Control , MCUs for Sensor Interface Peripherals ,Memory , Input/Output , Onboard A/D Conversion , Power-Saving Capability , Local Voltage or Current Regulation , Modular MCU Design , DSP Control , Algorithms Versus Lookup Tables , Techniques and Systems Considerations , Linearization , PWM Control , Autozero and Autorange , Diagnostics , Reducing Electromagnetic Compatibility and Radio Frequency Interference , Indirect (Computed, Not Sensed) Versus Direct Sensing , Software, Tools, and Support , Sensor Integration .

Unit V: **Control Techniques :** Programmable Logic Controllers , Open- Versus Closed-Loop Systems, PID Control , State Machines, Fuzzy Logic , Neural Networks , Combined Fuzzy Logic and Neural Networks ,Adaptive Control ,Observers for Sensing, Other Control Areas , RISC Versus CISC , Combined CISC, RISC, and DSP ,The Impact of Artificial Intelligence .

Unit VI: **Transceivers, Transponders, and Telemetry :** The RF Spectrum, Spread Spectrum, Wireless Data and Communications, Wireless Local Area Networks, FAX/ Modems, Wireless Zone Sensing, Optical Signal Transmission, RF Sensing Surface Acoustical Wave Devices, Radar, Global Positioning System, Remote Emissions Sensing Remote KeylessEntry, Intelligent Transportation System, RF-ID , Other Remote Sensing Measuring RF Signal Strength, Telemetry, RF MEMS.

Textbook: Understanding Smart Sensors, Randy Frank, 2e, Artech House

4AE52 INTRODUCTION TO NANOTECHNOLOGY

Unit I: **Introduction to Nanotechnology:** Nanotechnology – Definition and Examples, Background and Research Expenditures Lessons from Nature (Biomimetics), Applications in Different Fields, Various Issues, Research Training.

Unit II: **Introduction to Carbon Nanotubes:** Structure of Carbon Nanotubes, Synthesis of Carbon Nanotubes ,Growth Mechanisms of Carbon Nanotubes , Properties of Carbon Nanotubes , Carbon Nanotube-Based Nano-Objects , Applications of Carbon Nanotubes.

Unit III: **Nanowires:** Synthesis, Characterization and Physical Properties of Nanowires, Applications, Template-Based Synthesis of Nanorod or Nanowire Arrays: Template-Based Approach, Electrochemical deposition, Electrophoretic Deposition, Template Filling, Converting from Reactive Templates.

Unit VI: **Introduction to Micro/Nanofabrication:** Basic Microfabrication Techniques, MEMS Fabrication Techniques, Nanofabrication Techniques, Nanoimprint Lithography: Emerging Nanopatterning Methods, Nanoimprint Process, Tools and Materials for Nanoimprint, Applications.

Unit V: **Stamping Techniques for Micro- and Nanofabrication:** High-Resolution Stamps , Microcontact Printing , Nanotransfer Printing , Applications , Material Aspects of Micro- and Nanoelectromechanical Systems: Silicon , Germanium-Based Materials ,Metals , Harsh-Environment Semiconductors , GaAs, InP, and Related III–V materials ,Ferroelectric Materials, Polymer Materials, Future Trends.

Unit VI: **Nanorobotics:** Overview of Nanorobotics, Actuation at Nanoscales, Nanorobotic Manipulation Systems, Nanorobotic Assembly, Applications, Packaging and Reliability Issues in Micro/Nano Systems: Introduction to Micro-/Nano-Electromechanical (MEMS)/ (NEMS) Packaging, Hermetic and Vacuum Packaging and Applications, Thermal Issues and Packaging Reliability, Future Trends.

TEXT BOOK:

Bharat Bhushan (Ed.)," Springer Handbook of Nanotechnology",2nd revised and extended edition, 2007

4AE53 **PROGRAMMABLE LOGIC CONTROLLERS**

Unit I: **Programmable logic Controllers:** Introduction, Hardware, Internal architecture, PLC systems, Input devices, Output devices, Examples of applications, Number systems**:** The binary system, Octal and hexadecimal, binary arithmetic, PLC data, Input/output units, Signal conditioning, remote connections, Networks, Processing inputs, I/O addresses.

Unit II: **Ladder and functional block programming:** Ladder diagrams, Logic functions, Latching, Multiple outputs, Entering programs, Function blocks, Program examples, Instruction lists, Sequential function charts, structured text

Unit III: **Programming methods:** IL, SFC and ST, Internal relays**:** Internal relays, Ladder programs, Battery-backed relays, Jump and call: One-shot operation, Set and reset, Master control relay, Jump, Subroutines.

Unit IV: **Timers and counters:** Types of timers, Programming timers, Off-delay timers, Pulse timers, Programming examples, Forms of counter, Programming, Up and down counting, Timers with counters, Sequencer, Shift registers, Ladder programs, Shift registers**:** registers and bits.

Unit V: **Data handling**: Data handling, Arithmetic functions, closed loop control, Program development, Safe systems, Commissioning, Fault finding, System documentation.

Unit VI: **Designing systems:** Temperature control, Valve sequencing, Conveyor belt control, Control of a process.

Textbook: W. Bolton, "**Programmable Logic Controllers",** Fourth Edition Elsevier, 2006

4AE54 **ROBOTICS**

Unit I : Introduction to Robotics: Definition, Brief History, uses of robots Basic principle in robotics, Types of robots, Technology of robotics, notations used in analysis,

Unit II : System modeling and analysis: Position and orientation of rigid bodies, Denavit-Hartenberg Notation, homogenous transformation, forward and inverse position analysis, Block diagram and simulation.

Unit III: Electronics in Robotics: computing elements in robotics, Passive Electrical Components, Active Elements, Analog computer, Timer 555, Analog to digital conversion, Digital to analog conversion, digital computer, architecture ofmicroprocessor, Microcontroller, programmable Logic controller, computer peripheral.

Unit IV: Sensors and transducers: Sensors for motion and position measurement, Force, Toque and Tactile sensors, Temperature sensing devices, Ultrasonic sensors, Range sensors, Sensors for Condition Monitoring, Data acquisition system in robotics, Transducer signal conditioning for data conversion.

Unit V: Actuating Devices: DC servomotor, AC servo Motor, Brushless Permanent Magnet DC, Permanent Magnet stepper motor, Pneumatic, hydraulic and electric actuators, Fluid power actuation, Fluid power design Elements, Piezoelectric Actuators, micro actuator, Drive Selection and Applications.

Unit VI: Case studies: Transportation Bridge surface Materials, Robotic system for automotive Application, Slip casting process, Pick and Place Robot, Cleaning Robot, Lawn-moving robot, Robot in assembly (Puma560),SCARA,Cincinatti Milacron

Text Books:

1) Devdas Shetty, Richard A. Kolk: "Mechatronics System Design", Thomson Brooks/ Cole. Pubs. 2nd edition, 2007

2) Appuu Kuttan K.K.: "Introduction to MECHATRONICS", Oxford university Press, 2007

3) Ashitava Ghosal,"ROBOTICS, fundamental concepts and analysis", Oxford university press, 2008

Reference Book:

1) Bruno siciliano, Oussama Khatib "Springer Handbook on Robotic", Springer, 2008

4AE6 MICROWAVE ENGINEERING AND OPTICAL FIBER COMMUNICATIONS LABORATORY

Minimum 10 experiments based on the syllabus of 4AE1 and 4AE2, that are preferably uniformly distributed over the syllabi of both the subjects.

4AE7 PROFESSIONAL ELECTIVE#1 LABORATORY

Minimum 10 experiments each based on the syllabus of subjects included in 4AE4x, that are preferably uniformly distributed over the syllabus. A student, after choosing any one of the following subjects, has to conduct minimum 10 experiments based on the syllabus. Professional Elective group is comprised of the following subjects.

4AE41 DSP with TMS 320C54xx

4AE42 Low Power VLSI Design

4AE43 Digital Image Processing with MATLAB

4AE44 LabVIEW based Instrumentation

4AE8 PROJECT AND SEMINAR

Project (including 3AE8).The project work should be either hardware and/or software based. A project report should be submitted in three copies. Every student has to submit seminar report and deliver a seminar on advance state-of-the-art topics.

4AE9x FREE ELECTIVE (AUDIT)

4AE91 ENGINEERING ETHICS

Unit I: The importance of ethics in science & engineering. Managing ethical issues, The role of codes of ethics. The person and the virtues: Developing a model for a person, Limitation of the model, Habits and morals. The four main virtues. Real life example

Unit II: Analysing exterior acts: Ethics as a craft, distinguishing exterior & interior morality. Beginning case analysis, Event trees. Analyzing interior Intentions: Describing intention, The importance of intention. Efforts & virtues, the role of benevolence, a real life case.

Unit III: Hierarchy of moral values

Hierarchies of values: Moral and Nonmoral, line drawing, Mathematical Analogies, Ranking of virtues, ethical judgment, Moral judgment: The decisive role of intention, evaluating interior goodness, co-operating in the evil of others, Moral responsibility: factors limiting moral responsibility, degrees of responsibility, the sainthood and devil problems.

Unit IV: Truth: Person to person, truth in actions, truth in words, Harm from deception, harm from withholding truth, whistle blowing, Harm from spreading truth, privacy, Truth, Social. Distinction between science & engineering, Approach to knowledge in technology, intellectual property.

Unit V: Fairness: Person to person, Conflict of interest, qualitative versus Quantitative fairness, Credit or blame in team projects, authorship questions, fairness in supervising, fairness in contracting with clients.Fairness: Social, Intellectual property & the society, environmental issues, experts & paternalism, social aspects of employment.

Unit VI: Resource allocation, Defining safety & risk, evaluating risk, making decisions about risk, dealing with different ethical systems, Habit & intuition.

Text Book:

1) Edmond G. Seebauer : Fundamentals of Ethics for Scientists & Robert L. Barry Engineering Oxfords University Press.

4AE92 ARM SYSTEM DEVELOPMENT AND DESIGN

Unit I: **Introduction to Processor Design:** Processor architecture and organization Abstraction in hardware design MUO, a simple processor Instruction set design, Processor design trade-offs, The Reduced Instruction Set, Computer Design

for low power consumption.

Unit II: **The ARM Architecture:** The Acorn RISC Machine Architectural inheritance The ARM programmer's model ARM development tools.

Unit III: **ARM Assembly Language Programming:** Data processing instructions, Data transfer instructions, Control flow instructions, writing simple assembly language programs.

Unit IV: **ARM Organization and Implementation:**3-stage pipeline ARM organization, 5-stage pipeline ARM organization , ARM instruction execution, ARM implementation ,The ARM coprocessor interface.

Unit V: **The ARM Instruction Set -1:**Introduction, Exceptions, Conditional execution Branch and Branch with Link (B, BL) Branch, Branch with Link and exchange (BX, BLX) Software Interrupt (SWI) Data processing instructions, multiply instructions, Count leading zeros (CLZ - architecture v5T only) Single word and unsigned byte data transfer instructions ,Half-word and signed byte data transfer instructions.

Unit VI: **The ARM Instruction Set -2:**Multiple register transfer instructions, Swap memory and register instructions (SWP) ,Status register to general register transfer instructions, General register to status register transfer instructions, Coprocessor instructions, Coprocessor data operations, Coprocessor data transfers, Coprocessor register transfers, Breakpoint instruction (BRK - architecture V5T only) ,Unused instruction, space Memory faults ,ARM architecture variants.

TEXT BOOK:-

ARM SYSTEM ON-CHIP ARCHITECTURE, Steve Furber

4AE93 CMOS VLSI DESIGN

Unit I: **Introduction:** Basic principle of MOS transistor, Introduction to large signal MOS models (long channel) for digital design

Unit II: **The MOS Inverter:** Inverter principle, Depletion and enhancement load inverters, the basic CMOS inverter, transfer characteristics, logic threshold, Noise margins, and Dynamic behavior, Propagation Delay, Power Consumption

Unit II: **MOS Circuit Layout & Simulation:** MOS SPICE model, device characterization, Circuit characterization, interconnects simulation MOS device layout: Transistor layout, Inverter layout, CMOS digital circuit's layout & simulation.

Unit IV: **Combinational MOS Logic Design:** Static MOS design: Complementary MOS, Ratioed logic, Pass Transistor logic,

complex logic circuitsDynamic MOS design: Dynamic logic families and performances

Unit V: Sequential MOS Logic Design: **Static latches, Flip flops & Registers, Dynamic** Latches & Registers, CMOS Schmitt trigger, Monostable sequential Circuits, Astable Circuits Memory Design: ROM & RAM cells design

Unit VI: Interconnect & Clock Distribution: **Interconnect delays, Cross Talks, Clock Distribution Introduction to low power design, Input and Output Interface circuits BiCMOS Logic Circuits: Introduction, BJT Structure & operation, Basic BiCMOS Circuit behavior, Switching Delay in BiCMOS Logic circuits, BiCMOS Applications**

Textbook:1) Weste and Eshraghian, "Principles of CMOS VLSI design" Addison-Wesley, 2002

Reference books:

1) Kang & Leblebigi "CMOS Digital IC Circuit Analysis & Design"-McGraw Hill, 2003

2) Rabey, "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003

4AE94 REMOTE SENSING AND GIS

Unit I: Concept of remote sensing: Introduction, distance of remote sensing, definition of remote sensing, data, remote sensing process, source of energy, interaction with atmosphere, interaction with target, interaction with the atmosphere again, recording of energy by sensor, transmission, reception and processing.

Unit II: Remote sensing: Interpretation and analysis, applications of remote sensing, advantages of remote sensing, limitations of remote sensing, ideal remote sensing.Remote sensing platforms and sensor characteristics. Introduction, characteristics of images, remote sensing platforms, sensor resolutions.

Unit III: History of remote sensing and Indian space program: Introduction, early age, middle age, space age, photographic imaging- Introduction, digital imaging- Introduction, sensor, PAN Multi spectral imaging, hyper spectral imaging, thermal imaging.

Unit IV: Microwave remote sensing: Introduction, passive microwave remote sensing, active microwave remote sensing, RADAR imaging, GLOBAL POSITIONING SYSTEM-

Introduction, global navigation satellite system, Visual image

interpretation- introduction, information extraction by human and computer.

Unit V: Applications of remote sensing: Introduction, land cover and land used, agriculture, forestry, geology, mapping, oceans and coastal monitoring, monitoring of atmospheric constituents.

Unit VI: Concept of geographic information system: Introduction, definition of GIS, key components of GIS, functions and advantages of GIS, Applications areas. Modern trends of GIS- Introduction, integration of GIS and remote sensing, integration of GIS and multimedia, 3D GIS, 4D GIS and real time GIS, mobile GIS.

Text Book: **B. Bhatta- REMOTE SENSING AND GIS, Oxford university press higher education**

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DIRECTION

No. 24/2010 Date : 24/06/2010

Subject : Examinations leading to the Degree of Master of Science in Applied Electronics (Two-Year Course .... Semester Pattern)

Whereas, Direction No. 13 of 2009 in respect of Examinations leading to the Degree of Master of Science in Applied Electronics (Two-Year Course .... Semester Pattern) is in existence in the University,

AND

Whereas, the Academic Council in its meeting held on 20-02-2010 vide Item No. 16 (6) A) R-1) resolved to accept following addition in the scheme of III Semester M.Sc. (Applied Electronics) after Sr. No. 9 :-

"10. 3 AE 10 Industrial Visit / Tour ----------"

AND

Whereas, the schemes of teaching & examinations of I to IV Semesters Master of Science in Applied Electronics course are required to be regulated by the Regulation,

AND

Whereas, the process of making the Regulation is likely to take some time,

AND

Whereas, the schemes of teaching & examinations of III & IV Semesters Master of Science in Applied Electronics course are to be implemented from the academic session 2010-2011,

AND

Whereas. syllabus for III & IV Semesters Master of Science in Applied Electronics course is to be sent for printing.

Now, therefore, I, Dr. Ku. Kamal Singh, Vice-Chancellor of Sant Gadge Baba Amravati University in exercise of powers confirmed upon me under sub section (8) of Section 14 of the Maharashtra Universities Act, 1994, hereby direct as under :-

1) This Direction shall be called "Examinations leading to the Degree of Master of Science in Applied Electronics (Two-Year Course .... Semester Pattern) Direction, 2010"
2) This Direction shall come into force from the date of its issuance.
3) Following addition be made in the scheme of III Semester M.Sc. (Applied Electronics) after Sr. No. 9 :-

"10. 3 AE 10 Industrial Visit / Tour ----------"

Sd/-
Dr. Kamal Singh
Vice-Chancellor

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