# DEPARTMENT OF ELECTRICAL ENGINEERING

Scheme of Instruction
and
Syllabus of

## B.E. IV YEAR

# ELECTRICAL & ELECTRONICS ENGINEERING

# 2014

UNIVERSITY COLLEGE OF ENGINEERING
(AUTONOMOUS)

OSMANIA UNIVERSITY
Hyderabad – 500 007. Telangana State.

# CONTENTS

With effect from the Academic Year 2014-2015

# Scheme of Instruction & Examination

## B.E. IV YEAR (EEE) SEMESTER – I

| S.No. | Code No. | Subject | Scheme of Instruction | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L/T | D/P | Duration in Hours | Maximum Marks | | |
| | | | | | | Univ. Exam | Sessional | |
| | | THEORY | | | | | | |
| 1. | EE 401 UE | Utilization of Electrical Energy | 4 | - | 3 | 75 | 25 | 4 |
| 2. | EE 402 UE | Power System Operation and Control | 4 | - | 3 | 75 | 25 | 4 |
| 3. | EE 403 UE | Electrical Machine Design | 4 | - | 3 | 75 | 25 | 4 |
| 4. | EE 404 UE | Electric Drives and Static Control | 4 | - | 3 | 75 | 25 | 4 |
| 5. | | Elective – II | 4 | - | 3 | 75 | 25 | 4 |
| 6. | CM371 UE | Managerial Economics and Accountancy | 4 | - | 3 | 75 | 25 | 4 |
| | | PRACTICALS | | | | | | |
| 1. | EE 431 UE | Electrical Simulation Lab | - | 3 | 3 | 50 | 25 | 2 |
| 2. | EE 432 UE | Microprocessor and Microcontrollers Lab | - | 3 | 3 | 50 | 25 | 2 |
| 3. | EE 433 UE | Project Seminar | - | 3 | - | 50 | 25 | 2 |
| 4. | SI 400 UE | Summer Internship | - | - | - | - | *Grade | 2 |
| | | **Total** | **24** | **9** | | **550** | **225** | **32** |

**Excellent/Very Good/Good/Satisfactory/Unsatisfactory*

**NOTE: Summer Internship (6-Weeks) is after III/IV II-Semester. Grade will be awarded in IV/IV I-Semester.**

**ELECTIVE – II**

1. EE 405 UE Optimization Techniques
2. EE 406 UE Advanced Microprocessors
3. BM 406 UE Medical Instrumentation
4. CS 408 UE Data Base Systems
5. EC 422 UE Microcontrollers & RTOS
6. EC 423 UE VLSI Technology
7. ME 409 UE Entrepreneurship
8. ME 412 UE Finite Element Analysis

With effect from the Academic Year 2014-2015

# Scheme of Instruction & Examination

## SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

### B.E. IV YEAR SEMESTER – I

| S.No. | Code No. | Subject | Scheme of Instruction | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L/T | D/P | Duration in Hours | Maximum Marks | | |
| | | | | | | Univ. Exam | Sessional | |
| | | THEORY | | | | | | |
| 1. | EE 405 UE | Optimization Techniques | 4 | - | 3 | 75 | 25 | 4 |
| | | Total | 4 | - | | 75 | 25 | 4 |

Note: A student shall get minimum pass marks of 40% in the University Examination independent of Sessional marks. However, the Sessional and University exam marks of this subject will not be counted for the award of degree.

With effect from the academic year 2014-2015

EE 401 UE

# UTILIZATION OF ELECTRICAL ENERGY

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To introduce the students and understand Utilization of electrical energy for various applications like industrial heating, welding etc.,
- To understand the concept of illumination, and know the applications of various lamps to factory lighting, street lighting etc.
- To understand the concept of electrification of traction system.

UNIT I

**Industrial Heating:** Advantages and methods of electric heating. Description, operation and performance of resistance ovens — Design of elements. Core type, Coreless type furnaces, High frequency eddy current heating, Dielectric heating. Arc furnace. Electric welding, Resistance welding, welding transformer and its rating, various types of Electric arc welding and electric resistance welding.

UNIT II

Schematic Utilization and Connection Diagrams for Motor Control: Two supply sources for 3 phase Induction motors. Direct reversing, remote control operation, and jogging operating of Induction motor. Contactor control circuit. Push button control stations. Over load relays, limit switches, float switches. Interlocking methods for reversing control.

UNIT III

**Illumination:** Introduction, nature and production of light, Sensitivity

of the eye, Units of light. The inverse square law and cosine law, Solid angle, Lighting calculations — Determination of M.S.C.P, Rousseau's construction, Discharge lamps, Sodium vapour lamps, Mercury vapour lamps — Fluorescent lamp, Starting and power factor corrections, Stroboscopic effects — Neon signs, Application to factory lighting, Street lighting and Flood lighting.

## UNIT IV

**Electric Traction:** System of Electric Traction — Transmission of drive — Systems of track electrification — Traction mechanics — Speed time curves — Tractive effort — Power of Traction motor — Specific energy consumption — Mechanics of train movement— Coefficient of adhesion.

**Traction Motors:** Desirable characteristics, d.c series motors, a.c series motors, 3-phase induction motors, d.c motor series & parallel control, Energy saving.

## UNIT V

**Train Lighting:** Systems of train lighting – Special requirements of train lighting – Methods of obtaining unidirectional polarity – Methods of obtaining constant output – Single battery system – Double battery parallel block system – Principal equipment of double battery system – Coach wiring – Dynamo.

**Batteries:** Lead acid batteries, SMF batteries, Construction and maintenance, Charging and rating of batteries.

## Suggested Reading:


1. Partab H, *Art and Science of Utilization of Electric Power*, Dhanpat Rai & Sons, 1997.
2. K.B. Raina & S.K. Bhattacharya, *Electrical Design, Estimating and Costing*, Wiley Eastern Ltd., 1991.
3. Partab H, *Modern Electric Traction*, Dhanpat Rai & Sons, 2000.
4. B.L.Theraja, *A Text Book of Electrical Technology*, S.Chand & Company Ltd, Vol –I.

With effect from the academic year 2014-2015

EE402 UE

# POWER SYSTEM OPERATION AND CONTROL

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

## Course Objectives:

- To understand the concepts and Importance of Load flow studies, Economic Operation of thermal power units, frequency control of inter connected Power System Networks.
- To make the students understand about reactive Power Control and Stability of Power System Networks.

### UNIT I

Introduction. Formulation of Y bus for a system, Gauss Seidel, Newton Raphson, Decoupled and Fast decoupled methods of load flow analysis. Comparison of methods.

### UNIT II

**Economic operation of Power System:** Input output curves — Heat rates and incremental cost curves — Equal incremental cost criterion and economic operation neglecting transmission losses. $B_{mn}$ coefficients, economic operation including transmission losses.

### UNIT III

**Load Frequency Control:** Governor Characteristics — Regulation of two generators in parallel — concept of control area — incremental power balance of a control area —single area control. Flat Frequency control — Flat tie line frequency control—Tie line bias control. Advantages of pool operation — Development of model for two area control.

### UNIT IV

**Real & Reactive Power Control:** System voltage and reactive

power. Effect of synchronous machine excitation, automatic voltage regulators, FACTS Controllers - SVC, TCSC, STATCOM, Phase shifting transformers.

## UNIT V

**Power System Stability:** Steady State Stability, Dynamic Stability, Transient Stability — the Swing equation — Equal area criterion — Application of equal area criterion — Step-by-Step solution of the swing equation —factors affecting transient stability, Introduction to voltage stability.

## Suggested Reading:


1. C.L.Wadhwa, *Electric Power Systems*, New Age International (P) Ltd., Third Edition 2002.
2. Nagrath and Kothari, *Electrical Power Systems*, Tata McGraw Hill Co., Third Edition, 2004.
3. Elgerd O, *Electric Energy System Theory*, McGraw Hill, 1971.
4. Hingorani, *Understanding FACTS*, Standard Publishing, New Delhi, 2000.
5. Hadi Saadat – *Power System Analysis*, Tata McGraw-Hill Edition, 2002.

With effect from the academic year 2014-2015

EE403 UE

# ELECTRICAL MACHINE DESIGN

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To Study the Qualitative & Quantitative analysis of magnetic circuit design, Electrical Circuit Design and Thermal Circuit Design of Electrical Machine.
- To understand the Design and analysis of different types of windings used for DC/AC machines.
- To understand the Design principles of different rotating machines can be studied.

UNIT I

**Electrical Engineering Materials:** Insulating materials: Properties of ideal insulating materials. Classification and types of insulating materials, Gaseous, liquid, Solid, fibrous and mineral insulating materials, Plastic, glass and ceramic materials. Conducting Materials: General properties materials. Super conductors. Magnetic Materials: Classification of magnetic materials, Soft and hard magnetic materials, sheet, cold rolled steel, solid core and powder core materials.

UNIT II

**Magnetic Circuit:** Basic principles, magnetic circuit calculation flux density in air-gap and tooth. Carter's coefficient, ampere turns for gap and teeth, real and apparent flux density, magnetic leakage, leakage flux from salient poles, field distribution curves, field turns, armature reaction ampere turns. Reluctance of rectangular slots.

UNIT III

**Electrical Circuit:** AC Single phase, three phase windings. Mesh and concentric winding, Double layer winding.

**Thermal Circuit:** Types of enclosures, ventilating and cooling methods in Electrical machines — Losses. Temperature rise time curve and cooling curve. Rating of Electrical Machines, Calculation for quantity of cooling medium.

## UNIT IV

Transformer Design — Main Dimensions — Output Equation — Core Design — Cooling System Design. Design Principles of rotating machines: Output equation and main dimensions, definition of magnetic loading and electrical loading, design of slot field coils, estimation of air-gap length.

## UNIT V

**Computer Aided Design:** Introduction, Advantages of digital Computers: Computer aided design — different approaches: Analysis method, Synthesis method, Hybrid method, Optimization, General Procedure for Optimization, variable constraints, Computer aided design of 3 phase Induction motor. List of symbols used General Design Procedure.

## Suggested Reading:


1. A.K. Sawhney, *A Course in Electrical Machines Design*, Dhanpat Rai and Sons, 1996.
2. R.K. Agarwal, *Principles of Electrical Machine Design*, ESS Kay Publications, Naisarak, New Delhi, 1994.
3. V.N.Mittal, *Design of Electrical Machines*, Standard Publishers and Distributors, New Delhi, 1992.

With effect from the academic year 2014-2015

**EE 404 UE**

# ELECTRIC DRIVES AND STATIC CONTROL

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To study the concepts of stability, characteristics and braking methods of DC & AC motion.
- To determine the rating of motors based on heating effects and load conditions.
- To study the static control methods of DC motor, induction motor and synchronous motor.

UNIT I

**Electric Drives:** Concept and classification Dynamics of Electrical Drives: Types of loads, Torque characteristics of load. Characteristics of Motor - Load combination, Dynamics of Motor - Load combination. Steady - State and Transient stability of Electric Drive. Characteristics of Electric Drives: Modified Speed - Torque characteristics of D.C. Shunt motors, D.C series motors and Induction motors.

UNIT II

**Starting of Electric Motors:** Methods of Starting Electric Motors, Acceleration time, Energy relations during starting, D. C Shunt & Series motors and Induction motors. Methods to reduce the energy loss during starting.

**Electric Braking:** Types of Braking - Braking of D.C and A.C motors. Energy relation and Dynamics of Braking.

**Rating of Motors:** Heating effects - Load conditions and classes of duty. Determination of power rating. Effect of load inertia and load equalization.

## UNIT III

**D.C motor control:** Single-phase controlled rectifier and Chopper circuit arrangement for Continuous armature current operation. Dual converter control, Circulating current and Non - Circulating current modes of operation, Principles of closed loop control for D.C drives.

## UNIT IV

**Induction Motor Control:** Speed control of 3 phase Induction motor with A.C voltage regulators, Voltage sources inverters and Cyclo - converters, Static rotor resistance control, Slip power recovery schemes: Static Krammer drive and Scherbius drive, Variable frequency drives.

## UNIT V

**Synchronous Motor Control:** Self controlled and separately controlled synchronous motors, linear induction motors, Permanent magnet synchronous motor drives and Applications.

## Suggested Reading:


1. S.K. Pillai, *A First Course in Electrical Drives*, New Age International (P) Limited, Publishers, 2000.
2. M.D.Singh and K.B. Khanchandani, *Power Electronics*, Tata McGraw Hill Publishing Company Ltd., 2000.
3. Bimal. K. Bose, *Modern Power Electronics and AC Drives*, Pearson Education Asia, 2002.

With effect from the academic year 2014-2015

EE 405 UE

# OPTIMIZATION TECHNIQUES
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To understand the importance of optimization techniques, formulation of optimization problems.
- To make the students understand about linear and non linear optimization techniques and apply them for different engineering applications.

UNIT I

**Introduction to Classical Optimization Techniques:** Statement of optimization problem, Objective function, Classification of optimization problems.

**Classical optimization techniques:** Single-variable and Multi-Variable optimization without constraints. Multi-Variable optimization with equality constraints. Lagrange multiplier method, Multi-Variable optimization with inequality constraints, Kuhn-Tucker conditions.

UNIT II

**Linear Programming:** Standard form, Formulation of the LPP, Solution of simultaneous equations by pivotal condensation, Graphical methods, Simplex algorithm, Big M method, two phase Simplex method, Duality principle, Dual Simplex method.

UNIT III

**Non-linear Programming:** One-dimensional search methods. Fibonacci method, Golden section method. Direct Search method: Univariate Search and Pattern Search methods, Powell's method.

UNIT IV

**Gradient Method:** Steepest Descent, Conjugate Gradient and Quasi-Newton methods, Fletcher-Reeves method of Conjugate gradients.

UNIT V

**Dynamic Programming:** Multistage design process, Types, Principle of optimality, Computational procedure in Dynamic programming, Examples using Calculus method and Tabular method of solutions.

**Suggested Reading:**


1. S.S. Rao, *Optimization Theory and Application*, New Age International, 3rd Edition, 1998.
2. Jasbir S. Arora, *Introduction to Optimum Design*. McGraw Hill International Edition, 1989.
3. S.D Sharma, *Operational Research*, Kedarnath Ramnath & Co., 2004.

EE 406 UE

# ADVANCED MICROPROCESSORS

## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

Microprocessor Chronology, General structure of advanced microprocessors. General block diagram. Bus interface and Execution units. Memory management and control units. Prefetch and instruction queue. Pipe lining Pipe line hazards, Microprocessor Caches, Instruction set, Data formats, Instruction formats, Addressing modes.

### UNIT II

**Memory Hierarchy:** Register File, Cache Memory Mapping, Design Considerations, Virtual Memory and paging, Segmentation. The Instruction Pipeline, Pipeline Hazards, Instruction Level Parallelism, Reduced Instruction Set Computer Principles, RISC Versus CISC, RISC Properties, RISC Evaluation, on chip Register. File Versus Cache Evaluation, Overview of RISC development and current systems.

### UNIT III

The Intel x86 family, 8086, 80186, 8088, 80188, 80286, 8087, Architecture, Integer and floating points units, Register sets. Data formats. Addressing modes. Instruction sets and assembly directives, simple assembly programming.

### UNIT IV

Interrupt Segmentation, Paging, Real and Virtual Mode Execution, Protection Mechanism, Disk Management.

### UNIT V

The Pentium Processor: Block Diagram, Pentium Pipeline, Interior

Pipeline. Super Scalar Execution, Floating point Pipeline, Pin Functional Grouping, Addressing 32, 16 & 8 bit Memories, System Development Microcomputer Development Cycle, Microprocessor Development system (MDS), MDS ICE prototype interface, Prototype development process Example of an available &development system for Pentium Processor, Debug Port.

**Suggested Reading:**


1. Douglas V.T. Hall, *Microprocessors and Interfacing, Programming and Hardware*, Tata McGraw Hill 2nd Edition, 1999.
2. Barry B. Brey. *The Intel Microprocessors*, Prentice Hall India, 4th Edition, 1998.

With effect from the academic year 2014-2015

BM 406 UE

# MEDICAL INSTRUMENTATION
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**UNIT I**

Origin of bio-potentials — ECG, EEG, EMG, EOG, ENG, ERG, EGG. Bio-potential Electrodes: Half cell potential, offset voltage. Types of External, Internal and Micro electrodes. Electrochemical transducers. Potentiometric sensors, Ampero-metric sensors, Electrochemical gas sensors. Biosensors — Enzyme—based biosensors, immuno sensors, microbial sensors.

**UNIT II**

Medical display devices and recorders. Basic requirements for the display and recording of bio-potential signals. PMMC writing systems, General features of ink-jet, thermo-sensitive and optical recorders, Oscilloscopes - Medical, multi-beam & non-fade display systems.

**UNIT III**

Analytical Instrumentation. Methods of Chemical analysis, Absorption Photometry; Emission photometry; Fluorometry, Chromatography for blood gas analysis, Colorimeters, Spectrophotometers, Electrophoresis, auto analyzer.

**UNIT IV**

**ECG:** Block diagram & circuits, electrode placement, lead configuration, Types of ECG Recorders. Blood pressure measurement: Direct and indirect methods. Blood flow measurement: Electromagnetic & Ultrasonic techniques. Heart sounds: Origin, Phonocardiography.

## UNIT V

EEG – Block diagram & circuits, electrode placement. Evoked potentials and their measurement. EMG-Block diagram & circuits, electrode placement, Nerve conduction velocity determination, EMG stimulators.

### Suggested Reading:


1. John G. Webster, *Medical Instrumentation-Application and Design*, John Wiley and Sons Inc., 3rd Edition, 2003.
2. Khandpur R.S., *Hand Book of Biomedical Instrumentation*, Tata McGraw Hill Pub Co. Ltd., 2nd Edition, New Delhi, 2003.
3. Joseph J. Carr and John M. Brown. *Introduction to Biomedical Equipment Technology*, Pearson Education, 2001.

With effect from the academic year 2014-2015

CS 408 UE

# DATA BASE SYSTEMS
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

**Data and Data Management:** Role of Data and Databases. Database and Database Management system: Key Database concepts- Basic Database Models-Database Components.

**Data Modeling:** Database Design – Relational Database Models– Relationships – Comparing Data models.

### UNIT II

**SQL language:** SQL features- command basics- SELECT Fundamentals – Operators and Functions – DDL Commands – DML Commands.

**Data Access and Manipulation:** SELECT statement Advanced Syntax – Joins and Sub Queries.

**SQL Procedures:** SQL procedures and Functions – Triggers.

### UNIT III

**Designing a Database:** Designing Relational Tables - Comparing Relational Designs -Normalizing Data.

**Implementing a Database:** Physical Design and Implementation– Adjusting Design to the Real World – Implementing Database Objects.

### UNIT IV

**Improving Data Access:** Performance Rollbacks – Using Indexes and Views – Using Programmable objects. Database Administration: Need for Administration – Administration Responsibilities – Management Task.

## UNIT V

**Transactions and Locking:** Transaction Basics – Managing Concurrency control – SQL server transaction management.

**Database Access and Security:** Database Connections – Managing Access Control – Protecting data.

## Suggested Reading:


1. Mark L.Gillenson, Paulraj Ponniah.., "*Introduction to Database Management*", John Wiley & Sons Ltd, 2008.
2. Lee Chao, "*Database Development and Management*", Auerbach Publications, 2006.
3. Rob Coronel, "*Database Systems: Design, Implementation & Management*" Thomson Course Technology, 2000.

With effect from the academic year 2014-2015

EC 422UE

# MICROCONTROLLERS AND RTOS

## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

**8086 Microprocessor:** Architecture, Minimum and Maximum Mode, Addressing Modes, Instruction Set, Bus Cycle, Segmented Memory, Machine Cycle and Timing Diagrams, Programming. Introduction to 32-Bit Microprocessors.

### UNIT II

**8051 Microcontroller:** Architecture, Internal and External Memories, Counters and Timers, Register set, Synchronous and Asynchronous Serial Communication, Interrupts, Instruction Set, Basic Assembly Language Programming in 8051 Microcontroller.

### UNIT III

**PIC Microcontroller:** Architecture, Memory organization, Interrupts and Reset, Input and Output Ports, Timers, Synchronous and Asynchronous Serial Communication.

### UNIT IV

**Rabbit 3000 Microprocessor:** Introduction to Rabbit 3000 Microprocessor, Instruction Set, Interrupts Overview: Interrupts Details, Writing an Interrupt Service, Routine Polled Vs Interrupt Driven Serial Communication, Multitasking: Cooperative-Multitasking, Preemptive Multitasking, Programming in Dynamic C.

### UNIT V

**Real-Time Operating System concepts:** Architecture of Kernel, Tasks and Task Scheduler, Tasks States, Content Switching,

Scheduling Algorithms, Rate Monotonic Analysis, Task Management Function Calls. Interrupts, Service Routines, Semaphores, Priority Inversion, Problem, Operating Systems: QNX Neutrino. VX Works. Micro C Operating Systems: II, RT Linux.

**Suggested Reading:**


1. Kenneth J. Ayala, *The 8051 Microcontroller-Architecture, Programming and Applications*, 2nd Ed. Penram International Publishing, 2005.
2. D.V.Hall, *Microprocessors and Interfacing, Programming and Hardware*, Tata McGraw Hill, 1999.
3. Kamal Hyder & Bob Perrin, *Embedded Systems Design Using The Rabbit 3000 Microprocessor*, Tata McGraw Hill, 1999.
4. Dr. K.V.K. K. Prasad, *Embedded / Real Time Systems: Concepts, Design and Programming*, Dreamtech Press, 2004.
5. R.Barnett, L.O'CULL and S.Cox, *Embedded C Programming and Microchip PIC*, Thomson Learning, 2004.

With effect from the academic year 2014–2015

EC 423 UE

# VLSI TECHNOLOGY
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**UNIT I**

Overview of CMOS & BICMOS technologies, MOS & BICMOS Transistor Models, IC fabrication, MOS inverter characteristics.

**UNIT II**

IC Layout Design of basic structures & simulation, static MOS Gate circuits.

**UNIT III**

**Subsystem Design:** Arithmetic circuits in CMOS and ROM, SRAM & DRAM Arrays.

**UNIT IV**

**Process Technology - I:** Crystal growth & wafer Preparation, Epitoxy, Oxidation and Lithography, Etching.

**UNIT V**

**Process Technology-II:** Polysilicon Film Deposition, Diffusion, Ion implantation and Metallization VLSI Process Integration-CMOS IC technology.

**Suggested Reading:**


1. David Hodges, Horace G Jackson & Resve A Saleh, *Analysis and Design of Digital Integrated Circuits in Deep Submission Technology*, 3rd edition, TMH, 2005.
2. John P.Uymera, *Introduction to VLSI circuits & Systems*, John Wiley & Sons 2002.
3. JM Rabacy, Achandra Kasan and B.Nikahe, *Digital Integrated Circuits — A Design Perspective*, 2nd Edition, PHI 2003.
4. S.M.SZE, *VLSI Technology*, 2nd edition, Mc Graw Hill Company, 1988.

ME 409 UE

# ENTREPRENEURSHIP
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

Indian Industrial Environment— Competence, Opportunities and Challenges, Entrepreneurship and Economic growth, Small Scale Industry in India, Objectives, Linkage among small, medium and heavy industries. Types and forms enterprises.

### UNIT II

Identification and characteristics of entrepreneurs, Emergence of First generation entrepreneurs, environmental influence and women entrepreneurs. Conception and evaluation of ideas, their sources and decision making. Choice of Technology — Collaborative interaction for Technology development.

### UNIT III

Project formulation, analysis of marked demand, demand supply gap, financial and profitability analysis and technical analysis. Project financing in India.

### UNIT IV

Project Management during construction phase, project organization, project planning and control using CPM-PERT techniques. Human aspects of project management. Assessment of tax burden.

### UNIT V

**Behavioral Aspects of Entrepreneurs:** Personality — determinants, attributes and models, Leadership concepts and

models. Values and attitudes. Motivation aspects, change behavior. Time Management: Various approaches of time management, their strengths and weaknesses. The urgency addiction and time management matrix.

**Suggested Reading:**


1. Vasant Desai, *Dynamics of Entrepreneurial Development and Management*, Himalaya Publishing House, 1997.
2. Prasanna Chandra, *Project— Planning, Analysis, Selection, Implementation and Review*, Tata McGraw-Hill Publishing Company Ltd., 1995.
3. B. Badhai, *Entrepreneurship for Engineers*, Dhanpath Rai & Co., Delhi, 2001.
4. Stephen R. Covey and A. Roger Merrill, *First Things First*, Simon and Schuster, 2002.
5. Robert D. Hisrich and Michael P. Peters, *Entrepreneurship*, Tata McGraw Hill Edition, 2002.

With effect from the academic year 2014-2015

ME 412 UE

# FINITE ELEMENT ANALYSIS
## (ELECTIVE–II)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

Introduction to Finite Element Method for solving field problems. Stress and Equilibrium. Boundary conditions. Strain-Displacement relations. Stress-strain relations.

**One Dimensional problems:** Finite element modeling coordinates and shape functions.

**Potential Energy approach:** Assembly of Global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions. Quadratic shape functions.

### UNIT II

**Analysis of trusses and frames:** Element stiffness matrix for a truss member. Analysis of plane truss with number of unknowns not exceeding two at each node. Analysis of frames with two translations and a rotational degree of freedom at each node.

**Analysis of Beams:** Element stiffness matrix for two nodded, two degrees of freedom per node beam element.

### UNIT III

Finite element modeling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions.

Finite element modeling of Axisymmetric solids subjected to Axisymmetric loading with triangular elements.

### UNIT IV

Two dimensional four nodded isoparametric elements and numerical integration.

**Steady state heat transfer analysis:** One dimensional analysis of a fin and two dimensional analysis of thin plate. Analysis of a uniform shaft subjected to torsion.

## UNIT V

**Dynamic Analysis:** Formulation of finite element model, element matrices, evaluation of Eigen values and Eigen vectors for a stepped bar and a beam.

**Time dependent field problems:** Application to one dimensional heat flow in a rod. Finite element formation to three dimensional problems in stress analysis.

Convergence requirements and geometric isotropy, Local, natural and global coordinates. Introduction to Finite Element Analysis Software.

## Suggested Reading:


1. Tirupathi R. Chandraputla & Ashok. D. Belegundu, *Introduction to Finite Elements in Engineering*, Pearson Education, 2002. 3rd Edition.
2. Rao S.S., *The Finite Element Methods in Engineering*, Pergamon Press, 1989.
3. Segerlind. L.J., *Applied Finite Element Analysis*, Wiley Publication. 1984.
4. Reddy J.N., *An Introduction to Finite Element Method*, McGraw-Hill Company, 1984.

With effect from the academic year 2014-2015

CM 371 UE

# MANAGERIAL ECONOMICS AND ACCOUNTANCY

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

## UNIT I

**Introduction to Economics and its Evolution:** Managerial Economics its scope, importance and relation to other sciences, its usefulness to engineers – Basic concept of Managerial economics.

## UNIT II

**Demands:** Analysis – concept of demand, determinants, law of demand, its assumption, elasticity of demand, price, income and cross elasticity, demand forecasting – markets competitive structures, price-output determination under perfect competition and Monopoly. (theory questions and small numerical problems can be asked).

## UNIT III

**Theory of Production:** Firm and industry – production function – input out relations – laws of returns – internal and external economics of scale cost analysis – Cost concepts - fixed and variable costs – explicitly and implicitly costs – out of pockets costs and imputed costs – opportunity cost – cost output relationship – break – even analysis. (Theory and problems)

## UNIT IV

**Capital management:** Significance, determinates and estimation of fixed and working capital requirements, sources of capital. Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems.

(Theory questions and numerical problems on estimating working

capital requirements and evaluation of capital budgeting opportunities can be asked).

UNIT V

**Book-keeping**: Principles and significance of double entry book keeping, journal, subsidiary books, ledger accounts, trial balance concept and preparation of final accounts with simple adjustments – analysis and interpretation of financial statements through ratios.

(Theory questions are numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios).

**Suggested Reading:**


1. Varshney RL and KL Maheswari, *Managerial Economics*, Sultan Chand.
2. JC Pappas and EF Brigham, *Managerial Economics*.
3. Grawal T.S. *Introduction to Accountancy*.
4. Maheswari S.N. *Introduction Accountancy*.
5. Panday I.M. *Financial Management*.

EE 431 UE

# ELECTRICAL SIMULATION LAB

| | | |
|---|---|---|
| Instruction | : | 3 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 50 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

Simulation experiments should be conducted in the following areas using MATLAB / Simulink (with DSP Tool Box, Control System Tool Box & Power System Tool Box) PSpice / PSCAD / SABER / EDSA/ MOTORPRO / CASPOC / PSSE.

1. Verification of Network theorems
   i. Thevinin's theorem
   ii. Superposition theorem
   iii. Maximum power transfer theorem.
2. Transient responses of Series RLC, RL and RC circuits with Sine and Step inputs.
3. Series and Parallel resonance.
4. Bode plot, Root-Locus plot and Nyquist plot.
5. Transfer function analysis (i) Time response for Step input (ii) Frequency response for Sinusoidal input.
6. Design of Lag, Lead and Lag - Lead compensators.
7. Load flow studies.
8. Fault analysis.
9. Transient stability studies.
10. Generation of Basic signals using DSP.
11. Calculation of DFT using different methods.
12. Design of filters (Low pass filter).
13. Chopper fed dc motor drives.
14. VSI /CSI Fed induction motors drives. Doubly fed Induction motor, PWM.
15. Phase Control / Chopper control on DC motor Drives.
16. Control of BLDC motor.

**Note**: At least ten experiments should be conducted.

With effect from the academic year 2014-2015

**EE 432 UE**

# MICROPROCESSOR AND MICROCONTROLLERS LAB

| | | |
|---|---|---|
| Instruction | : | 3 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 50 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**List of Experiments:**

**For 8086:**

1. Programs for signed/unsigned multiplication and division.
2. Programs for finding average of N-16 bit numbers.
3. Programs for finding largest number in array.
4. Programs for code conversion like BCD numbers into 7-Segment.
5. Programs for computing factorial of appositive integer number.
6. 8279 – Keyboard display: write a small program to display a string of characters.
7. 8255 - PPI: Write ALP to generate triangular wave using DAC.
8. 8253 – Timer/counter: Application of different modes.
9. 8251-USART: Write a program in ALP to establish communication between two processors.
10. Traffic signal controller.

**For 8051:**

1. Data transfer – block move, exchange, sorting, finding largest element in array.
2. Arithmetic instructions: multi byte operations.
3. Boolean & logical instructions (Bit manipulations).
4. Programs to generate delay, programs using serial port and on chip timer/counter.
5. Use of JUMP and CALL instructions.
6. Square wave generation using timers.
7. Interfacing of keyboard and 7-segment display module.
8. ADC interfacing for temperature monitoring.
9. DAC interfacing for generation of sinusoidal wave.
10. Stepper motor control (clock wise, anticlockwise and in precise angles).

**Note**: At least ten experiments should be conducted.

With effect from the academic year 2014-2015

**EE 433 UE**

# PROJECT SEMINAR

| | | |
|---|---|---|
| Instruction | : | 3 Periods per week |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

The Objective of the project seminar is to actively involve the students in the initial work required to undertake the final year project. It may comprise of:

- Problem definition and specification laying
- A broad understanding of the available techniques to solve a problem of interest
- Presentation (Oral and Written) of the project to be undertaken.

The Department can initiate the work related to project allotment at the end of III year II Semester and complete it in the first two weeks of the IV year I Semester.

First 4 weeks of IV year I semester will be spent on special lectures by faculty members, research scholars and PG students of the department and by speakers from Industries and R & D institutions. The objective of these talks is to expose students to real life/practical problems, and methodologies to solve them.

A Seminar schedule will be prepared by the coordinator for all the students. It should be from the 5th week to the last week to the semester and should be strictly adhered to.

Each student will be required to:

1. Submit a one page synopsis of the seminar to be delivered for display on notice board.
2. Give a 20 minutes presentation followed by 10 minutes discussion.
3. Submit a technical write up on the talk delivered.

At least two teachers will be associated with the evaluation of the project seminar for the award of the Sessional marks, which should be on the basis of performance on all three items stated above.

**Note**: Three periods will be assigned to each project guide.

With effect from the Academic Year 2014-2015

# Scheme of Instruction & Examination

## B.E. IV YEAR (EEE) SEMESTER – II

| S.No. | Code No. | Subject | Scheme of Instruction | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L/T | D/P | Duration in Hours | Maximum Marks | | |
| | | | | | | Univ. Exam | Sessional | |
| | | **THEORY** | | | | | | |
| 1. | ME 471 UE | Industrial and Financial Management | 4 | - | 3 | 75 | 25 | 4 |
| 2. | | Elective – III | 4 | - | 3 | 75 | 25 | 4 |
| 3. | | Elective – IV | 4 | - | 3 | 75 | 25 | 4 |
| | | **PRACTICALS** | | | | | | |
| 1. | EE 481 UE | Power Systems Lab | - | 3 | 3 | 50 | 25 | 2 |
| 2. | EE 482 UE | Project | - | 6 | Viva Voce | Grade* | 50 | 12 |
| 3. | EE 483 UE | Seminar | - | 3 | - | - | 25 | 2 |
| | | **Total** | **12** | **12** | | **275** | **175** | **28** |

**ELECTIVE – III**

1. EE 451 UE Reliability Engineering
2. EE 452 UE HVDC Transmission
3. BM 452 UE Medical Image Processing
4. CS 459 UE Information Security
5. EC 465 UE Embedded System Design
6. ME 455 UE Composite Materials

**ELECTIVE – IV**

1. EE 453 UE Advanced Control System
2. EE 454 Electrical Distribution Systems
3. BM 454 UE Bio-Electricity
4. ME 460 UE Robotics
5. LA 454 UE Intellectual Property Rights
6. CE 461 UE Disaster Management
7. CS 458 UE Data Mining

**Excellent / Very Good / Good / Satisfactory / Unsatisfactory.*

With effect from the Academic Year 2014-2015

# Scheme of Instruction & Examination
## SERVICE COURSES OFFERED TO OTHER DEPARTMENTS

### SEMESTER – II

| S.No. | Code No. | Subject | Scheme of Instruction | | Scheme of Examination | | | Credits |
|---|---|---|---|---|---|---|---|---|
| | | | L/T | D/P | Duration in Hours | Maximum Marks | | |
| | | | | | | Univ. Exam | Sessional | |
| | | **THEORY** | | | | | | |
| 1. | EE 451 UE | Reliability Engineering (Elective–III) | 4 | - | 3 | 75 | 25 | 4 |
| | | **Total** | **4** | **-** | | **75** | **25** | **4** |

2014-2015

ion
RTMENTS

| of on | mum rks | | Credits |
|---|---|---|---|
| | Sess-ional | | |
| | | | |
| | 25 | | 4 |
| | 25 | | 4 |

With effect from the academic year 2014-2015

ME 471 UE

# INDUSTRIAL AND FINANCIAL MANAGEMENT

| | | |
|---|---|---|
| nstruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

## UNIT I

Types of organizations, organizational structures.

**Designing Products, Services and Processes:** New product design and development. Product life cycle: phasing multiple products.

**Manufacturing process Technology:** Product, job shop, batch, assembly line and continuous process technology; flexible manufacturing systems.

Design of Services, service process technology operations capacity; capacity planning decisions, measuring capacity; estimating future capacity needs.

## UNIT II

Locating production and services facilities, effects of location and costs and revenues, factor rating, simple median model (linear programming)

Layout planning; process layout; product layout—Assembly lines: line balancing manufacturing cellular layout.

Scheduling systems and aggregate planning for production and services; loading assignment algorithm; priority sequencing and other criteria.

## UNIT III

**Quality planning and Control:** basic concepts, definitions and history of quality control. Quality function and concept of quality cycle. Quality policy and objectives. Economics of quality and measurement of the cost of quality. Quality considerations in design.

**Process control:** machine and process capability analysis. Use of control charts and process engineering techniques for implementing the quality plan. Acceptance sampling: single, double and multiple sampling, operating characteristic Curve – calculation of producers risk and consumers risk.

## UNIT IV

**Inventory control:** deterministic and stochastic inventory models; variable demand; lead time, specific service level, perishable products and service.

Inventory control in application; concepts for the practioners; saving money in inventory systems; ABC classifications;

Inventory control procedures; Quantity — reorders versus periodic inventory systems; material requirement planning (MRP); MRP as a scheduling and ordering system; MRP system components; MRP computational procedure; Detailed capacity planning; MRP — limitation and advantages; Manufacturing Resources Planning (MRP-II).

## UNIT V

Elements of cost, overheads, breakeven analysis, depreciation, replacement analysis. Nature of financial management-time value of money, techniques of capital budgeting and method, cost of capital, financial leverage.

## Suggested Reading:


1. Buffa and Sarin, *Production and Operations Management*, Wiley Publications.
2. I.M. Pandey, *Elements of Financial Management*, Vikas Publications, New Delhi, 1994.
3. James C. Van Home & John, M. Wachowicz, Jr., *Fundamentals of Financial Management*, Pearson Education Asia, 11th edition., 2001.

With effect from the academic year 2014-2015

EE 451 UE

# RELIABILITY ENGINEERING

## (ELECTIVE III)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To understand the concepts of different types of probability distributions, importance of reliability evaluation of networks.
- To make the students understand about Reliability, availability model of Power Systems and markov modeling of Power Plants. with identical and nonidentical units.

**UNIT I**

Discrete and continuous random variables. Probability density function and Cumulative distribution function. Mean and variance. Binomial, Poisson, Exponential and Weibull distributions.

**UNIT II**

Failure and causes of failure. Failure rate and failure density. Reliability function and MTTF. Bath tub curve for different systems. Parametric methods for above distributions. Non - Parametric methods from field data.

**UNIT III**

Reliability block diagram. Series and parallel systems. Network reduction technique, Examples. Evaluation of failure rate, MTTF and reliability, Active and Standby Redundancy, r out of n configuration. Non-series - parallel systems. Path based and cut set methods.

**UNIT IV**

Availability, MTTR and MTBF, Markov models and State transition

matrices. Reliability models for single component, two components. Load sharing and standby systems. Reliability and availability models of two unit parallel system with repair and standby system with repair.

## UNIT V

Repairable Systems. Maintainability, Preventive maintenance. Evaluation of reliability and MTTF. Overhauling and replacement. Optimum maintenance policy. Markov model of a power plant with identical units and non-identical units. Capacity outage probability table. Frequency of failures and Cumulative frequency.

## Suggested Reading:


1. Charles E. Ebeling, *Reliability and Maintainability Engineering*. McGraw Hill International Edition, 1997.
2. Balaguruswamy, *Reliability Engineering*, Tata McGraw Hill Publishing Company Ltd, 1984.
3. R.N. Allan, *Reliability Evaluation of Engineering Systems*, Pitman Publishing, 1996.
4. Endrenyi, *Reliability Modeling in Electric Power Systems*, John Wiley & Sons, 1978.

With effect from the academic year 2014-2015

EE 452 UE

# HIGH VOLTAGE DC TRANSMISSION
## (ELECTIVE III)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To understand the importance and need of HVDC Transmission. Control and Applications.
- To understand about Multiterminal HVDC Systems, their Control and Protection.

**UNIT I**

General consideration of DC and AC Transmission Systems — Comparison of AC and DC Transmission systems. Application of DC transmission. Economic consideration. Kinds of DC links. Planning for HVDC Transmission. Modern Trends in DC Transmission. Corona loss in AC & DC System.

**UNIT II**

**Converter Circuits:** Properties of Converter Circuits. Different kinds of arrangements. Analysis of bridge converters with grid control. With and without overlap angle. Equivalent circuit of rectifier. Inversion: Operation as an inverter— equivalent circuit of inverter.

**UNIT III**

**Control:** Basic means of control. Limitations of manual control. Desired features of control. Combined characteristics of rectifier and inverter. Power reversal. Constant minimum ignition angle control. Constant current control. Constant extinction angle control.

**UNIT IV**

**Protection:** Short circuit current. Arc back. Misfire. Arc through.

Commutation failure. Bypass valves. Smoothing reactors. DC circuit breakers. Protection against over voltages. Generation of Harmonics, Harmonic filters.

## UNIT V

**Multi-terminal DC Systems:** Application of MTDC System - Types of MTDC system. Comparison of series and parallel MTDC systems. Control and protection of MTDC System.

## Suggested Reading:


1. Padiyar K.R., *HVDC Power Transmission Systems*, Wiley Eastern, 1990.
2. Kimbark E.W., *Direct Current Transmission*, Vol-I, John Wiley, 1971
3. J. Arrillaga, *High Voltage DC Transmission*, Peter Peregrinus Ltd, London, 1983.

With effect from the academic year 2014–2015

BM 452 UE

# MEDICAL IMAGE PROCESSING

## (ELECTIVE III)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

**Basic Principles:** Structure of the human eye. Image formation in the eye. Brightness and contrast. Adaptation and discrimination. Block's Law and critical fusion frequency. Image Formation model, Image Acquisition, Sampling and Quantization principles, Image transforms DFT, DCT, Walsh and Hadamard Transform.

### UNITII

**Image operations:** Gray level Transformation-Image negatives, Image Subtraction, Contrast enhancement, Thresholding, Histogram techniques, Filtering-Low pass and High pass in spatial and frequency domain, Derivative filters, Homomorphic filters.

### UNIT III

**Radiography and CT: X-rays:** Interaction of X-ray beam with tissue-ray detectors, Data acquisition in CT, Image reconstruction, Computed Axial Tomography, generations of CT, Spiral CT, Mammography, Computed Radiography (CR).

### UNIT IV

**Magnetic Resonance Imaging:** Image acquisition and reconstruction, Interaction with tissue, Slice selection, Basic pulse sequences, Fast imaging methods, Functional imaging, FMRI, Diffusion Tensor Imaging.

### UNIT V

**Ultrasonic imaging and nuclear imaging:** Physics of acoustic waves, Wave propagation in tissues, Generation and detection of

Ultrasound, B-mode, M-mode. TM-mode processing- Data acquisition and reconstruction of Doppler Image-Pulsed wave doppler. NMI-Radio active decay modes, Data acquisition. PET. SPECT.

**Suggested Reading:**


1. R.C.Gonzalez and R.E. Woods, *Digital Image Processing*, 2nd ed. Prentice Hall, 2002.
2. Anil. K.Jain, *Fundamentals of Image Processing*, Prentice Hall, Englewood Cliffs, New Jersey, 1989.
3. Paul Suetens, *Fundamentals of Image Processing*, Cambridge University Press, 2002.
4. S.Webb, *The Physics of Medical Imaging*, IOP Publishing. 1991.
5. R.A.Robb, *Three-Dimensional Biomedical Imaging: Principles and Practice*, John Wiley &Sons 1995.

With effect from the academic year 2014-2015

CS 459 UE

# INFORMATION SECURITY

## (ELECTIVE–III for BME/CE/ECE/EE/ME)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To learn legal and technical issues in building secure Information Systems.
- To Provide an understanding of network security.
- To expose the students to security standards and practices.

UNIT – I

**Introduction:** Characteristics of Information, Components of an Information System, Securing the Components, Balancing Security and Access, The Security Development Life Cycle, Security Professionals and the organization. Security Investigation Phase: Need for Security, Threats, Attacks.

UNIT – II

Legal, Ethical and Professional Issues in Information Security Ethical Component in Information Systems, Codes of Ethics, Certification Security Analysis: Risk Management, Identifying and assessing risk, and Controlling Risk.

UNIT – III

**Logical Design:** Blue print for security, Security Policy, standards and Practices, Design of Security Architecture.

**Physical Design:** Security Technology, Physical Design of Security SDLC Firewalls, Dialup Protection, Intrusion Detection Systems, Scanning and analysis tools, and content filters.

## UNIT – IV

**Cryptography:** The basic elements of cryptography: symmetric (Symmetric Key-DES, IDEA, and AES), and public key cryptography (Public Key Encryptions-RSA).

## UNIT – V

Message digest (MD-5, SHA), and digital signatures.
SSL and SET: SSL and SET protocols. Internet transactions using both SSL and SET.

## Suggested Reading:


1. Michael E Whitman and Herbert J Mattord, *"Principles of Information Security"*, Thomson, 2003.
2. William Stallings, "Cryptography and Network Security", Pearson Education, 2000.
3. Nina Godbole, "Information System Security", John Wiley & Sons, 2008.

With effect from the academic year 2014-2015

EC 465UE

# EMBEDDED SYSTEM DESIGN

## (ELECTIVE III)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Objectives:**

- To gain knowledge to design Embedded Systems.
- To get acquaint with Real Time Operating System Environment for ES Design.
- To Gain the Knowledge of Programmable Gate Arrays.

**UNIT I**

**Introduction to Embedded Systems:** The Embedded Design Life Cycle: Product Specification, Hardware/Software Partitioning, Iteration and Implementation, Detailed Hardware and Software Design, Hardware/Software Integration, Product Testing and Release; Maintenance and Upgradation.

**UNIT II**

**The Selection Process:** Choosing the Right Processor; Packaging the Silicon: Silicon Economics, Systems-on-Silicon; Adequate Performance: Performance Measuring Tools, Meaningful Benchmarking; RTOS Availability: Language/Microprocessor Support, Tool Compatibility, Device Drivers, Services; Tool Chain Availability: Compilers, Hardware and Software Debugging Tools; Other Issues in Selection Process.

**UNIT III**

**Introduction to Real-Time Operating Systems:** Tasks and Task States: The Scheduler; Tasks and Data; Shared-Data Problems, Reentrancy; Semaphores and Shared Data: RTOS Semaphores, Semaphores as a Signaling Device, Semaphore Problems,

Semaphore Variants, Ways to Protect Shared Data; Message Queues; Mailboxes; Pipes; Pointers and Queues; Timer Functions; Events: Memory Management; Interrupt Routines in an RTOS Environment.

UNIT IV

**Embedded Software Development Tools:** Host and Target Machines: Cross-Compilers, Cross-Assemblers Tool Chains; Linkers/ Locators for Embedded Software: Address Resolution, Locator Maps; Getting Embedded Software into the Target System: In-Circuit Emulators Monitors; Testing on your host machine: Calling Interrupt Routines; Instruction-Set Simulators; Logic Analyzers; Software-Only Monitors.

UNIT V

**The Role of FPGAs in Embedded System Design:** FPGA Types; FPGAs vs Custom VLSI; FPGA Based System Design; Hierarchical Design, Design Abstractions. Methodologies, FPGA Architectures: Generic Structure, Interconnect, Configuration; SRAM-Based FPGAs Xiilinx FPGA, Altera FPGA, Actel FPGA; Permanently Programmed FPGAs; Chip I/O; Logic Element Parameters; Interconnect Architecture; Pinout.

Suggested Reading:


1. Arnold Berger; Embedded System Design – An Introduction to Processes, Tools and Techniques; 1st Sough Asian Edition 2005, CMP Books.
2. David E. Simon; An Embedded Software Primer; Pearson Education Asia.
3. Wayne Wolf; FPGA Based System Design – Pearson Education, 2005 Edition.

With effect from the academic year 2014-2015

ME 455 UE

# COMPOSITE MATERIALS

## (ELECTIVE III)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**UNIT I**

**Introduction:** Fibres, Matrix materials, interfaces, polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon fibre composites.

**UNIT II**

**Micromechanics of Composites:** Mechanical properties: Production of Elastic constant, micromechanical approach, Halpin-Tsal equations, Transverse stresses. Thermal properties: Hygrothermal stresses, mechanics of load transfer from matrix to fibre.

**UNIT III**

**Macromechanics of Composites:** Elastic constants of a lamina, relations between engineering constants and reduced stiffness and compliances, variation of lamina properties with orientation, analysis of laminated composites. stresses and strains with orientation.

**UNIT IV**

Inter-laminar stresses and edge effects. Simplified composite beam solutions. Bending of laminated beams.

Tensile and compressive strength of unidirectional fibre composites. fracture modes in composites: Single and multiple fracture, de-bonding, fibre pullout and de-lamination failure, fatigue of laminate composite. Effect of variability of fibre strength.

**UNIT V**

**Strength of an orthotropic lamina:** Maximum stress theory,

maximum strain criteria, maximum work (Tsai-Hill) criterion, quadratic interaction criteria. Designing with composite materials. Measurement of constituent material properties: Fibre tests, Matrix tests. Measurement of basic composite properties: Tensile test, compressive test, a plane shear test, interlaminar shear test, flexure test.

**Suggested Reading:**


1. Jones, R.M., *Mechanics of Composite Materials*, McGraw Hill Co., 1967.
2. Ronald F. Gibson, *Principles of Composite Materials Mechanics*, McGraw-Hill, Inc., 1994.
3. Krishan, K. Chewla, *Composite Material*, Springer— Verlag, 1987.
4. Carl. T. Herakovich, *Mechanics of Fibrous Composites*, John Wiley Sons Inc., 1998.

With effect from the academic year 2014-2015

EE 453 UE

# ADVANCED CONTROL SYSTEMS
## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I
Review of state space analysis - Controllable canonical form- Observable canonical form-Diagonal form- Jordan canonical form- state transition matrix- solution to state equations-Controllability- observability - pole placement using state feedback.

### UNIT II
**Non linear systems:** Behavior of non linear systems – Jump resonance- sub harmonic oscillations- limit cycles- common physical non linearities- singular point- phase plane method – construction of phase plane trajectories using isocline method and delta method.

### UNIT III
Lyapunov stability criterion – stability theorems- Methods of constructing Lyapunov functions – Krasovski's method- Variable gradient method.

### UNIT IV
**Adaptive control system:** Introduction to adaptive control systems- Adaptive schemes: Gain scheduling – MRAS – Self tuning Regulators- Dual Control – Design of MRAS using MIT rule.

### UNIT V
**Optimal control:** Formulation of optimal control problem- calculus of variations – fundamental theorem of calculus of variation – Functionals of a single function, Boundary conditions.

**Suggested Reading:**


1. Nagarath I J and Gopal M, *Control Systems Engineering*, Wiley Eastern limited,Second edition ,1982.
2. Gopal M, *State Variable and Digital control*, New age International pvt Ltd. 2000.
3. Karl J Astrom, Bjorn Wittenmark, *Adaptive Control*, Second edition, Pearson Education Asia.
4. Donald E Kirk, *Optimal Control Theory An introduction*, Prentice hall Electrical Engineering series.

With effect from the academic year 2014–2015

EE 454 UE

# ELECTRICAL DISTRIBUTION SYSTEM

## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To understand the concepts and Importance of different loads characteristics, Design of Sub-Transmission Lines, Sub-Stations and Feeders.
- To make the students understand about importance of Power Quality and Applications of capacitors in distribution systems.

### UNIT I

Introduction, Load characteristics. Diversified demand. Non-coincidence demand. Coincidence factor contribution factor Problems. Rate structure, customer billing, types of distribution transformers.

### UNIT II

Design of Sub-transmission lines and distribution sub-stations. Substation bus schemes, rating of distribution substation, service area with multiple feeders, percent voltage drop Calculations.

### UNIT III

Design considerations of primary systems, radial type, loop type primary feeder, primary feeder loading, uniformly distributed load application to a long line. Design considerations of secondary systems. Secondary banking. Secondary networks. Network transformers, unbalanced loads and voltages.

### UNIT IV

Voltage drop and power loss calculations, 3-phase, non 3-phase

primary lines - Single phase two wire laterals with ungrounded neutral, single phase two wire ungrounded laterals. Voltage fluctuations, measures to reduce flickering.

**UNIT V**

Application of capacitors to distribution systems. Effect of series and shunt capacitors power factor correction, economic justification for capacitors. Best capacitor location-Algorithm. Distribution Automation: Definitions, Components of distribution SCADA.

**Suggested Reading:**


1. Turan Gonen, *Electric Power Distribution Engineering*, McGraw Hill Book Co., International Student Edition. 1986.
2. A.S. Pabla, *Electric Power Distribution*, Tata McGraw Hill Publishing Company Ltd., 1997.

With effect from the academic year 2014-2015

**BM 454 UE**

# BIO-ELECTRICITY
## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

**Basic Electromagnetic theory:** Scalar and Vector Quantities. Gradient, Divergence, Laplacian Operators. Vector Identities, Gauss theorem, Green's theorem, Electrical sources and fields, Fundamental Relationships, Poisson's Equation, Concept of monopole and dipole field.

### UNIT II

**Action potentials and propagation:** Membrane structure, Nernst Potential and Resting Potential. Action Potential- Origin and Characteristics. Application of Nernst equation in bio fluids.Voltage clamp. Hodgkin- Huxley equations and analysis. Core conductor model, Propagation in myelinated and unmyelinated nerve fibres.

### UNIT III

**Electrophysiology of skeletal muscle and neuromuscular junction:** Release of Neuromuscular transmitter, post junctional response to transmitter, Origin of EPSP and IPSP. Neuro-muscular block, determination of degree of neuro-muscular block. Muscle structure and contraction. Excitation contraction mechanism.

### UNIT IV

**Electro-physiology of Heart:** Properties of Cardiac muscle, Heart vector, electrical.activity of the heart. Standard leads, Lead vectors. Recording of the ECG from the surface. Dipole theory of the heart. Relationship between the different ECG leads.

## UNIT V

**Applications of Bio-Electric Phenomena:** Functional Neuro-muscular stimulation, impedance plethysmography, measurement of resistance of isotropic & anisotropic tissue and Electro encephalography.

### Suggested Reading:


1. Plonsey Robert and Roger C., Barr R., *Bioelectricity*, Plenum Press, 1988.
2. Plonsey Robert and Fleming David G., *Bioelectrical Phenomena*, McGraw Hill, 1969.
3. D.P. Zipes and J. Jalife, *Cardiac Eectro-Physiology: from Cell to Bedside*, Saunders, Philadelphia, 1990.

With effect from the academic year 2014-2015

ME 460 UE

# ROBOTICS
## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

Introduction to Robotics Basic structure of Robots. Degree of freedom of Robots. Work envelope. Classification of Robots based on drive Technology, Work-Envelope and motion control methods. Application of Robots in Industry. Specification of requirement of motion and force for different application. Repeatability, Precision and Accuracy as applied to Robots.

### UNIT II

Rotation matrix. Homogeneous transformation matrix. Denavit and Hartenberg representation. Euler angles and RPY representation. Representation of absolute position and orientation in terms of joint parameters, Kinematic equation for manipulators. Inverse kinematics of Robot arm for position and orientation. Redundancy in Robots.

### UNIT III

Jacobian for direct and inverse kinematics. Trajectory planning for Robots. Trajectory control based on incremental inverse kinematics of kinematic equations, Static force analysis, stiffness.

### UNIT IV

Newton — Euler formulation of dynamic equation. Lagrangian formulation. Inertia tensor. Control schemes, individual joint control and disadvantages. Control through computed torques.

### UNIT V

Position and velocity measurement. Optical encoders. Different types of End effectors for industrial Robots. Range and Proximity

sensing. Tactile sensors. Force and Torque sensors. Drives used in industrial Robots. Introduction to techniques used in Robot vision. Image acquisition and processing. Introduction to Robot programming.

**Suggested Reading:**


1. Fu. K.S., Gon Zalez R.C., Lee C.S.G. *Robotics, Control- Sensing Vision and Intelligence*, Mc Graw Hill, international Edition, 1987.
2. Asada and Slotine, *Robot Analysis and Intelligence*, Willey-Inter-Science, 1986.
3. Spong and Vidyasagar, *Robot Dynamics & Control*, John Wiley and Sons, 1990.
4. Groover M P, *Industrial Robotics*, McGraw Hill Publications, 1999.
5. Mittal and Nagrath, *Industrial Robotics*, Tata McGraw Hill Publications, 2004.

Drives used
Robot vision.
n to Robot

*trol- Sensing*
dition, 1987.
Willey-Inter-

. John Wiley

ublications,

lcGraw Hill



LA 454 UE

# INTELLECTUAL PROPERTY RIGHTS

## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

Meaning of Intellectual Property Rights. Justification of Intellectual Property Rights.

Classification of these rights. Classification of Treaties relating to Intellectual Property Rights (i) Standard setting treaties (ii) Global protection system treaties. (iii) Classification treats. The salient features of the TRIPS Agreement. The two international institutions: (a) The world Intellectual Property Organization (b) The world Trade Organization.

### UNIT II

History of the patent system. Patents in all fields of technology. (i) Patents on genetic resources patents on chemicals, designs, patents based on software, business methods, internet patents, etc. (ii) Exceptions to exclusive rights conferred to a patent holder. (iii) Grounds for revocation of a patent. (iv) Remedies for infringement of a patent.

### UNIT III

Copyrights and related rights. Nature and scope of protection of copyrights and related rights. Protection of copyrights in the digital media. Defence of fair use. Moral rights of the author. Copyright societies. Remedies for infringement of copyrights.

### UNIT IV

Nature and scope of protection of design rights, protection of layout designs (topographies) of Integrated circuits, protection of

undisclosed information, protection of trade marks, domain names and geographical indications.

**UNIT V**

Practical aspects — Drafting of a patent. Some exercises on the preliminary rules on preparing an application seeking a patent.

**Suggested Reading:**


1. Cornish W.R, *Intellectual Property: Patents*, Copyright, Trademarks and Allied Rights, Sweet & Maxwell 1993.
2. P.Narayana, *Intellectual Property Law*, Eastern Law House 2nd Edition, 1997.
3. Robin Jacob & Daniel Alexander, *A Guide Book to Intellectual Property Patents Trademarks*, Copyrights and Design. Sweet and Maxwell 4th Edition. 1993.

With effect from the academic year 2014–2015

CS 458 UE

# DATA MINING
## (ELECTIVE IV)

| | | |
|---|---|---|
| Instruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

### UNIT I

**Introduction:** Challenges – Origins of Data Mining and Data Mining Tasks.

**Data:** Types of Data – Data Quality – Data Preprocessing – Measures of Similarity and Dissimilarity – OLAP and Multidimensional Data Analysis.

### UNIT II

**Classification:** Preliminaries – General approach to solving a classification problem – Decision tree induction – Model over fitting – Evaluating the performance of a classifier – Methods of comparing classifiers – Rule–based classifier.

### UNIT III

**Classification:** Nearest – Neighbor classifiers – Artificial Neural Networks – Support vector machine – Ensemble methods – Class imbalance problem – Multiclass problem.

### UNIT IV

**Association Analysis:** Problem definition – Frequent item set generation – Rule generation – Compact representation of frequent item sets – Alternative methods for generating frequent item sets – FP – Growth Algorithm – Evaluation of association patterns – Effect of Skewed support distribution – Handling categorical attributes – Handling continuous attributes – Handling concept hierarchy.

## UNIT V

**Cluster Analysis:** Overview – K-means – Agglomerative hierarchical clustering – DBSCAN – Cluster evaluation- Characteristics of Data, Clusters and Clustering Algorithms.

### Suggested Reading:


1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, "*Introduction to Data Mining*", Pearson Education, 2008.
2. K.P. Soman, Shyam Diwakar, V.Ajay, "*Insight into Data Mining Theory and Practice*", PHI, 2010.
3. Arun K Pujari, "*Data Mining Techniques*", University Press, 2nd Edition, 2009.
4. Vikram Pudi P. Radha Krishna, "*Data Mining*", Oxford University Press, 1st Edition, 2009.
5. Galit S, Nitin RP, Peter C Bruce, "*Data Mining for Business Intelligence*", Wiley India Edition, 2007.

With effect from the academic year 2014-2015

CE 461 UE

# DISASTER MANAGEMENT

## (ELECTIVE IV for BME/CSE/CE/ECE/EE/ME)

| | | |
|---|---|---|
| nstruction | : | 4 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 75 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 4 |

**Course Objectives:**

- To Provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

**UNIT – I**

**Introduction to Disasters**: Concepts and definitions of Disaster, Hazard, Vulnerability, Resilience, Risks.

Natural and Manmade Disasters, impact of drought, review of past disasters and drought in India, its classification and characteristics. Classification of drought, causes, Impacts (including social economi, political, environmental, health, psychosocial, etc.

**UNIT – II**

**Disaster:** Classifications, Causes, Impacts including social, economic, political, environmental, health, psychosocial etc.

**Differential Impacts**–in terms of caste, class, gender, age, location,

disability global trends in disasters, urban disasters, pandemics, complex emergencies, climate change.

**Cyclones and Floods:** Tropical cyclones & Local storms, Destruction by tropical cyclones and local storms, Cumulative atmospheric hazards/disasters, Cold waves, Heat waves, Causes of floods, Rood hazards in India.

## UNIT – III

**Approaches to Disaster Risk Reduction:** Disaster cycle – its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural – Nonstructural sources, roles and responsibilities of community, Panchayati Raj Institutions / Urban Local Bodies (PRis/ULBs), states, Centre, and other stake-holders.

## UNIT – IV

**Inter-relationship between Disasters and Development:** Factors affecting Vulnerabilities, differential impacts, impact of development projects such as darns, embankments, changes in Land-use etc. Climate Change Adaptation, Relevance of indigenous knowledge, appropriate technology and local resources.

## UNIT – V

**Disaster Risk Management in India:** Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management Institutional arrangements (Mitigation, Response and Preparedness, OM Act and Policy, other related policies, plans, programmes and legislation)

## Field Work, Case Studies:

The field work is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must to conceived creatively based on the geographic location and hazard profile of the region where the college is located.

## Suggested Reading:

1. Sharma V.K (1999). Disaster Management, National Centre for Disaster Management, IIPE, Delhi.

2. Gupta Anil K, and Steeja S. Nair. (2011). Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi.
3. Nice. (1991). Disaster Management: A Disaster Manager's Handbook, Asian Development Bank, Manila Philppines.
4. Kapur, et al. (2005). Disasters in India Students of grim reality, Rawat Publishers, Jaipur.
5. Pelling Mark, (2003). The Vulnerability of Cities: Natural Disaster and Social Resilience Earthscan publishers, Londan.

With effect from the academic year 2014-2015

EE 481 UE

# POWER SYSTEMS LAB

| | | |
|---|---|---|
| Instruction | : | 3 Periods per week |
| Duration of University Examination | : | 3 Hours |
| University Examination | : | 50 Marks |
| Sessional | : | 25 Marks |
| Credits | : | 2 |

**List of Experiments:**

1. Study of 3-transmission line model.
   (a) Performance of transmission line. (b) ABCD parameters.
2. IDMT Characteristics of an over current (Electromagnetic) Relay.
3. Differential Protection of 1-phase transformer.
4. Determination of +ve, -ve, zero sequence impedance of 3-phase transformer.
5. Determination of +ve, -ve, zero sequence impedance of 3-phase alternator.
6. Synchronous machine reactance and time constant from 3-phase S.C. test.
7. Fault analysis on an un-loaded 3-phase alternator.
8. Sequence current detectors.
9. Sequence voltage detectors.
10. Determination of capacitance of a 3-core cable.
11. Determination of potential distribution across the string of insulators and string efficiency.
12. Characteristics of microprocessor based over current / distance relay.

**Note**: At least ten experiments should be conducted.

EE 482 UE

# PROJECT

| | | |
|---|---|---|
| Instruction | : | 6 Periods per week |
| Duration of University Examination | : | Viva |
| University Examination | : | Grade* |
| Sessionals | : | 50 Marks |

'Solving a real life problem' should be the focus of U.G. project. Faculty members should prepare project briefs well in advance. They should be made available to the students at the Department library. A project may be classified as hardware/software/modeling/ simulation. It should involve elements of analysis, design, synthesis.

The Department will appoint a project coordinator who will be in charge of the following:

- Grouping of students (maximum of three in a group)
- Allotment of projects and project guides
- Project monitoring at regular intervals.

Project allotment is to be completed by the 2nd week of 1St Semester of IV year so that students get sufficient time for completion of their projects.

All projects are to be checked for progress at least twice in a semester. It should be on the basis of presentation by the students.

Sessional marks are to be based on the Grades / Marks, awarded by a monitoring committee comprising of faculty members as well as by the supervisor.

Efforts should be made so that some of the projects are carried out in industries. Projects may also be invited from industries for execution. Norms for final documentation of the project report are to be provided by the Department.

*Excellent / Very Good I Good I Satisfactory / Unsatisfactory

**Note**: Three periods will be assigned to each project guide.

With effect from the academic year 2014-2015

EE 483 UE

# SEMINAR

| | | |
|---|---|---|
| Instruction | : | 3 Periods per week |
| Sessionals | : | 25 Marks |

Oral presentation is an important aspect of engineering education. The objective of the Seminar Course is to motivate a student to do a systematic and independent study of state-of-art topics in a broad area of his / her interest.

Seminar topics may be chosen by the students with the suggestions from the faculty members. Students are to be exposed to following aspects of a seminar presentation:

- Literature survey
- Organization of material to be presented
- OHP slides / PC presentation
- Technical writing.

Each student is required to:

1. Submit a one page synopsis of the seminar talk for display on notice board of the Department.
2. Give a 20 minutes presentation with the aids of an OHP/PC Slide projector, followed by a 10 minutes discussion.
3. Submit a report on the seminar topic presented along with list of References and slides/transparencies used.

Seminars are to be scheduled from 3rd week of the semester and last till end of the Semester. Any change in the schedule should be discouraged.

Sessional marks are to be awarded jointly or independently by at least two faculty members. The awards are on the basis of the oral presentation made, written material submitted, active participation of the student in the proceedings as well as involvement in the discussions.

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