UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Principles of Management
Course Code: HU601
L-T Scheme: 2-1 **Course Credits: 2**

Introduction:

This course deals with the principles of Management within workplace. Students understand the intricacies of management that operates to extract work from the employees. Students dig into topics like:

- Basic concepts of Management
- Functions of Management
- Structure of Management
- How management and society are interlinked
- People Management
- Leadership concepts
- Quantitative methods
- Customer relations

Objectives:

This course briefs students on the mode of operandi for the employees and the mechanism tool for job at a workplace. Furthermore the handling of customers is an integral part of the course. This subject deals with the growth of an individual as an employee.

Learning Outcomes:

Knowledge:

1. Learning the various modes of operations for the management.
2. Customer handling and taking care of their needs and requirements keeping in mind the basic infrastructure of the company.
3. Managing people and their mode of work.
4. Understanding leadership skills that leads to growth of an individual.
5. Understanding the link between society and management and how to maintain a balance between the two.
6. Company's responsibility towards the society through CSR.
7. Quantitative Methods.

Course Contents:

Unit 1: Basic conceptsof Management: Definition, essence, Functions, Roles, Level. Functions of Management Planning : Concept, Nature, Types, Analysis, Management, objectives Structure : Concept, Structure, Principles, Centralization, Decentralization, Spn of Management, Organizational Effectiveness

Unit 2: Management and Society: Concept, external environment, CSR, Corporate Governance, Ethical Standards. People Management: Overview, Job design, Recruitment and Selection, Stress Management Managerial competencies: Communication, Motivation, Team Effectiveness, Conflict Management, Creativity, And Entrepreneurship.

Unit 3: Leadership concept: Nature, Styles, Decision Making, Process, Tools and Techniques. Economic, Financial and quantitative Analysis : Production Markets, National Income Accounting, Financial

Function, and goals, Financial statements, Ratio Analysis. Quantitative Methods : Statistical Interference, Forecasting, Regression Analysis, Statistical Quality Control

Unit 4: Customer Management: Market planning and research, Market Mix, Advertising and Brand Management. Operations and Technology Management: Production and Operations Management, Logistics, & supply chain Management. TQM, Kaizen and Six Sigma, MIS.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Control Systems-II
Course Code: EE601
L-T Scheme: 3-0 **Course Credits: 3**

Course Objectives:

1. Understand the basic theory and mathematical models for linear systems
2. Analyze and design linear control systems
3. Understand the representation of discrete system

Course Outcomes:
At the end of the course the student will be able to:
1. Use state space representation and find the solution using state equation
2. Apply analysis process for continuous and discrete controllers
3. Represent a discrete system for finding solution and discretising the continuous system
4. Find out whether the system is stable or not applying Lyapunov stability analysis

UNIT I

State variable model of continuous dynamic systems:

Converting higher order linear differential equations into State Variable (SV) form. Obtaining SV model from Transfer Function. Obtaining characteristic equation and transfer functions from SV model. Obtaining SV equation directly for R-L-C and spring-mass-dashpot systems.

Concept and properties associated with state equations. Linear transformations on state variables. Canonical forms of SV equations. Companion forms. Solutions of state equations. State transition matrix, properties of state transition matrix.

Controllability andObservability. Linear state variable feedback controller, the pole allocation problems. Linear system design by state variable feedback.

UNIT II

Analysis of discrete time (sampled data) systems using Z-transform:

Difference equation. Inverse Z transforms. Stability and damping in Z domain. Practical sampled data systems and computer control system. Practical and theoretical samplers. Sampling as Impulse modulation. Sampled spectra and aliasing. Anti-aliasing filters. Zero order hold. Approximation of discrete (Z-domain) controllers with ZOH by Tustin transform and other methods. State variable analysis of sampled data system. Digital compensator design using frequency response.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

UNIT III

Introduction to nonlinear systems:

Block diagram and state variable representation of nonlinear systems. Characteristics of common nonlinearities.

Phase plane analysis of linear and nonlinear second order systems. Methods of obtaining phase plane trajectories by graphical method, isoclines method. Qualitative analysis of simple control systems by phase plane methods.

Describing function analysis. Limit cycles in nonlinear systems. Prediction of limit cycles using describing function technique.

Stability concepts for nonlinear systems. BIBO Vs state stability. Definitions of Lyapunov functions. Lyapunov analysis of LTI systems, Asymptotic stability, Global asymptotic

stability. The first and second methods of Lyapunov to analyze nonlinear systems.

Text Books:

1) Katsuhiko Ogata, (2002), Modern Control Engineering, Prentice Hall of India Private Ltd., New Delhi.

2) Nagrath I.J. and Gopal M., (2006), Control Systems Engineering, New Age International Publisher, New Delhi.

3) Gopal M, (2003), Digital Control and State Variable Methods, Tata McGraw-Hill Publishing Company Limited, New Delhi, India.

4) Nise S. Norman, (2000), Control Systems Engineering, John Wiley & Sons, lnc, Delhi.

5) Benjamin C Kuo, (2002), Automatic Control Systems, John Wiley & Sons, Inc., Delhi.

. **Reference Books:**

1. Control System Design, Goodwin, Pearson Education.
2. Nonlinear Control system, J.E. Gibson, McGraw Hill Book Co.
3. Control theory & Practice, M.N. Bandyopadhyaya, PHI
4. Digital Control system, B.C. Kuo, Oxford University Press.
5. Digital Control System, C.H. Houpis, McGraw Hill International.
6. Discrete Time control system, K. Ogata, Prentice Hall, 1995
7. Sampled Data Control system, E.I. Jury, John Wiley & Sons Inc.
8. System Dynamics and Control, EroniniUmez, Eronini, Thomson
9. Modern Control system, R.C. Dorf& R.H. Bishop, Pearson Education
10. Control Engineering, Ramakalyan, Vikas
11. Control System R\Engineering, A. Natarajan Reddy, Scitech
12. Control System Theory with Engineering Application, Lyshevski, Jaico

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Power system-II
Course Code: EE602
L-T Scheme: 3-1 **Course Credits:4**

Introduction:

To introduce the students with different types of substation, different type of eathing system, different type of feeder with radial and loop system. Load flow studies by Gauss siedel and Newton rapson method. Design and operation of a transmission line influenced for the determination of voltage drop, line losses and efficiency of transmission, which are generally influenced by line constant R,L,Cof transmission line. Besides that one can acknowledge with voltage regulation of long.medium,short transmission line. different type of fault occur in transmission line. During power transmission ,lot of protection were being taken by using protective devices.

Objective: Main objective of this subject is that it will help students to make a perfect design for power transmission purpose by using various transmission equipment with proper orientation and having within safety limit.

Course outcome:-
At the end of the study a perfect design will come out for power system design, by which all equipment will work perfectly so that a system will able to work perfectly without any breakdown. A student can see the test of the function of under voltage relay, over voltage relay, over current relay, whether it is working perfectly or not according to his design. Any kinds of adverse situation arises then whole circuit should be tripped by using the protective circuitequipment.

Course Contents :-

1.Representation of power system components

2.Distribution System

3.Load flow studies

4.Power Flow in electric systems

5.Power system stability

6.Power systemprotection

Text Book:A text book on Power System Engineering by Soni. Gupta, Bhatnagar & Chakraborty

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Power Electronics
Course Code: EE603
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course examines power electronics switches basic structure, working methodology, series and parallel module of switches, various switching device parameter characteristics, various type of converter topology for DC as well as AC for driving DC and AC load (RL,RLE and RLC) and advantage, disadvantages of using power converter for various application. The Topics to be covered (tentatively) include:

- Definition and concept of power electronics.
- Advantages and disadvantages of using power electronics converters, power diodes, power transistors power MOSFETS, IGBT and GTO.
- Brief description of Thyristor, SCR series and parallel operation, SCR gate triggering circuits, different commutation techniques of SCR
- Phase controlled converters single phase and three with DC motor load
- DC-DC converters for different quadrant of operation buck and boost type for DC load
- Inverters single phase as well as three phase system for induction motor load.
- AC controller's single phase and three phase system RL, RLE and RLC load.
- Application of power electronics converters.

Objectives:

In this course we will study the basic concepts of power electronics systems, their advantages, disadvantages and application, various power electronics switches basic working principle, structure, V-I characteristics. Various type of triggering and commutation technique, operation and study the output waveforms of single phase and three phase rectifier, inverter for R, RL and RLC load. Operation of chopper circuits, AC voltage controller circuit. We will learn the harmonic analysis's for output waveforms of converters to obtain distortion less output also we will learn to design heat sink for power electronics switches. This way different modules in the power electronics interact and work together to provide the basic services of power electronics system.

Learning Outcomes:

Knowledge:

1. Understand the basic operating principle power electronics converters, advantages, disadvantages and application of power electronics converters.
2. You will examine the various constructions and operating principles of power electronic switches various dynamic and static characteristics of switching devices.
3. You will differentiate between various switches as per different application, Series and parallel operation of switches, Gate triggering circuit for SCR, various types of commutation technique etc.
4. Become aware various AC/DC converter topology and theirs various parameter for single phase and three phase R, RL, RLC and RLE loads . Basic operating principles semi controlled or fully controlled converters.
5. Know the problems in the design DC to DC converters or choppers for multi quadrant operation for DC motors, analysis of their output wave forms.
6. Learn working principle of DC/AC converters or Inverters single phase and three phase, difference between VSI and CSI, their output waveform analysis, harmonic analysis using furiour transform method to design proper harmonic elimination filter.
7. Learn various PWM technique for inverters RL,RLC and RLE load
8. Understanding various application of power converters in HVDC transmission system, drives for cement mill, steel plant, power plant, online UPS system etc.

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Course Description

Application:

1. To design, implement various AC to DC power converters for various industrial applications, renewable energy, fuel cell etc, online UPS charging etc..
2. To design, implement various DC to DC power converters for various industrial applications like crane, solar power, HVDC transmission
3. To design, implement various DC to AC power converters for various industrial applications like crane, wind power, static VAR controller for HVAC transmission
4. To select the proper semiconductor switches for proper application, selection of heat sink for switches.

Course Contents:

Unit 1: Introduction- Concept of power electronics, application of power electronics, uncontrolled converters, advantages and disadvantages of power electronics converters, power electronics systems, power diodes, power transistors, power MOSFETS, IGBT and GTO.

Unit 2: PNPN devices-Thyristors, brief description of members of Thyristor family with symbol, V-I characteristics and applications. Two transistor model of SCR, SCR turn on methods, switching characteristics, gate characteristics, ratings, SCR protection, series and parallel operation, gate triggering circuits, different commutation techniques of SCR.

Unit 3: Phase controlled converter- Principle of operation of single phase and three phase half wave, half controlled, full controlled converters with R, R-L and RLE loads, effects of free wheeling diodes and source inductance on the performance of converters. External performance parameters of converters, techniques of power factor improvement, single phase and three phase dual converters.

.**Unit 4:** DC-DC converters- Principle of operation, control strategies, step up choppers, types of choppers circuits basedon quadrant of operation, performance parameters, multiphase choppers and switching mode regulators.

Unit 5: Inverters- Definition, classification of inverters based on nature of input source, wave shape of output voltage, method of commutation & connections. Principle of operation of single phase and three phase bridge inverter with R and R-L loads, performance parameters of inverters, methods of voltage control and harmonic reduction of inverters. Brief idea of Resonant Pulse inverters.

Unit 6: AC controllers- Principle of on-off and phase control, single phase and three phase controllers with R and R-L loads. Principle of operation of cycloconverters, circulating and non circulating mode of operation, single phase to single phase step up and step down cycloconverters, three phase to single phase Cycloconverters, three phase to three phase Cycloconvetter.

Unit 7: Applications- Speed control of AC and DC motors. HVDC transmission. Static circuit breaker, UPS, static VAR controller.

Text Books

1. Power Electronics, M.D. Singh and K.B. Khanchandani, Tata Mc Graw Hill. 2007.
2. Power Electronics, M.H. Rashid, PHI, 3rd Edition.
3. Power Electronics, P.S. Bhimra, Khanna Publishers, 3rd Edition.

References

1. Modern Power Electronics & AC drives, B.K. Bose, Prentice Hall
2. Power Electronics, Mohan,Undeland & Riobbins, Wiley India

3. Element of power Electronics, Phillip T Krein, Oxford, 2007
4. Power Electronics systems, J.P. Agarwal, Pearson Education, 2006
5. Power Electronics, M.S. Jamal Asgha, PHI, 2007
6. Analysis of Thyristor power conditioned motor, S.K. Pillai, University Press.
7. Power Electronics : Principles and applications, J.M. Jacob, Thomson

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Software Engineering
Course Code: EE604A
L-T Scheme: 3-1 **Course Credits: 3**

Pre-requisite: Good Knowledge of Computer Programming
Post Course: Object Oriented Software Engineering, Software Quality Management
Objective: To engineer good quality software from its specification.

Learning Outcomes
1. Familiar with processes of Software Engineering
2. Awareness about handling the complexities that may arise in various stages of SDLC
3. Generating test cases for software testing
4. Computer Aided Software Engineering
5. Aspect of Quality in Software Development
6. The Rational method

Course Contents:
Unit I- Interactive Systems, Usability, Introduction to software engineering, Software process models, PSP, TSP, Requirement Engineering: Requirement Elicitation, Analysis, Specification, SRS, Formal system development techniques.

Unit II- Analysis and Modeling: Data modeling, Functional modeling Software Architecture and Design: Data design, Architectural Design Process, SADT, OOAD, function-oriented design, Design Patterns: Structural Patterns, Behavioral Patterns, and Creational Patterns.

Unit III- UML: Use case diagram, State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Event trace diagram.

Unit IV- Software Estimation: Estimating Size, Effort and Cost: Metric for Analysis, Metric for Design, COCOMO model, Putnam Model etc., Implementation and Integration: Coding standard and practices.

Unit V- Software Testing: Top-Down and Bottom–up Approach, Verification and Validation, Structural testing, functional Testing, Testing Strategies, Test Case design.

Unit VI- Software Maintenance: Types, Cost of Software, maintenance, Software Maintenance Models, CASE Tool Taxonomy: Business Process Engineering tool, Process modeling and management tool, project planning tool, requirement tracking tool, Metric and management tool, documentation tool, system software tool etc.Introduction to software engineering for web and mobile applications.

Text Books
1. Software Engineering: A practitioner's approach: Roger S. Pressman, McGraw- Hill Publications (Sixth Edition).
2. Fundamentals of Software Engineering: Mall, Rajib, Prentice Hall of India, New Delhi (2nd Edition).

References
1. Software Testing Techniques, B. Beizer.
2. Structured Systems Analysis: Tools and Techniques, Gane and Sarson.
3. Software Engineering, Sommerville, Addison Wesley.
4. Modern Structured Analysis, E.Yourdon.
5. An Integrated approach to Software Engineering: Pankaj Jalote, Narosa Publishing House.

6. Structured design, E. Yourdon and L.Constantine.
7. Fundamentals of Software Engineering: Ghezzi, Jazayeri, Mandriol, PHI

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Database Management System
Course Code: EE604B
L-T Scheme: 3-1 **Course Credits: 3**

Introduction

Database Management Systems (DBMS) consists of a set of interrelated data and a set of programs to access that data. They underpin any computer system and are therefore fundamental to any program of study in computer science. An understanding of DBMS is crucial in order to appreciate the limitations of data storage and application behavior and to identify why performance problems arise.
Students who complete this course are expected to develop the ability to design, implement and manipulate databases. Students will apply and build databases for various day to day real life scenarios and real life applications. The course will by and large be structured but will introduce open-ended data base problems.

Course Objectives:

- Ability to build normalized databases.
- Knowledge of Entity Relationship Modeling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues.
- Familiarity with ODBC, JDBC.

Outcomes:

- Develop the ability to design, implement and manipulate databases.
- Introduce students to build database management systems.
- Apply DBMS concepts to various examples and real life applications.

Expected Student Background (Preconditions)

- Introduction to any programming language (Preferably, C)
- Data Structures

Course Contents:

Unit 1: Introduction to DBMS- Concept & overview of DBMS, Data Models & database Language, Database Administrator, Database Users, architecture of DBMS, Three levels of abstraction.

Unit 2: Entity Relationship Model – Basic concepts, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features.

Relational Model-
Structure of relational Databases, Relational Algebra, Relational Algebra Operations,Views, Modifications of the Database.

Unit 3: SQL and Integrity Constraints: Concept of DDL, DML, DCL ,Basic Structure, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Sub queries.

Course Description

Unit 4: Relational Database Design: -Functional Dependency, Different anomalies in designing a Database, Normalization using functional dependencies, Decomposition, Boyce-Codd Normal Form, 3NF,Normalization using multi-valued dependencies, 4NF, 5NF.

Unit 5: Transaction: -Transaction concept, transaction model, serializability, transaction isolation level, Transaction atomicity and durability, transaction isolation and atomicity.

Concurrency control and recovery system:
Lock based protocol, dead lock handling, time stamp based and validation based protocol, failure classification, storage, recovery algorithm, recovery and atomicity, backup.

Unit 6: Internals of RDBMS:-Physical data structures, Query optimization: join algorithm, Statistics and cost based optimization.

Unit 7: File Organization & Index Structures:-File & Record Concept, Placing file records on Disk, Fixed and Variable sized Records, Types of Single-Level Index (primary secondary, clustering), Multilevel Indexes, Dynamic Multilevel Indexes using B tree and B+ tree.

Text Books:

1. Silberschatz, Korth and Sudarshan, "Database System Concepts", 6th Edition,McGraw Hill, 2010

2. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson, Addison-Wesley, 2010

References:

1. C.J. Date, "An Introduction to Database Systems", 8th Edition, Addison-Wesley, 2003

2. Ramakrishnan&Gherke, Database Management Systems, 2nd Edn., McGraw

3. Connolly and Begg, "Database Systems", 4th Edn., Addison-Wesley, 2005

4. Toby, Lightstone and Jagadish, "Database Modeling and Design", 5th Edn, Elsevier, 2011

5. Coronel and Rob, "Database Systems", 9th Edn.,Cengage, 2011
6. IEEE / ACM Transactions on Database Systems (TODS).
7. DBMS related Journals.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: Object Oriented Programming Using Java
Course Code: EE604C
L-T Scheme: 3-1 **Course Credits: 4**

Introduction:

This course presents a conceptual and practical introduction to imperative and object oriented programming, exemplified by Java. As well as providing grounding in the use of Java, the course will cover general principles of programming in imperative and object oriented frameworks. The course should enable you to develop programs that support experimentation, simulation and exploration in other parts of the computer science curriculum (e.g. the capacity to implement, test and observe a particular algorithm).

Objectives:

In this course we will study the basic components of an operating system, their functions, mechanisms, policies and techniques used in their implementation and examples from popular operating systems. The way different modules in the operating system interact and work together to provide the basic services of an operating system. An introductory programming course for vocational computer majors and students transferring to universities in a business program. Course concentration includes object-oriented programming including data types, classes, objects, methods, decision and repetition structures, string and array manipulation, and Java applets.

Learning Outcomes:
Knowledge:
At the conclusion of the course, following learning objectives are expected to be achieved:

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of Object-oriented programming over other approaches.
2. Explain the benefits of object oriented design and the types of systems in which it is an appropriate methodology.
3. Apply an object-oriented approach to developing applications of varying complexities.
4. Augment a class definition using constructors, destructors, member functions, helper functions and custom input/output operators to add functionality to a programming solution.
5. Manage an object's resources using dynamic memory allocation and de-allocation to access data stored outside the object's memory.
6. Read from and write to files using objects from the standard input output library and custom file operators for future restoration.
7. Model specialization using single inheritance and abstract base classes to minimize code duplication.
8. Model polymorphic behavior using coercion, overloading, virtual functions and function templates to amplify reusability of code
9. knowledge of the structure and model of the Java programming language.

Application:

1. The lab work and homework portions of the course are intended to help you apply your understanding.
2. Basic programming techniques.
3. Design object oriented solutions for small systems involving multiple objects.
4. Apply good programming style and understand the impact of style on developing and maintaining programs.
5. Be able to justify programming style choices.

6. Explain the steps in creating an executable program for a computer, including the intermediate representations and their purpose.
7. Trace the execution of program code to debug an application
8. Use the Java programming language for various programming technologies.
9. Develop software in the Java programming language.
10. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
11. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem

Course Contents:

Unit 1: Concepts of object oriented programming language, Major and minor elements, Object, Class, relationships among objects, aggregation, links, relationships among classes-association, aggregation, using, instantiation, meta-class, grouping constructs.

Unit 2: Difference between OOP and other conventional programming – advantages and disadvantages. Class, object, message passing, inheritance, encapsulation, polymorphism.

Unit 3: Basic concepts of java programming – advantages of java, byte-code & JVM, data types, access specifiers, operators, control statements & loops, array, creation of class, object, constructor, finalize and garbage collection, use of method overloading, this keyword, use of objects as parameter & methods returning objects, call by value & call by reference, static variables & methods, garbage collection, nested & inner classes, basic string handling concepts- String (discuss charAt() , compare To(), equals(), equalsIgnoreCase(), indexOf(), length() , substring(), to CharArray() , to LowerCase(), toString(), toUpperCase() , trim() , valueOf() methods) & String Buffer classes (discuss append(), capacity(), charAt(), delete(), deleteCharAt(), ensureCapacity(), getChars(), indexOf(), insert(), length(), setCharAt(), setLength(), substring(), toString() methods), concept of mutable and immutable string, command line arguments, basics of I/O operations – keyboard input using BufferedReader & Scanner classes.

Unit 4: Super class & subclasses including multilevel hierarchy, process of constructor calling in inheritance, use of super and final keywords with super() method, dynamic method dispatch, use of abstract classes & methods, interfaces. Creation of packages, importing packages, member access for packages.

Unit 5: Exception handling basics, different types of exception classes, use of try & catch with throw, throws & finally, creation of user defined exception classes. Basics of multithreading, main thread, thread life cycle, creation of multiple threads, thread priorities, thread synchronization, inter-thread communication, deadlocks for threads, suspending & resuming threads.

Unit 6: Basics of applet programming, applet life cycle, difference between application & applet programming, parameter passing in applets, concept of delegation event model and listener, I/O in applets, use of repaint(), getDocumentBase(), getCodeBase() methods, layout manager (basic concept), creation of buttons (JButton class only) & text fields.

Text Books

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – , Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata Mcgraw Hill Education Private , 7th Ed).

References

1. Rambaugh, James Michael, Blaha – "Object Oriented Modelling and Design" – Prentice Hall, India.

2. Ali Bahrami – "Object Oriented System Development" – Mc Graw Hill.
3. Deitel and Deitel – "Java How to Program" – 6th Ed. – Pearson.

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: VLSI & Microelectronics
Course Code: EE604D
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course examines microelectronics & VLSI design concepts, and MOS fabrication basics. The topics to be covered (tentatively) include:

- Introduction to VLSI Design
- Micro-electronic Processes for VLSI Fabrication
- CMOS for Digital VLSI Circuits
- VHDL

Objectives:

The Course Educational Objectives are:

1. To acquire knowledge on basics of microelectronics & VLSI design.
2. To get acquainted with IC fabrication process and layout design rules.
3. To gain knowledge on design concept of CMOS digital circuits.
4. To gain knowledge on VHDL.

Learning Outcomes:

Knowledge:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. Able to explain the basic concepts of Microelectronics & VLSI design.
2. Able to describe VLSI design steps.
3. Able to describe the IC fabrication steps and different layout design rules.
4. Able to design various CMOS based digital circuits.
5. Able to describe various digital circuits using VHDL.

Application:

1. To design and implement CMOS based circuits.
2. To fabricate NMOS, PMOS, and CMOS.
3. To design VHDL based digital circuits.

Course Contents:

Pre-requisite: Knowledge of Basic Electronics Engineering of first year and Analog Electronics of second year.

Unit 1: Introduction to VLSI Design: VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical).

Unit 2: MOS structure: E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-Band voltage, Potential balance & Charge balance, Inversion, MOS capacitances, three-terminal MOS structure with Body-effect, four-terminal MOS transistor: Drain current, I-V characteristics, Current-voltage equations (simple derivation), scaling in MOSFET: General scaling, Constant voltage scaling & Constant field scaling, Short channel effects. CMOS inverter, Simple Combinational Gates-NAND gate and NOR gate using CMOS.

Unit 3: Micro-electronic Processes for VLSI Fabrication: Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning,

Course Description

Etching, Photo-lithography – Positive & Negative photo-resist ; Basic CMOS Technology – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator; Layout Design Rule: Stick diagram with examples, Layout rules.

Unit 4: Hardware Description Language: VHDL or Verilog Combinational & Sequential Logic circuit Design.

Text Books

1. Wayne Wolf; Modern VLSI Design, Pearson Education. [For unit-I]
2. S.M.Kang & Y.Leblebici; CMOS Digital Integrated Circuit, Tata McGraw Hill. [For unit-II and unit-III]
3. J. Bhaskar; A VHDL primer, third edition, Prentice hall [For unit-IV]

References

1. Digital Integrated Circuits, Demassa & Ciccone, John Willey & Sons.
2. CMOS Circuit Design, Layout & Simulation, R. J. Baker, H. W. Lee, D. E. Boyee, PHI.
3. Advance Digital Design Using Verilog, Michel D. Celliti, PHI

UNIVERSITY OF ENGINEERING & MANAGEMENT, JAIPUR

Course Description

Title of Course: VLSI & Microelectronics
Course Code: EE604D
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course examines microelectronics & VLSI design concepts, and MOS fabrication basics. The topics to be covered (tentatively) include:

- Introduction to VLSI Design
- Micro-electronic Processes for VLSI Fabrication
- CMOS for Digital VLSI Circuits
- VHDL

Objectives:

The Course Educational Objectives are:

1. To acquire knowledge on basics of microelectronics & VLSI design.
2. To get acquainted with IC fabrication process and layout design rules.
3. To gain knowledge on design concept of CMOS digital circuits.
4. To gain knowledge on VHDL.

Learning Outcomes:

Knowledge:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. Able to explain the basic concepts of Microelectronics & VLSI design.
2. Able to describe VLSI design steps.
3. Able to describe the IC fabrication steps and different layout design rules.
4. Able to design various CMOS based digital circuits.
5. Able to describe various digital circuits using VHDL.

Application:

1. To design and implement CMOS based circuits.
2. To fabricate NMOS, PMOS, and CMOS.
3. To design VHDL based digital circuits.

Course Contents:

Pre-requisite: Knowledge of Basic Electronics Engineering of first year and Analog Electronics of second year.

Unit 1: Introduction to VLSI Design: VLSI Design Concepts, Moor's Law, Scale of Integration (SSI, MSI, LSI, VLSI, ULSI – basic idea only), Types of VLSI Chips (Analog & Digital VLSI chips, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioral, Structural, Physical).

Unit 2: MOS structure: E-MOS & D-MOS, Charge inversion in E-MOS, Threshold voltage, Flat-Band voltage, Potential balance & Charge balance, Inversion, MOS capacitances, three-terminal MOS structure with Body-effect, four-terminal MOS transistor: Drain current, I-V characteristics, Current-voltage equations (simple derivation), scaling in MOSFET: General scaling, Constant voltage scaling & Constant field scaling, Short channel effects. CMOS inverter, Simple Combinational Gates-NAND gate and NOR gate using CMOS.

Course Description

Unit 3: Micro-electronic Processes for VLSI Fabrication: Silicon Semiconductor Technology- An Overview, Wafer processing, Oxidation, Epitaxial deposition, Ion-implantation & Diffusion, Cleaning, Etching, Photo-lithography – Positive & Negative photo-resist ; Basic CMOS Technology – (Steps in fabricating CMOS), Basic n-well CMOS process, p-well CMOS process, Twin tub process, Silicon on insulator; Layout Design Rule: Stick diagram with examples, Layout rules.

Unit 4: Hardware Description Language: VHDL or Verilog Combinational & Sequential Logic circuit Design.

Text Books

1. Wayne Wolf; Modern VLSI Design, Pearson Education. [For unit-I]
2. S.M.Kang & Y.Leblebici; CMOS Digital Integrated Circuit, Tata McGraw Hill. [For unit-II and unit-III]
3. J. Bhaskar; A VHDL primer, third edition, Prentice hall [For unit-IV]

References

1. Digital Integrated Circuits, Demassa & Ciccone, John Willey & Sons.
2. CMOS Circuit Design, Layout & Simulation, R. J. Baker, H. W. Lee, D. E. Boyee, PHI.
3. Advance Digital Design Using Verilog, Michel D. Celliti, PHI

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Course Description

Title of Course: Communication Engineering
Course Code: EE605B
L-T Scheme: 3-1 **Course Credits: 3**

Introduction:

The course provides a basic understanding of the analysis and design of analog & digital communication systems. This course presents the fundamentals of communications like analysis of signals and systems,amplitude modulation and demodulation, frequency modulation and demodulation,phase modulation and demodulation,Super heterodyne receiver, Noise performance, Nyquist criterion, Line coding, band pass communication, Modulation techniques, Inter symbol Interference. The course also provides a foundation in information theory.

Objectives:

To introduce the concepts of communication systems and to equip students with various issues related to Analog& Digital communication such as modulation, demodulation, transmitters and receivers and noise performance.The course also provide a foundation in information theory – the theory that provides quantitative measures of information and allows to analyze and characterize the fundamental limits of communication systems, to understand various source coding techniques for data compression, channel coding techniques and their capabilities.

Learning Outcomes:

Knowledge:

1. The learner mustbeableto appreciate theneedfor modulationandcalculate theantennasize for differentcarrier frequencies.
2. Fromthefunctionalrepresentationofthemodulatedcarrierwave,thelearnermustbeabletoidentifythetypeof modulation,calculatetheside-band frequencies, identifythemodulating and carrier frequencies,decide thetype of generationmethod tobeadopted.
3. Afterunderstandingthebasicconceptsthelearnermustbeabletocomparebetweenthedifferentdemodulation methods,designan envelopedetector, calculate theIFandimagefrequenciesfor thesuperheterdynereceiversgiventhe carrier andmodulatingfrequencies,calculate the oscillator frequency.
4. Apply different modulation schemes to baseband signals.
5. The learner will be able to understand the concept of uncertainty and information, mutual information and source coding.
6. The learner understands different types of channel models, channel types, channel coding, information capacity and the Shannon limit.
7. The learnerwill acquire knowledge on error control codes, linear codes and block codes.

Application:

1. The ability to design and analyze basic analog transmitters and receivers
2. The ability to apply computer software for the design and analysis of a simple analog communication system.
3. Able to explaininformation theoretic analysis of communication system.
4. Able to describedesign a data compression scheme using suitable source coding technique
5. Able to design a channel coding scheme for a communication system.

Course Contents:

Unit 1: Introduction to Base Band transmission & Modulation; Elements of Communication systems; origin of noise and its effect, Importance of SNR in system design; Basic principles of Linear Modulation; Basic principles of Non-linear modulation (Angle Modulation - FM, PM) ; Sampling theorem, Sampling rate, Impulse sampling, Reconstruction from samples, Aliasing; Analog Pulse Modulation - PAM (Natural & flat topped sampling), PWM, PPM ; Basic concept of Pulse Code Modulation, Block diagram of PCM; Multiplexing - TDM, FDM.

Course Description

Unit 2: Concept of Quantization & Quantization error, Uniform Quantize; Non-uniform Quantize, A-law & μ law commanding; Encoding, Coding efficiency; Line coding & properties, NRZ & RZ, AMI, Manchester coding PCM, DPCM; Baseband Pulse Transmission, Matched filter (mention of its importance and basic concept only), Error rate due to noise; ISI, Raised cosine function, Nyquist criterion for distortion-less base-band binary transmission, Eye pattern, Signal power in binary digital signals.

Unit 3: Bit rate, Baud rate; Information capacity, Shanon's limit ; M-ary encoding, Introduction to the different digital modulation techniques - ASK, FSK, PSK, BPSK, QPSK, mention of 8 BPSK, 16 BPSK; Introduction to QAM, mention of 8QAM, 16 QAM without elaboration; Delta modulation, Adaptive delta modulation (basic concept and importance only, no details); introduction to the concept of DPCM, Delta Modulation, Adaptive Delta modulation and their relevance; Spread Spectrum Modulation - concept only.

Unit 4: Introduction, News value & Information content ;Entropy ; Mutual information; Information rate; Shanon-Fano algorithm for encoding ; Shannon's Theorem - Source Coding Theorem;Channel Coding Theorem, Information Capacity Theorem ; Error Control & Coding - basic principle only.

Text Books

1. B.P. Lathi, Zhi Ding, Modern Digital and Analog Communication Systems, 4thed, Oxford Publication.
2.DigitalCommunications,S.Haykin,Wiley India.
3.DigitalCommunications, Sanjay Sharma.
4. Information theory, coding and cryptography - Ranjan Bose; TMH.

References

1. P Ramakrishna Rao, Analog Communication, Tata McGraw Hill Education
2.DigitalCommunications, J.G.Proakis,TMHPublishing Co.
3.Information Theory - R B Ash; Prentice Hall.

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Course Description

Title of Course: Digital Signal Processing
Course Code: EE605C
L-T Scheme: 3-0 **Course Credits: 3**

Introduction:

This course examines the concepts of Digital signal processing, filter designing, its architecture and algorithms, and programming of basic signal and system design with filtering. The Topics to be covered (tentatively) include:

- Discrete time signal and system
- Discrete Time Fourier Transform and System response
- Discrete Fourier Transform and Fast Fourier Transform
- Z transform and System analysis
- Filter Design and analysis
- DSP processor
- FPGA

Objectives:

In this course, we will study the basic concepts and techniques for processing signals on a computer, what are the key DSP concepts and how do they relate to real applications. What are the methods of time domain and frequency domain implementation and what are typical characteristics of real DSP systems? How can you use MATLAB to analyze and design DSP systems and how can we use DSP processor and apply it in real life application?

Learning Outcomes:

Knowledge:

Once the student has successfully completed this course, he/she will be able to answer the following questions or perform following activities:

1. This course will introduce the basic concepts and techniques for processing signals and systems.
2. Provide a deeper understanding of the latest developments in the DSP research area.
3. By the end of the course, you be familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors.
4. The course emphasizes intuitive understanding and practical implementations of the theoretical concepts.
5. Provide students with backgrounds for pursuing independent research in DSP with related applications.

Application:

1. To develop and implement various DSP related system algorithms,
2. To develop, implement, and demonstrate the algorithms of filters,
3. To analysis the real-time signal and system,
4. To implement any kind of circuit on

Course Contents:

Unit 1: Concept of discrete-time signal, basic idea of samplingandreconstructionofsignal,samplingtheorem, sequences–periodic, energy,power,unit-sample, unit-step,unit-ramp,real&complex exponentials, arithmeticoperationsonsequences.

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Course Description

Unit 2: LTI Systems:
Definition,representation, impulse response,derivationfortheoutputsequence,conceptofconvolution,graphical,analyticalandoverlap-add methodstocomputeconvolutionsupportedwithexamplesandexercises,propertiesofconvolution,interconnectionsofLTIsystemswithphysical interpretations,stabilityandcausalityconditions,recursive and non-recursive systems.

Unit 3: DiscreteFourierTransform:
ConceptandrelationsforDFT/IDFT,Twiddlefactorsandtheirproperties,computationalburdenondirectDFT,DFT/IDFT aslineartransformations,DFT/IDFT matrices,computationofDFT/IDFT bymatrixmethod,multiplicationofDFTs, circular convolution,computationofcircular convolution bygraphical,DFT/IDFT andmatrixmethods,linearfiltering usingDFT,aliasingerror,filteringoflongdatasequences–Overlap-SaveandOverlap- Addmethodswith examples andexercises.

Unit 4:Fast Fourier Transform:
Radix-2algorithm,decimation-in-time,decimation-in-frequencyalgorithms,bit reversal.

Unit 5:Z-Transform:
Definition,mappingbetweens-planeandz-plane,unitcircle,convergenceandROC,propertiesofZ-transform,Z-transformonsequenceswith examplesandexercises, characteristic familiesofsignalsalongwith ROC,convolution,correlationandmultiplicationusingZ-transform,initial value theorem, Perseval'srelation,inverseZ-transformbypartial-fraction expansions with examplesand exercises.

Unit 6:FilterDesign:
BasicconceptsofIIRandFIRfilters,differenceequations,designofButterworthIIRanalogfilterusingimpulseinvariantandbilineartransforms,designof linear phase FIRfilters, no. of taps,rectangular,Hammingand Blackmanwindows**.**

Unit 7:DigitalSignalProcessor:
ElementaryideaaboutthearchitectureandimportantinstructionsetsofTMS320C5416/6713processor, and basic concept of FPGA.

Text Books
1. DigitalSignal Processing – "Digital Signal Processing: A Modern introduction", Ashok Ambardar, Cenage Learning India private limited
2. DigitalSignal Processing – "Principles,AlgorithmsandApplications",J.G.Proakis&D.G.Manolakis, Pearson Ed.
3.TexasInstrumentsDSPProcessor user manualsand application notes.
4. Xilinx FPGAuser manualsandapplication notes.

References
1. DigitalSignalprocessing–AComputer BasedApproach,S.K.Mitra, TMHPublishingCo.
2. DigitalSignal Processing - Signals,Systems andFilters,A.Antoniou,TMH PublishingCo.
3. Digital Signal Processing, A.NagoorKani,TMHEducation
4. DigitalSignal Processing withFieldProgrammableGateArrays,U.Meyer-Baese, Springer

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Course Description

Title of Course: Embedded Systems
Course Code: EE605A
L-T Scheme: 3-1 **Course Credits: 3**

Learning Outcomes:
Knowledge:
Although the students are engaged with a fun and rewarding lab experience, the educational pedagogy is centered on fundamental learning objectives. After the successful conclusion of this class, students should be able to understand the basic components of a computer, write C language programs that perform I/O functions and implement simple data structures, manipulate numbers in multiple formats, and understand how software uses global memory to store permanent information and the stack to store temporary information. Our goal is for students to learn these concepts:

1. Understanding how the computer stores and manipulates data,
2. The understanding of embedded systems using modular design and abstraction,
3. C programming: considering both function and style,
4. The strategic use of memory,
5. Debugging and verification using a simulator and on the real microcontroller
6. How input/output using switches, LEDs, DACs, ADCs, motors, and serial ports,
7. The implementation of an I/O driver, multithreaded programming,
8. Understanding how local variables and parameters work,
9. Analog to digital conversion (ADC), periodic sampling,
10. Simple motors (e.g., open and closed-loop stepper motor control),
11. Digital to analog conversion (DAC), used to make simple sounds,
12. Design and implementation of elementary data structures.

Course Content:

Unit 1. IntroductiontoEmbeddedSystem:EmbeddedsystemVsGeneralcomputingsystems,HistoryofEmbeddedsystems,Purpose of Embeddedsystems,MicroprocessorandMicrocontroller,Hardwarearchitectureoftherealtimesystems.
Unit 2. DevicesandCommunication Buses: I/O types,serialandparallelcommunicationdevices,wirelesscommunicationdevices,timer andcountingdevices,watchdogtimer,realtimeclock,serialbuscommunicationprotocols,parallelcommunicationnetworkusingISA,PCI,PCT-X,Internetembeddedsystemnetworkprotocols,USB,Bluetooth.
Unit 3. ProgramModelingConcepts;FundamentalissuesinHardware softwareco-design,UnifiedModelingLanguage(UML),HardwareSoftwaretrade-offsDFGmodel,statemachineprogrammingmodel,modelformultiprocessor system.
Unit 4. Real Time Operating Systems:Operatingsystembasics,Tasks,ProcessandThreads,Multiprocessingandmultitasking, task communication,tasksynchronization,qualitiesofgoodRTOS.
Unit 5. ExamplesofEmbeddedSystem:Mobilephones, RFID,WISENET,Robotics,BiomedicalApplications,Brain machineinterfaceetc. Popularmicrocontrollersusedinembeddedsystems,sensors,actuators.
Unit 6. Programmingconceptsandembeddedprogramming inC,C++,JAVA.

TextBooks

Course Description

1. EmbeddedSystems: Rajkamal(TMH)

ReferenceBooks

1. IntroductiontoEmbeddedSystems:ShibuK.V.(TMH)
2. Embedded System Design Aunifiedhardwareandsoftwareintroduction:F.Vahid (JohnWiley)
3. EmbeddedSystems:L.B.Das(Pearson)
4. EmbeddedSystemdesign:S. Heath(Elsevier)
5. Embeddedmicrocontrollerandprocessordesign:G.Osborn(Pearson)

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Course Description

Title of Course: Control Systems-II Lab
Course Code: EE691
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To provide the students with a hands-on experience on the theoreticalconcepts through simple experiments.
2. To develop the ability to designand validate their knowledge through open ended experiments.

Learning Outcomes:

On successful completion of this lab course, the students would beable to

1. Understanding on the topics of state space
2. Understanding of nonlinear systems.

Course Contents:

List of Experiments:

1. STUDY OF A PRACTICAL POSITION CONTROL SYSTEM USING SIMULINK AND HARDWARE.
2. TUNING OF P, PI, AND PID CONTROLLER FOR FIRST ORDER PLANT WITH DEAD TIME USING Z-N METHOD .(MATLAB AND HARWARE)
3. DESIGN OF LEAD AND LAG COMPENSATION USING CACSAD TOOLS (PSPICE, MATLAB, SciLab may be used).
4. STATE VARIABLE ANALYSIS USING CACSAD COMMAND TOOL. (PSPICE, MATLAB, SciLab may be used).
5. STATE VARIABLE ANALYSIS USING CACSAD BLOCK DIAGRAM TOOL. (PSPICE, MATLAB, SciLab may be used).
6. PERFORMANCE ANALYSIS OF A DISCRETE TIME SYSTEM USING CACSAD TOOL. (PSPICE, MATLAB, SciLab may be used).
7. STUDYING THE EFFECTS OF NONLINEARITY IN A FEEDBACK CONTROLLED SYSTEM USING TIME RESPONSE. (PSPICE, MATLAB, SciLab may be used).
8. STUDYING THE EFFECTS OF NONLINEARITY IN A FEEDBACK CONTROLLED SYSTEM USING PHASE PLANE PLOTS. (PSPICE, MATLAB, SciLab may be used)

Text Book:

1) Katsuhiko Ogata, (2002), Modern Control Engineering, Prentice Hall of India Private Ltd., New Delhi.
2) Nagrath I.J. and Gopal M., (2006), Control Systems Engineering, New Age International Publisher, New Delhi.

Recommended Systems/Software Requirements:

SCILAB, MATLAB

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Course Description

Title of Course: Power System-II Lab
Course Code: EE692
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To learn and understand the characteristics of an Three phase over voltage relay.
2. To provide an understanding of the design aspects of single phase over current relay.
3. To provide an efficient understanding ofperformance of load flow analysis using Newton Raphson method. (by simulation).
4. To provide an efficient understanding of performance of load flow analysis using Gauss-seidel method (by simulation).
5. To learn and understand the performance of a single phase under voltage relay.

Learning Outcomes: The students will have a detailed knowledge of the concepts ofthree phase over voltage relay, single phase under voltage relay. Aware of a variety of approaches load flow analysis. Student will learn the basics behind single phase overcurrent relay.Upon the completion of Power systemcourse, the student will be able to:

- **Understand** and implement characteristics of anvariousthree phase relay circuit.
- **Use** modern tools and circut to understand the performance of load flow study**.**
- **Understand** the concepts of single phase over current relay and single phase under voltage relay

Course Contents:
Exercises that must be done in this course are listed below:

Exercise No. 1:To study the characteristics of single phase under voltage relay.
Exercise No. 2: To study the characteristics of single phase over current relay.
Exercise No. 3:To study the different characteristics of three phase over voltage relay.
Exercise No. 4:To study on AC load flow using Gauss-seidel method (by simulation).
Exercise No.5:To study on AC load flow using Newton Raphson method. (by simulation).

Text Book:

1. Power System Protection and Switchgear,adri Ram, D. N. Vishwakarma,Tata McGraw-Hill Education.
2.Etap 6.0 power station user guide,byetap.
3. Protection and Switchgear, BhaveshBhalja, Maheshwari,, NileshChothani OUP India.
4. Handbook of Switchgears ByBhel, Tata McGraw-Hill Education, 2005 - Electric switchgear.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Etap 6.0 power station.EMTP.
3. Testing kit ofrelay protection various type of fedder, transformers, alternator and motors protection.

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Course Description

Title of Course: Power Electronics Lab
Course Code: EE693
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To learn and understand the characteristics of an SCR,Triac.
2. To provide an understanding of the design aspects of different triggering circuits of an SCR.
3. To provide an efficient understanding ofperformance of single phase half controlled symmetrical and asymmetrical bridge converter.
4. To provide an efficient understanding of performance of three phase controlled converter with R & R-L load.
5. To learn and understand the performance of a Cycloconverter, Dual converter.

Learning Outcomes: The students will have a detailed knowledge of the concepts of characteristics of an SCR, Traic devices. Aware of a variety of approaches to triggering circuits of an SCR. Student will learn the basics behind performance of single phase half controlled symmetrical and asymmetrical bridge converter, Dual converter.Upon the completion of Power Electronics practical course, the student will be able to:

- **Understand** and implement characteristics of an various power electronic switches like SCR,Traic.
- **Use** modern tools and circut to understand the performance of Dual converter (Used for crane drive, conveyor belt drive)**.**
- **Understand** the concepts of single phase half controlled symmetrical and asymmetrical bridge converter
- **Analyze** and simulate three phase AC controller with R and R-L load (RL laod like induction motor load and its speed variations)
- **Implement** a Cycloconverter and study the performance used for VVVF drive for induction motor.
- **Simulate** different triggering circuits of an SCR and **Implement**thetriggering circuits for SCR, Power Mosfet, IGBT .
- **Understand the**performance of step down chopper with R and R-L load (chopper used for HVDC transmission, renewable energy like solar and wind energy system) .
-

Course Contents:
Exercises that must be done in this course are listed below:

Exercise No.1: Study the characteristics of an SCR.
Exercise No.2: Study the characteristics of a Triac
Exercise No. 3: Study of performance of single phase controlled converter with and without source inductance (simulation)
Exercise No. 4: Study of performance of single phase half controlled symmetrical and asymmetrical bridge converter.(simulation)
Exercise No. 5: Study of performance of three phase controlled converter with R & R-L load.(simulation)
Exercise No. 6: Study of performance of single phase AC voltage controller with R and R-L load (simulation)
Exercise No. 7: Study of performance of a Dual converter.
Exercise No. 8: Study of performance of step down chopper with R and R-L load.

Text Book:

1. Fundamental of Power Electronics with MATLAB, Randall Shaffer, Cengage Learning.
2. SPICE for Power electronics and electric power, M.H. Rashid & H.M. Rashid, Taylor & Francis.
3. Power Electronics: Principles and application, Jacob, Cengage Learning
4. Power Electronics, Daniel W. Hart, Tata McGraw Hill Edition.

5. Modeling & Simulation using MATLAB-SIMILINK , S. Jain, Wiley India
6. MATLAB & SIMULINK for Engineers, A.K. Tyagi, Oxford University Press.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100 MB free disk space.
2. Matlab 32 bit or 64 bit 2009a/2009b.
3. Testing kit for TRAIC,SCR,DUAL converter, Chopper, Inverter and converter circuit, Microcontroller train kit(PV59RD2V51),uc8051,128kb memory.
4. Chip burning kit.
5. Spare equipments components like MOSFET(IRF540,MCTE2E,IN407,2K,10k,50uf 230V).

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Course Description

Title of Course: Database Management System Lab
Course Code: EE694B
L-T-P Scheme: 0-0-3 **Course Credits: 2**

Objective:

At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared database including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL. In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user. All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques. One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Learning Outcomes:

- Ability to build normalized databases.
- Knowledge of Entity Relationship Modelling.
- Familiarity with SQL, embedded SQL and PLSQL.
- Familiarity with query processing and query optimization techniques.
- Understanding of transaction processing.
- Ability to handle recovery and concurrency issues.
- Familiarity with ODBC, JDBC.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1:ER Model: An entity-relationship model (ERM) is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system

Exercise No. 2:EER Model: In computer science, the enhanced entity-relationship (EER) model is a high-level or conceptual data model incorporating extensions to the original entity-relationship (ER) model, used in the design of databases. It was developed by a need to reflect more precisely properties and constraints that are found in more complex databases.

Exercise No. 3: Relational Model: The relational model for database management is a database model based on first-order 4predicate logic, first formulated and proposed in 1969 by E.F. Codd. The model uses the concept of a mathematical relation, which looks somewhat like a table of values - as its basic building block, and has its theoretical basis in set theory and first-order predicate logic.

Exercise No. 4:1 NF: First normal form (1NF or Minimal Form) is a normal form used in database normalization. A relational database table that adheres to 1NF is one that meets a certain minimum set

of criteria. These criteria are basically concerned with ensuring that the table is a faithful representation of a relation and that it is free of repeating groups.

Exercise No. 5:2 NF: Second normal form (2NF) is a normal form used in database normalization. 2NF was originally defined by E.F. Codd in 1971. A table that is in first normal form (1NF) must

Exercise No. 6:3 NF: The Third normal form (3NF) is an important form of database normalization. 3NF is said to hold if and only if both of the following conditions hold:

• The relation R (table) is in second normal form (2NF)

• Every non-prime attribute of R is non-transitively dependent (i.e. directly dependent) on every candidate key of R.

Exercise No. 7:BCNF: A relation R is in Boyce-Codd normal form (BCNF) if and only if every determinant is a candidate key. 4The definition of BCNF addresses certain (rather unlikely) situations which 3NF does not handle.

Exercise No. 8:SQL-1: In this lab., we discuss basic SQL operations like creating a table, deleting a table, changing the schema of the table, primary key and foreign key constraints on a table and creating indexes on tables.

Exercise No. 9:SQL-2: Its scope includes efficient data insert, query, update and delete, schema creation and modification, and data access control. In this lab., we discuss SQL operations for populating the tables like inserting into a table, deleting values from a table, and updating the content of the tables.

References

1. “Database Systems: A Practical Approach to design, Implementation and Management”. Thomas Connolly, Carolyn Begg; Third Edition, Pearson Education.
2. "Fundamentals of Database Systems" Elmasri, Navathe, Pearson Education.
3. Bipin C Desai, ?An Introduction to Database Systems?, Galgotia. Publications Pvt Limited, 2001
4. “An Introduction to Database Systems”, C.J.Date, Pearson Education.
5. “A first course in Database Systems”, Jeffrey D. Ullman, Jennifer Windon, Pearson, Education.
6. “Data Management: databases and organization”, Richard T. Watson, Wiley.
7. “DataModeling Essentials”, Graeme C. Simxion, Dreamtech.
8. Introduction to Data Base Management, Naveen Prakash, Tata McGraw Hill
9. “Oracle 10g manuals”.

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Course Description

Title of Course: Object Oriented Programming Using Java Lab
Course Code: EE694C
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives:

1. To strengthen their problem solving ability by applying the characteristics of an object oriented approach.
2. To introduce object oriented concepts in Java.

Learning Outcomes:

1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
2. Apply an object-oriented approach to developing applications of varying complexities.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No. 1: Class creation with main method and steps of source code compilation and execution.
Exercise No. 2: Design a stack and a queue.
Exercise No. 3: Design different types of linked lists for different operations.
Exercise No. 4: Methods of String.
Exercise No. 5: Implement different types of polymorphism: overloading and overriding.
Exercise No. 6: Implement different types of inheritance.
Exercise No. 7: Use of package with access specifier.
Exercise No. 8: Write a program using static keyword.
Exercise No. 9: Write a program to use this, this(), super, super().
Exercise No. 10: Exception handling.
Exercise No. 11: Threading.
Exercise No. 12: Applet programming and Action Event.
Exercise No. 13: Swing programming and Layout.

Text Book:

1. E. Balagurusamy – " Programming With Java: A Primer" – 3rd Ed. – Tata Mc Graw Hill.
2. Herbert Schildt, Java: The Complete Reference (Tata Mcgraw Hill Education Private , 7th Ed).

Recommended Systems/Software Requirements:

1. Java Development Kit and Java Runtime Environment, preferable latest version.

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Course Description

Title of Course: Software Engineering Lab
Course Code: EE694A
L-T-P scheme: 0-0-3 **Course Credit: 2**

Prerequisite: Students must have already registered for the course, "Software Engineering".

Objectives: Students will be capable to acquire the generic software development skill through various stages of software life cycle. He will also be able to ensure the quality of software through software development with various protocol based environment.

Learning Outcomes: After completion of course student will be able to generate test cases for software testing. Students will also be able to handle software development models through rational method.

Course Contents:
Unit I- Introduction to software engineering: Code comprehension.
Unit II- Requirement engineering: Requirement Elicitation, specification, IEEE standard template for SRS, Requirement Engineering tools.
Unit III- UML Modeling: Use case diagram , State diagram, Activity Diagram, Class Diagram, Sequence diagram, Collaboration diagram, Deployment Diagram, Component Diagram, Event trace diagram , c++ code generation, Introduction to Sec UML.
Unit IV- Software Metrics: Product, process and project metrics.
Unit V- Software Testing: Structural testing, functional Testing, Testing Strategies and Tactics, Test Case design.

List of Experiments

1. Identifying the Requirements from Problem Statements Requirements, Characteristics of Requirements, Categorization of Requirements, Functional Requirements, Identifying Functional Requirements
2. E-R Modeling from the Problem Statements, Entity Relationship Model, Entity Set and Relationship Set, Attributes of Entity, Keys, Weak Entity, Entity Generalization and Specialization, Mapping Cardinalities, ER Diagram, Graphical Notations for ER Diagram Importance of ER modeling
3. Identifying Domain Classes from the Problem Statements, Domain Class, Traditional Techniques for Identification of Classes, Grammatical Approach Using Nouns, Advantages, Disadvantages, Using Generalization, Using Subclasses, Steps to Identify Domain Classes from Problem Statement, Advanced Concepts
4. Modeling UML Use Case Diagrams and Capturing Use Case Scenarios, Use case diagrams, Actor, Use Case, Subject, Graphical Representation, Association between Actors and Use Cases, Use Case Relationships, Include
5. Modeling UML Class Diagrams and Sequence diagrams, Structural and Behavioral aspects, Class diagram, Elements in class diagram, Class Relationships, Sequence diagram, Elements in sequence diagram, Object, Life-line bar, Messages.
6. Modeling Data Flow Diagrams, Data Flow Diagram, Graphical notations for Data Flow Diagram, Explanation of Symbols used in DFD, Context diagram and leveling DFD
7. Statechart and Activity Modeling Statechart Diagrams, Building Blocks of a Statechart Diagram State, Transition, Action, Guidelines for drawing Statechart Diagrams, Activity Diagrams, Components of an Activity Diagram, Activity, Flow Decision, Merge, Fork, Join, Note, Partition, A Simple Example, Guidelines for drawing an Activity Diagram
8. Estimation of Project Metrics Project Estimation Techniques, COCOMO, Basic COCOMO Model, Intermediate COCOMO Model, Complete COCOMO Model, Advantages of COCOMO, Drawbacks of COCOMO, Halstead's Complexity Metrics.

9. Estimation of Test Coverage Metrics and Structural Complexity, Control Flow Graph, Terminologies, McCabe's Cyclomatic Complexity, Computing Cyclomatic Complexity, Optimum Value of Cyclomatic Complexity, Merits, Demerits

References

1. R.S. Pressman, “Software Engineering: A Practitioner’s Approach”, 7Edition, McGraw Hill, 2010
2. 2. Fundamentals of Software Engineering: Mall, Rajib, Prentice Hall of India, New Delhi (2nd Edition).
3. 2. Sommerville, “Introduction to Software Engineering”, 8Edition, Addison-Wesley, 2007
4. Ghezzi, Jazayeri and Mandrioli, “Fundamentals of Software Engineering”, 2Edition, Prentice-Hall, 2003
5. Peters and Pedrycz, “Software Engineering: An Engineering Approach, John Wiley, 2004
6. Len Bass, “Software Architecture in Practice”, 2Edn. Addison Wesley, 2003
7. Allamaraju, “Professional Java Server Programming”, Apress, 2004

UNIVERSITY OF ENGINEERING AND MANAGEMENT, JAIPUR

Lab Manual

Title of Course: VLSI & Microelectronics Lab
Course Code: EE694D
L-T-P scheme: 0-0-3 **Course Credit: 2**

Objectives: The overall course objective is to teach electrical engineering students fundamental concepts of hardware description languages and advanced techniques in digital system design. Specific objectives include the following:

1. Learn VHDL (Very high speed integrated circuit Hardware Description Language).
2. Utilize VHDL to design and analyze digital systems including arithmetic units and state machines.
3. Learn field programmable gate array (FPGA) technologies and utilize associated computer aided design (CAD) tools to synthesize and analyze digital systems.
4. Learn testing strategies and construct test-benches.
5. Conduct laboratory experiments using an FPGA based development board to prototype digital systems and to confirm the analysis done in class.
6. Prepare informative and organized lab reports that describe the methodologies employed, the results obtained, and the conclusions made in a laboratory experiment.

Learning Outcomes: The students will have a detailed knowledge of the concepts of IEEE and ANSI standard HDL. Upon the completion of Operating Systems practical course, the student will be able to:

- **Understand** and implement basic digital logic circuits of VLSI.
- **Model** complex digital systems at several levels of abstractions; behavioral and structural, synthesis and rapid system prototyping.
- **Develop and Si**mulate register-level models of hierarchical digital systems.
- **Design and model** complex digital system independently or in a team
- Carry out **implementation**s of registers and counter**s.**
- **Simulate and synthesize** all type of digital logic circuits used in VLSI.
- Finally **design** a CPU.

Course Contents:

Exercises that must be done in this course are listed below:

Exercise No.1: Design of basic Gates: AND, OR, NOT.
Exercise No. 2: Design of universal gates
Exercise No. 3: Design of XOR and XNOR gate.
Exercise No. 4: Design of 2:1 MUX .
Exercise No. 5: Design of 2 to 4 Decoder.
Exercise No. 6: Design of Half-Adder and Full Adder.
Exercise No. 7: Design of 8:3 Priority Encoder.
Exercise No. 8: Design of 4 Bit Binary to Grey code Converter.
Exercise No. 9: Design of all Flip-Flops.
Exercise No. 10: Design of Shift register.
Exercise No. 11: Design of ALU.

Text Book:

1. J. Bhaskar, A VHDL Primer, 3rd edition, Prentice Hall.

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 1GHZ or faster processor with at least 1GB RAM and 8 GB free disk space.
2. Xilinx ISE14.2 software in Windows XP or Linux Operating System.