

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW



Evaluation Scheme & Syllabus

For

B.Tech. 3rd Year

(Computer Science and Engineering/CS)

On

Choice Based Credit System

(Effective from the Session: 2018-19)

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY LUCKNOW

B.TECH (COMPUTER SCIENCE & ENGINEERING) CURRICULUM STRUCTURE

SEMESTER- V

| Sl. No. | Subject Codes | Subject | Periods | | | Evaluation Scheme | | | | End Semester | | Total | Credit |
|---------|-----------------|---|-----------|----------|----------|-------------------|----|-------|----|--------------|----|------------|-----------|
| | | | L | T | P | CT | TA | Total | PS | TE | PE | | |
| 1 | KCS501 | Database Management System | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 2 | KCS502 | Compiler Design | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 3 | KCS503 | Design and Analysis of Algorithm | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 4 | | Departmental Elective-I | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 5 | | Departmental Elective-II | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 6 | KCS551 | Database Management System Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 7 | KCS552 | Compiler Design Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 8 | KCS553 | Design and Analysis of Algorithm Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 9 | KCS554 | Mini Project or Internship Assessment* | 0 | 0 | 2 | | | | 50 | | | 50 | 1 |
| 10 | NC ⁺ | Constitution of India / Essence of Indian Traditional Knowledge | 2 | 0 | 0 | 15 | 10 | 25 | | 50 | | | |
| 11 | | MOOCs (Essential for Hons. Degree) | | | | | | | | | | | |
| | | Total | 17 | 3 | 8 | | | | | | | 950 | 22 |

*The Mini Project or internship (4 weeks) conducted during summer break after IV semester and will be assessed during V semester.

| SEMESTER- VI | | | | | | | | | | | | | |
|--------------|-----------------|---|----------|----------|----------|-------------------|----|-------|----|--------------|------------|-----------|--------|
| Sl. No. | Subject Codes | Subject | Periods | | | Evaluation Scheme | | | | End Semester | | Total | Credit |
| | | | L | T | P | CT | TA | Total | PS | TE | PE | | |
| 1 | KCS601 | Software Engineering | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 2 | KCS602 | Web Technology | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 3 | KCS603 | Computer Networks | 3 | 1 | 0 | 30 | 20 | 50 | | 100 | | 150 | 4 |
| 4 | | Departmental Elective-III | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 5 | | Open Elective-I [Annexure - B(iv)] | 3 | 0 | 0 | 30 | 20 | 50 | | 100 | | 150 | 3 |
| 6 | KCS651 | Software Engineering Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 7 | KCS652 | Web Technology Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 8 | KCS653 | Computer Networks Lab | 0 | 0 | 2 | | | | 25 | | 25 | 50 | 1 |
| 9 | NC ⁺ | Essence of Indian Traditional Knowledge/Constitution of India | 2 | 0 | 0 | 15 | 10 | 25 | | 50 | | | |
| 10 | | MOOCs (Essential for Hons. Degree) | | | | | | | | | | | |
| | | Total | 0 | 3 | 6 | | | | | | 900 | 21 | |

NC⁺ : Non Credit Course

Departmental Elective-I

1. KCS-051 Data Analytics
2. KCS-052 Web Designing
3. KCS-053 Computer Graphics
4. KCS-054 Application of Soft Computing

Departmental Elective-II

1. KCS-055 Machine Learning Techniques
2. KCS-056 Object Oriented System Design
3. KCS-057 Augmented & Virtual Reality
4. KCS-058 Human Computer Interface

Departmental Elective-III

1. KCS-061 Big Data
2. KCS-062 Image Processing
3. KCS-063 Real Time Systems
4. KCS-064 Data Compression

B.TECH. (CSE & CS)

FIFTH SEMESTER (DETAILED SYLLABUS)

| Database Management System (KCS501) | | |
|--|--|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Apply knowledge of database for real life applications. | K ₃ |
| CO 2 | Apply query processing techniques to automate the real time problems of databases. | K ₃ , K ₄ |
| CO 3 | Identify and solve the redundancy problem in database tables using normalization. | K ₂ , K ₃ |
| CO 4 | Understand the concepts of transactions, their processing so they will familiar with broad range of database management issues including data integrity, security and recovery. | K ₂ , K ₄ |
| CO 5 | Design, develop and implement a small database project using database tools. | K ₃ , K ₆ |
| DETAILED SYLLABUS | | 3-1-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction: Overview, Database System vs File System, Database System Concept and Architecture, Data Model Schema and Instances, Data Independence and Database Language and Interfaces, Data Definitions Language, DML, Overall Database Structure. Data Modeling Using the Entity Relationship Model: ER Model Concepts, Notation for ER Diagram, Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key, Generalization, Aggregation, Reduction of an ER Diagrams to Tables, Extended ER Model, Relationship of Higher Degree. | 08 |
| II | Relational data Model and Language: Relational Data Model Concepts, Integrity Constraints, Entity Integrity, Referential Integrity, Keys Constraints, Domain Constraints, Relational Algebra, Relational Calculus, Tuple and Domain Calculus. Introduction on SQL: Characteristics of SQL, Advantage of SQL. SQL Data Type and Literals. Types of SQL Commands. SQL Operators and Their Procedure. Tables, Views and Indexes. Queries and Sub Queries. Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL | 08 |
| III | Data Base Design & Normalization: Functional dependencies, normal forms, first, second, 8 third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design | 08 |
| IV | Transaction Processing Concept: Transaction System, Testing of Serializability, Serializability of Schedules, Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures, Log Based Recovery, Checkpoints, Deadlock Handling. Distributed Database: Distributed Data Storage, Concurrency Control, Directory System. | 08 |
| V | Concurrency Control Techniques: Concurrency Control, Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol, Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction, Case Study of Oracle. | 08 |
| Text books: | | |
| <ol style="list-style-type: none"> 1. Korth, Silbertz, Sudarshan, " Database Concepts", McGraw Hill 2. Date C J, "An Introduction to Database Systems", Addison Wesley 3. Elmasri, Navathe, " Fundamentals of Database Systems", Addison Wesley 4. O'Neil, Databases, Elsevier Pub. 5. RAMAKRISHNAN "Database Management Systems", McGraw Hill 6. Leon & Leon, "Database Management Systems", Vikas Publishing House 7. Bipin C. Desai, " An Introduction to Database Systems", Gagotia Publications 8. Majumdar & Bhattacharya, "Database Management System", TMH | | |

| Compiler Design (KCS-502) | | |
|---|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. | K ₃ , K ₆ |
| CO 2 | Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. | K ₂ , K ₆ |
| CO 3 | Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. | K ₄ , K ₅ |
| CO 4 | Acquire knowledge about run time data structure like symbol table organization and different techniques used in that. | K ₂ , K ₃ |
| CO 5 | Understand the target machine's run time environment, its instruction set for code generation and techniques used for code optimization. | K ₂ , K ₄ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction to Compiler: Phases and passes, Bootstrapping, Finite state machines and regular expressions and their applications to lexical analysis, Optimization of DFA-Based Pattern Matchers implementation of lexical analyzers, lexical-analyzer generator, LEX compiler, Formal grammars and their application to syntax analysis, BNF notation, ambiguity, YACC. The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG. | 08 |
| II | Basic Parsing Techniques: Parsers, Shift reduce parsing, operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables. | 08 |
| III | Syntax-directed Translation: Syntax-directed Translation schemes, Implementation of Syntax-directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples, translation of assignment statements, Boolean expressions, statements that alter the flow of control, postfix translation, translation with a top down parser. More about translation: Array references in arithmetic expressions, procedures call, declarations and case statements. | 08 |
| IV | Symbol Tables: Data structure for symbols tables, representing scope information. Run-Time Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors semantic errors. | 08 |
| V | Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, value numbers and algebraic laws, Global Data-Flow analysis. | 08 |
| Text books: | | |
| 1.K. Muneeswaran,Compiler Design,First Edition,Oxford University Press. | | |
| 2,J.P. Bennet, "Introduction to Compiler Techniques", Second Edition, Tata McGraw-Hill,2003. | | |
| 3.Henk Alblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI, 2001. | | |
| 4.Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education | | |

- 5.V Raghvan, “Principles of Compiler Design”, TMH
 6.Kenneth Louden,” Compiler Construction”, Cengage Learning.
 7.Charles Fischer and Ricard LeBlanc,” Crafting a Compiler with C”, Pearson Education

| Design and Analysis of Algorithm (KCS503) | | |
|--|--|-------------------------------------|
| Course Outcome (CO) | | Bloom’s Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands. | K ₄ , K ₆ |
| CO 2 | Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate). | K ₅ , K ₆ |
| CO 3 | Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms. | K ₂ , K ₅ |
| CO 4 | Apply classical sorting, searching, optimization and graph algorithms. | K ₂ , K ₄ |
| CO 5 | Understand basic techniques for designing algorithms, including the techniques of recursion, divide-and-conquer, and greedy. | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-1-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction: Algorithms, Analyzing Algorithms, Complexity of Algorithms, Growth of Functions, Performance Measurements, Sorting and Order Statistics - Shell Sort, Quick Sort, Merge Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time. | 08 |
| II | Advanced Data Structures: Red-Black Trees, B – Trees, Binomial Heaps, Fibonacci Heaps, Tries, Skip List | 08 |
| III | Divide and Conquer with Examples Such as Sorting, Matrix Multiplication, Convex Hull and Searching. Greedy Methods with Examples Such as Optimal Reliability Allocation, Knapsack, Minimum Spanning Trees – Prim’s and Kruskal’s Algorithms, Single Source Shortest Paths - Dijkstra’s and Bellman Ford Algorithms. | 08 |
| IV | Dynamic Programming with Examples Such as Knapsack. All Pair Shortest Paths – Warshal’s and Floyd’s Algorithms, Resource Allocation Problem. Backtracking, Branch and Bound with Examples Such as Travelling Salesman Problem, Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets. | 08 |
| V | Selected Topics: Algebraic Computation, Fast Fourier Transform, String Matching, Theory of NP-Completeness, Approximation Algorithms and Randomized Algorithms | 08 |
| Text books: | | |
| <ol style="list-style-type: none"> 1. Thomas H. Coreman, Charles E. Leiserson and Ronald L. Rivest, “Introduction to Algorithms”, Printice Hall of India. 2. E. Horowitz & S Sahni, "Fundamentals of Computer Algorithms", 3. Aho, Hopcraft, Ullman, “The Design and Analysis of Computer Algorithms” Pearson Education, 2008. 4. LEE "Design & Analysis of Algorithms (POD)", McGraw Hill 5. Richard E. Neapolitan "Foundations of Algorithms" Jones & Bartlett Learning 6. Jon Kleinberg and Éva Tardos, Algorithm Design, Pearson, 2005. 7. Michael T Goodrich and Roberto Tamassia, Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Wiley, 2006. 8. Harry R. Lewis and Larry Denenberg, Data Structures and Their Algorithms, Harper Collins, 1997 | | |

9. Robert Sedgewick and Kevin Wayne, Algorithms, fourth edition, Addison Wesley, 2011.
10. Harsh Bhasin, "Algorithm Design and Analysis", First Edition, Oxford University Press.
11. Gilles Brassard and Paul Bratley, Algorithmics: Theory and Practice, Prentice Hall, 1995.

Data Analytics (KCS-051)

Course Outcome (CO)

Bloom's Knowledge Level (KL)

At the end of course , the student will be able to understand

| | | |
|------|--|--|
| CO 1 | Describe the life cycle phases of Data Analytics through discovery, planning and building. | |
| CO 2 | Learn various Data Analysis Techniques. | |
| CO 3 | Implement various Data streams. | |
| CO 4 | Understand item sets, Clustering, frame works & Visualizations. | |
| CO 5 | Apply R tool for developing real time applications. | |

DETAILED SYLLABUS

3-0-0

| Unit | Topic | Proposed Lecture |
|------------|---|------------------|
| I | Introduction to Data Analytics: Sources and nature of data, classification of data (structured, semi-structured, unstructured), characteristics of data, introduction to Big Data platform, need of data analytics, evolution of analytic scalability, analytic process and tools, analysis vs reporting, modern data analytic tools, applications of data analytics. Data Analytics Lifecycle: Need, key roles for successful analytic projects, various phases of data analytics lifecycle – discovery, data preparation, model planning, model building, communicating results, operationalization. | 08 |
| II | Data Analysis: Regression modeling, multivariate analysis, Bayesian modeling, inference and Bayesian networks, support vector and kernel methods, analysis of time series: linear systems analysis & nonlinear dynamics, rule induction, neural networks: learning and generalisation, competitive learning, principal component analysis and neural networks, fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, stochastic search methods. | 08 |
| III | Mining Data Streams: Introduction to streams concepts, stream data model and architecture, stream computing, sampling data in a stream, filtering streams, counting distinct elements in a stream, estimating moments, counting oneness in a window, decaying window, Real-time Analytics Platform (RTAP) applications, Case studies – real time sentiment analysis, stock market predictions. | 08 |
| IV | Frequent Itemsets and Clustering: Mining frequent itemsets, market based modelling, Apriori algorithm, handling large data sets in main memory, limited pass algorithm, counting frequent itemsets in a stream, clustering techniques: hierarchical, K-means, clustering high dimensional data, CLIQUE and ProCLUS, frequent pattern based clustering methods, clustering in non-euclidean space, clustering for streams and parallelism. | 08 |
| V | Frame Works and Visualization: MapReduce, Hadoop, Pig, Hive, HBase, MapR, Sharding, NoSQL Databases, S3, Hadoop Distributed File Systems, Visualization: visual data analysis techniques, interaction techniques, systems and applications. Introduction to R - R graphical user interfaces, data import and export, attribute and data types, descriptive statistics, exploratory data analysis, visualization before analysis, | 08 |

| | |
|---|--|
| analytics for unstructured data. | |
| Text books and References: | |
| 1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer | |
| 2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press. | |
| 3. Bill Franks, Taming the Big Data Tidal wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & Sons. | |
| 4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley | |
| 5. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big Data Analytics", EMC Education Series, John Wiley | |
| 6. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series | |
| 7. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis", Elsevier | |
| 8. Michael Berthold, David J. Hand," Intelligent Data Analysis", Springer | |
| 9. Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGraw Hill | |
| 10. Trevor Hastie, Robert Tibshirani, Jerome Friedman, "The Elements of Statistical Learning", Springer | |
| 11. Mark Gardner, "Beginning R: The Statistical Programming Language", Wrox Publication | |
| 12. Pete Warden, Big Data Glossary, O'Reilly | |
| 13. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons | |
| 14. Pete Warden, Big Data Glossary, O'Reilly. | |
| 15. Peter Bühlmann, Petros Drineas, Michael Kane, Mark van der Laan, "Handbook of Big Data", CRC Press | |
| 16. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier | |

| Data Analytics (KCS-051) | | |
|--|--|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Gain the principle concepts and foundational understanding of data analytics. | |
| CO 2 | Understanding of the statistical procedures most often used by practicing engineers | |
| CO 3 | Demonstrate the business analytical techniques used in decision making. | |
| CO 4 | Understand item sets, classification, clustering and machine learning techniques. | |
| CO 5 | Employ tools and technologies to analyze data | |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction: Sources, modes of availability, inaccuracies, and uses of data. Data Objects and Attributes: Descriptive Statistics; Visualization; and Data Similarity and Dissimilarity. | 08 |
| II | Pre-processing of Data: Cleaning for Missing and Noisy Data; Data Reduction – Discrete Wavelet Transform, Principal Component Analysis, Partial Least Square Method, Attribute Subset Selection; and Data Transformation and Discretization. Inferential Statistics: Probability Density Functions; Inferential Statistics through Hypothesis Tests | 08 |
| III | Business Analytics: Predictive Analysis (Regression and Correlation, Logistic Regression, InSample and Out-of-Sample Predictions), Prescriptive Analytics (Optimization and | 08 |

| | | |
|-----------|---|-----------|
| | Simulation with Multiple Objectives); Mining Frequent Patterns: Concepts of Support and Confidence; Frequent Itemset Mining Methods; Pattern Evaluation. | |
| IV | Classification: Decision Trees – Attribute Selection Measures and Tree Pruning; Bayesian and Rule-based Classification; Model Evaluation and Selection; Cross-Validation; Classification Accuracy; Bayesian Belief Networks; Classification by Backpropagation; and Support Vector Machine. Partitioning Methods – k-means Hierarchical Methods and Hierarchical Clustering Using Feature Trees; Probabilistic Hierarchical Clustering; Introduction to Density-, Grid-, and Fuzzy and Probabilistic Model-based Clustering Methods; and Evaluation of Clustering Methods. | 08 |
| V | Machine Learning: Introduction and Concepts: Ridge Regression; Lasso Regression; and kNearest Neighbours, Regression and Classification. Supervised Learning with Regression and Classification Techniques: Bias-Variance Dichotomy, Linear and Quadratic Discriminant Analysis, Classification and Regression Trees, Ensemble Methods: Random Forest, Neural Networks, Deep Learning. | 08 |

Text books and References:

1. James, G., D. Witten, T. Hastie, and R. Tibshirani, An Introduction to Statistical learning with Application to R, Springer, New York.
2. Jank, W., Business Analytics for Managers, Springer, New York.
3. Witten, I. H., E. Frank, and M. A. Hall, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.
4. Wolfgang, J., Business Analytics for Managers, Springer.
5. Montgomery, D. C., and G. C. Runger, Applied Statistics and Probability for Engineers.
6. John Wiley & Sons
7. Samueli G., N. R. Patel, and P. C. Bruce, Data Mining for Business Intelligence, John Wiley & Sons, New York.
8. Hastie, T., R. T. Jerome, and H. Friedman, “The Elements of Statistical Learning: Data Mining, Inference and Prediction”, Springer.
9. Mark Gardner, “Beginning R: The Statistical Programming Language”, Wrox Publication
10. Colleen Mccue, “Data Mining and Predictive Analysis: Intelligence Gathering and Crime Analysis”, Elsevier
11. Michael Berthold, David J. Hand,” Intelligent Data Analysis”, Springer
12. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons
13. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer
14. David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big Data Analytics”, EMC Education Series, John Wiley
15. Jiawei Han, Micheline Kamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier

| Web Designing (KCS-052) | | |
|--|---|-------------------------------------|
| Course Outcome (CO) | | Bloom’s Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Understand principle of Web page design and about types of websites | K ₃ , K ₄ |
| CO 2 | Visualize and Recognize the basic concept of HTML and application in web designing. | K ₁ , K ₂ |
| CO 3 | Recognize and apply the elements of Creating Style Sheet (CSS). | K ₂ , K ₄ |

| | | |
|---|--|---------------------------------|
| CO 4 | Understanding the basic concept of Java Script and its application. | K ₂ , K ₃ |
| CO 5 | Introduce basics concept of Web Hosting and apply the concept of SEO | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction : Basic principles involved in developing a web site, Planning process , Domains and Hosting, Responsive Web Designing , Types of Websites (Static and Dynamic Websites), Web Standards and W3C recommendations, Introduction to HTML: What is HTML , HTML Documents, Basic structure of an HTML document , Creating an HTML document , Mark up Tags , Heading-Paragraphs , Line Breaks | 08 |
| II | Elements of HTML: HTML Tags., Working with Text , Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls | 08 |
| III | Concept of CSS: Creating Style Sheet, CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties) CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs. | 08 |
| IV | Introduction to Client Side Scripting , Introduction to Java Script , Javascript Types , Variables in JS, Operators in JS , Conditions Statements , Java Script Loops, JS Popup Boxes , JS Events , JS Arrays, Working with Arrays, JS Objects ,JS Functions , Using Java Script in Real time , Validation of Forms, Related Examples | 08 |
| V | Web Hosting: Web Hosting Basics , Types of Hosting Packages, Registering domains , Defining Name Servers , Using Control Panel, Creating Emails in Cpanel , Using FTP Client, Maintaining a Website Concepts of SEO : Basics of SEO, Importance of SEO, Onpage Optimization Basics | 08 |
| Text Books: | | |
| <ol style="list-style-type: none"> 1. Steven M. Schafer, “HTML, XHTML, and CSS Bible, 5ed”, Wiley India 2. Ian Pouncey, Richard York, “Beginning CSS: Cascading Style Sheets for Web Design”, Wiley India | | |

| | | |
|--|---|-------------------------------------|
| Computer Graphics (KCS-053) | | |
| Course Outcome (CO) | | Bloom’s Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Understand the graphics hardware used in field of computer graphics. | K ₂ |
| CO 2 | Understand the concept of graphics primitives like lines and circle based on different algorithms. | K ₂ , K ₄ |
| CO 3 | Apply the 2D graphics transformations, composite transformation and Clipping concepts . | K ₄ |
| CO 4 | Apply the concepts of and techniques used in 3D computer graphics, including viewing transformations. | K ₂ , K ₃ |

| | | |
|--------------------------|---|---------------------------------|
| CO 5 | Perform the concept of projections, curve and hidden surfaces in real life. | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating algorithm, and parallel version of these algorithms. | 08 |
| II | Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping | 08 |
| III | Three Dimensional: 3-D Geometric Primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping. | 08 |
| IV | Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory concepts of Spline, Bspline and Bezier curves and surfaces. | 08 |
| V | Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models– Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows. | 08 |

Text books:

1. Donald Hearn and M Pauline Baker, “Computer Graphics C Version”, Pearson Education
2. Foley, Vandam, Feiner, Hughes – “Computer Graphics principle”, Pearson Education.
3. Rogers, “ Procedural Elements of Computer Graphics”, McGraw Hill
4. W. M. Newman, R. F. Sproull – “Principles of Interactive computer Graphics” – Tata MCGraw Hill.
5. Amrendra N Sinha and Arun D Udai,” Computer Graphics”, Tata MCGraw Hill.
6. R.K. Maurya, “Computer Graphics ” Wiley Dreamtech Publication.
7. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI Learning Private Limited.
8. Donald Hearn and M Pauline Baker, “Computer Graphics with OpenGL”, Pearson education

| Application of Soft Computing (KCS- 054) | | |
|--|---|-------------------------------------|
| Course Outcome (CO) | | Bloom’s Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Recognize the feasibility of applying a soft computing methodology for a particular problem | K ₂ , K ₄ |
| CO 2 | Know the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems. | K ₄ , K ₆ |
| CO 3 | Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing approaches for a given problem. | K ₃ , K ₅ |
| CO 4 | Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems | K ₃ , K ₄ |
| CO 5 | Apply genetic algorithms to combinatorial optimization problems | K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |

| | | |
|-----|---|----|
| I | Neural Networks-I (Introduction & Architecture) : Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory. | 08 |
| II | Neural Networks-II (Back propogation networks): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perception model; back propogation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting backpropagation training, applications. | 08 |
| III | Fuzzy Logic-I (Introduction): Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion. | 08 |
| IV | Fuzzy Logic –II (Fuzzy Membership, Rules) : Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial applications | 08 |
| V | Genetic Algorithm(GA): Basic concepts, working principle, procedures of GA, flow chart of GA, Genetic representations, (encoding) Initialization and selection, Genetic operators, Mutation, Generational Cycle, applications. | 08 |

Text books:

1. S. Rajsekaran & G.A. Vijayalakshmi Pai, “Neural Networks,Fuzzy Logic and Genetic Algorithm:Synthesis and Applications” Prentice Hall of India.
2. N.P.Padhy, ”Artificial Intelligence and Intelligent Systems” Oxford University Press. Reference Books:
3. Siman Haykin, ”Neural Netowrks”Prentice Hall of India
4. Timothy J. Ross, “Fuzzy Logic with Engineering Applications” Wiley India.
5. Kumar Satish, “Neural Networks” Tata Mc Graw Hill

| Machine Learning Techniques (KCS 055) | | |
|---|---|-------------------------------------|
| Course Outcome (CO) | | Bloom’s Knowledge Level (KL) |
| At the end of course , the student will be able: | | |
| CO 1 | To understand the need for machine learning for various problem solving | K ₁ , K ₂ |
| CO 2 | To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning | K ₁ , K ₂ |
| CO 3 | To understand the latest trends in machine learning | K ₁ , K ₂ |
| CO 4 | To design appropriate machine learning algorithms for problem solving | K ₃ , K ₆ |
| CO 5 | To understand the need for machine learning for various problem solving | K ₄ , K ₅ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | INTRODUCTION – Well defined learning problems, Designing a Learning System, Issues in Machine Learning; THE CONCEPT LEARNING TASK - General-to-specific ordering of | 08 |

| | | |
|-----|--|----|
| | hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm, Inductive bias | |
| II | DECISION TREE LEARNING - Decision tree learning algorithm-Inductive bias- Issues in Decision tree learning; ARTIFICIAL NEURAL NETWORKS – Perceptrons, Gradient descent and the Delta rule, Adaline, Multilayer networks, Derivation of backpropagation rule Backpropagation Algorithm Convergence, Generalization; | 08 |
| III | Evaluating Hypotheses: Estimating Hypotheses Accuracy, Basics of sampling Theory, Comparing Learning Algorithms; Bayesian Learning: Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm; | 08 |
| IV | Computational Learning Theory: Sample Complexity for Finite Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning; INSTANCE-BASED LEARNING – k-Nearest Neighbour Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning | 08 |
| V | Genetic Algorithms: an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-FOIL; REINFORCEMENT LEARNING - The Learning Task, Q Learning. | 08 |

Text books:

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2. Ethem Alpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
3. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.
4. Bishop, C., Pattern Recognition and Machine Learning. Berlin: Springer-Verlag.

| Object Oriented System Design (KCS-056) | | |
|--|---|--|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | To Understand the application development and analyze the insights of object oriented programming to implement application | K ₂ , K ₄ |
| CO 2 | To Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) | K ₂ , K ₃ |
| CO 3 | To Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) | K ₂ , K ₃ , K ₄ |
| CO 4 | To learn concepts of C++ for understanding the implementation of object oriented concepts | K ₂ , K ₃ |
| CO 5 | To learn the programming concepts to implement object oriented modeling. | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction: The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modelling, principles of modelling, object oriented modelling, Introduction to UML, conceptual model of the UML, Architecture. | 08 |
| II | Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams. Collaboration Diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration Diagrams, iterated messages, use of self in messages. Sequence Diagrams: Terms, concepts, depicting asynchronous messages with/without priority, call-back mechanism, broadcast messages. Basic Behavioural Modeling: Use cases, Use case Diagrams, Activity Diagrams, State Machine , Process and thread, Event and signals, Time diagram, interaction diagram, Package diagram. Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. | 08 |
| III | Object Oriented Analysis: Object oriented design, Object design, Combining three models, Designing | 08 |

| | | |
|-----------|--|-----------|
| | algorithms, design optimization, Implementation of control, Adjustment of inheritance, Object representation, Physical packaging, Documenting design considerations. Structured analysis and structured design (SA/SD) , Jackson Structured Development (JSD). Mapping object oriented concepts using non-object oriented language, Translating classes into data structures, Passing arguments to methods, Implementing inheritance, associations encapsulation. Object oriented programming style: reusability, extensibility, robustness, programming in the large. Procedural v/s OOP, Object oriented language features. Abstraction and Encapsulation. | |
| IV | C++ Basics : Overview, Program structure, namespace, identifiers, variables, constants, enum, operators, typecasting, control structures C++ Functions : Simple functions, Call and Return by reference, Inline functions, Macro Vs. Inline functions, Overloading of functions, default arguments, friend functions, virtual functions | 08 |
| V | Objects and Classes : Basics of object and class in C++, Private and public members, static data and function members, constructors and their types, destructors, operator overloading, type conversion. Inheritance : Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class Polymorphism : Pointers in C++, Pointers and Objects, this pointer, virtual and pure virtual functions, Implementing polymorphism | 08 |

Text Books

1. James Rumbaugh et. al, "Object Oriented Modeling and Design", PHI
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", Pearson Education
3. Object Oriented Programming With C++, E Balagurusamy, TMH
4. C++ Programming, Black Book, Steven Holzner, dreamtech
5. Object Oriented Programming in Turbo C++, Robert Lafore, Galgotia
6. Object Oriented Programming with ANSI and Turbo C++, Ashok Kamthane, Pearson
7. The Complete Reference C++, Herbert Schilitz, TMH

| Augmented & Virtual Reality (KCS- 057) | | |
|--|--|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able : | | |
| CO 1 | To make students know the basic concept and framework of virtual reality. | K ₁ , K ₂ |
| CO 2 | To teach students the principles and multidisciplinary features of virtual reality. | K ₂ , K ₄ |
| CO 3 | To teach students the technology for multimodal user interaction and perception in VR, in particular the visual, audial and haptic interface and behavior. | K ₂ , K ₃ |
| CO 4 | To teach students the technology for managing large scale VR environment in real time. | K ₂ , K ₃ |
| CO 5 | To provide students with an introduction to the AR system framework and development tools. | K ₂ , K ₃ , |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | VIRTUAL REALITY AND VIRTUAL ENVIRONMENTS: The historical development of VR: Scientific landmarks Computer Graphics, Real-time computer graphics, Flight simulation, Virtual | 08 |

| | | |
|-----|---|----|
| | environments, Requirements for VR, benefits of Virtual reality. HARDWARE TECHNOLOGIES FOR 3D USER INTERFACES: Visual Displays Auditory Displays, Haptic Displays, Choosing Output Devices for 3D User Interfaces. | |
| II | 3D USER INTERFACE INPUT HARDWARE: Input device characteristics, Desktop input devices, Tracking Devices, 3D Mice, Special Purpose Input Devices, Direct Human Input, Home - Brewed Input Devices, Choosing Input Devices for 3D Interfaces. | 08 |
| III | SOFTWARE TECHNOLOGIES: Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User Interface, Control Panel, 2D Controls, Hardware Controls, Room / Stage / Area Descriptions, World Authoring and Playback, VR toolkits, Available software in the market | 08 |
| IV | 3D INTERACTION TECHNIQUES: 3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Design Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of Wayfinding, User Centered Wayfinding Support, Environment Centered Wayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control, Classification, Graphical Menus, Voice Commands, Gestural Commands, Tools, Multimodal System Control Techniques, Design Guidelines, Case Study: Mixing System Control Methods, Symbolic Input Tasks, symbolic Input Techniques, Design Guidelines, Beyond Text and Number entry . DESIGNING AND DEVELOPING 3D USER INTERFACES: Strategies for Designing and Developing Guidelines and Evaluation. VIRTUAL REALITY APPLICATIONS: Engineering, Architecture, Education, Medicine, Entertainment, Science, Training. | 08 |
| V | Augmented and Mixed Reality, Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems. | 08 |

Text books:

1. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.
2. Gerard Jounghyun Kim, "Designing Virtual Systems: The Structured Approach", 2005.
3. Doug A Bowman, Ernest Kuijff, Joseph J LaViola, Jr and Ivan Poupyrev, "3D User Interfaces, Theory and Practice", Addison Wesley, USA, 2005.
4. Oliver Bimber and Ramesh Raskar, "Spatial Augmented Reality: Merging Real and Virtual Worlds", 2005.
5. Burdea, Grigore C and Philippe Coiffet, "Virtual Reality Technology", Wiley Interscience, India, 2003.
6. John Vince, "Virtual Reality Systems", Addison Wesley, 1995.

7. Howard Rheingold, "Virtual Reality: The Revolutionary Technology and how it Promises to Transform Society", Simon and Schuster, 1991.
8. William R Sherman and Alan B Craig, "Understanding Virtual Reality: Interface, Application and Design (The Morgan Kaufmann Series in Computer Graphics)". Morgan Kaufmann Publishers, San Francisco, CA, 2002
9. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

| Human Computer Interface (KCS- 058) | | |
|--|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Critically discuss common methods in the user-centered design process and the appropriateness of individual methods for a given problem. | K ₂ , K ₄ |
| CO 2 | Use, adapt and extend classic design standards, guidelines, and patterns. | K ₃ , K ₅ |
| CO 3 | Employ selected design methods and evaluation methods at a basic level of competence. | K ₄ , K ₅ |
| CO 4 | Build prototypes at varying levels of fidelity, from paper prototypes to functional, interactive prototypes. | K ₄ , K ₅ |
| CO 5 | Demonstrate sufficient theory of human computer interaction, experimental methodology and inferential statistics to engage with the contemporary research literature in interface technology and design. | K ₃ , K ₄ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction : Importance of user Interface – definition, importance of 8 good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface | 08 |
| II | Design process: Human interaction with computers, importance of 8 human characteristics human consideration, Human interaction speeds, understanding business junctions. III Screen Designing : Design goals – Scre | 08 |
| III | Screen Designing : Design goals – Screen planning and purpose, 8 organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design. | 08 |
| IV | Windows : New and Navigation schemes selection of window, 8 selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, | 08 |

| | | |
|---|---|-----------|
| | uses problems, choosing colors | |
| V | Software tools : Specification methods, interface – Building Tools. 8 Interaction Devices – Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers. | 08 |

Text books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition Prentice Hall, 2004.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in HumanComputer Interaction, Wiley, 2010.
3. Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0- 321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.

Database Management Systems Lab (KCS-551)

1. Installing oracle/ MYSQL
2. Creating Entity-Relationship Diagram using case tools.
3. Writing SQL statements Using ORACLE /MYSQL:
 - a)Writing basic SQL SELECT statements.
 - b) Restricting and sorting data.
 - c)Displaying data from multiple tables.
 - d)Aggregating data using group function.
 - e)Manipulating data.
 - e)Creating and managing tables.
4. Normalization
5. Creating cursor
6. Creating procedure and functions
7. Creating packages and triggers
8. Design and implementation of payroll processing system
9. Design and implementation of Library Information System
10. Design and implementation of Student Information System
11. Automatic Backup of Files and Recovery of Files

COMPILER DESIGN LAB (KCS-552)

1. Implementation of LEXICAL ANALYZER for IF STATEMENT
2. Implementation of LEXICAL ANALYZER for ARITHMETIC EXPRESSION
3. Construction of NFA from REGULAR EXPRESSION
4. Construction of DFA from NFA
5. Implementation of SHIFT REDUCE PARSING ALGORITHM
6. Implementation of OPERATOR PRECEDENCE PARSER
7. Implementation of RECURSIVE DESCENT PARSER
8. Implementation of CODE OPTIMIZATION TECHNIQUES
9. Implementation of CODE GENERATOR

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner.

Design and Analysis of Algorithm Lab (KCS-553)

1. Program for Recursive Binary & Linear Search.
2. Program for Heap Sort.
3. Program for Merge Sort.
4. Program for Selection Sort.
5. Program for Insertion Sort.
6. Program for Quick Sort.
7. Knapsack Problem using Greedy Solution
8. Perform Travelling Salesman Problem
9. Find Minimum Spanning Tree using Kruskal's Algorithm
10. Implement N Queen Problem using Backtracking

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner

B.TECH. (CSE & CS)
SIXTH SEMESTER (DETAILED SYLLABUS)

| Software Engineering (KCS-601) | | |
|---|--|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | To learn about generic models of software development process. | K ₂ |
| CO 2 | To understand fundamental concepts of requirements engineering and Analysis Modeling. | K ₂ |
| CO 3 | To understand the different design techniques and their implementation. | K ₂ , K ₃ |
| CO 4 | To learn various testing measures. | K ₂ , K ₄ |
| CO 5 | To learn various maintenance and project management techniques. | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-1-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. | 08 |
| II | Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model. | 08 |
| III | Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs. | 08 |
| IV | Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, TopDown and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards. | 08 |
| V | Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management. | 08 |
| Text books: | | |
| <ol style="list-style-type: none"> 1.RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill. 2. Pankaj Jalote, Software Engineering, Wiley 3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication. 4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers. 5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication. 6. Ian Sommerville, Software Engineering, Addison Wesley. | | |

7. Kassem Saleh, "Software Engineering", Cengage Learning.

8. P fleeger, Software Engineering, Macmillan Publication

Web Technology (KCS-602)

Course Outcome (CO)

Bloom's Knowledge Level (KL)

At the end of course , the student will be able to understand

| | | |
|------|--|--|
| CO 1 | Apply the knowledge of the internet and related internet concepts that are vital in understanding web application development and analyze the insights of internet programming to implement complete application over the web. | K ₃ , K ₆ |
| CO 2 | Understand, analyze and apply the role of mark up languages like HTML, DHTML, and XML in the workings of the web and web applications. | K ₂ , K ₃ |
| CO 3 | Use web application development software tools i.e. XML, Apache Tomcat etc. and identifies the environments currently available on the market to design web sites. | K ₃ , K ₆ |
| CO 4 | Understand, analyze and build dynamic web pages using client side programming JavaScript and also develop the web application using servlet and JSP. | K ₂ , K ₄ , K ₆ |
| CO 5 | Understand the impact of web designing by database connectivity with JDBC in the current market place where everyone use to prefer electronic medium for shopping, commerce, fund transfer and even social life also. | K ₂ , K ₃ , K ₄ |

DETAILED SYLLABUS

3-0-0

| Unit | Topic | Proposed Lecture |
|------------|---|------------------|
| I | Introduction: Introduction and Web Development Strategies, History of Web and Internet, Protocols Governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing. Core Java: Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers | 08 |
| II | Web Page Designing: HTML: List, Table, Images, Frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML | 08 |
| III | Scripting: Java script: Introduction, documents, forms, statements, functions, objects; introduction to AJAX, Networking : Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagram. | 08 |
| IV | Enterprise Java Bean: Preparing a Class to be a JavaBeans, Creating a JavaBeans, JavaBeans Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures. | 08 |
| V | Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries.. | 08 |

Text books: 1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley

2. Xavier, C, " Web Technology and Design" , New Age International

3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication

4. Bhave, "Programming with Java", Pearson Education

5. Herbert Schildt, "The Complete Reference:Java", TMH.

6. Hans Bergsten, "Java Server Pages", SPD O'Reilly
7. Margaret Levine Young, "The Complete Reference Internet", TMH
8. Naughton, Schildt, "The Complete Reference JAVA2", TMH
9. Balagurusamy E, "Programming in JAVA", TMH

| Computer Networks (KCS- 603) | | |
|--|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | Build an understanding of the fundamental concepts and Layered Architecture of computer networking. | K ₂ , K ₃ |
| CO 2 | Understand the basic concepts of link layer properties to detect error and develop the solution for error control and flow control. | K ₂ , K ₄ |
| CO 3 | Design, calculate, and apply subnet masks and addresses to fulfil networking requirements and calculate distance among routers in subnet. | K ₃ , K ₆ |
| CO 4 | Understanding the duties of transport layer, session layer and presentation layer and also focus on network security issues to secure communication towards society. | K ₂ , K ₄ |
| CO 5 | Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks. | K ₃ , K ₆ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introductory Concepts: Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, Network structure and architecture (layering principles, services, protocols and standards), The OSI reference model, TCP/IP protocol suite, Network devices and components. Physical Layer: Network topology design, Types of connections, Transmission media, Signal transmission and encoding, Network performance and transmission impairments, Switching techniques and multiplexing. | 08 |
| II | Link layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges (learning bridge and spanning tree algorithms). | 08 |
| III | Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6. | 08 |
| IV | Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP), Multiplexing, Connection management, Flow control and retransmission, Window management, TCP Congestion control, Quality of service. | 08 |
| V | Application Layer: Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login, Network management, Data compression, Cryptography – basic concepts. | 08 |
| Text books: | | |
| Text books and References: | | |
| <ol style="list-style-type: none"> 1. Behrouz Forouzan, "Data Communication and Networking", McGraw Hill 2. Andrew Tanenbaum "Computer Networks", Prentice Hall. 3. William Stallings, "Data and Computer Communication", Pearson. 4. Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson. 5. Peterson and Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann | | |

6. W. A. Shay, "Understanding Communications and Networks", Cengage Learning.
7. D. Comer, "Computer Networks and Internets", Pearson.
8. Behrouz Forouzan, "TCP/IP Protocol Suite", McGraw Hill.

Big Data (KCS-061)

Course Outcome (CO)

Bloom's Knowledge Level (KL)

At the end of course , the student will be able to

| | | |
|------|--|--|
| CO 1 | Identify Big Data and its business implications. | |
| CO 2 | Use various techniques for mining data stream | |
| CO 3 | List the components of Hadoop and Hadoop Eco-System. | |
| CO 4 | Apply Map Reduce programming model to access and process data on Distributed File System. | |
| CO 5 | Manage job execution in Hadoop environment and develop Big Data solutions by applying Hadoop Eco System components | |

DETAILED SYLLABUS

3-0-0

| Unit | Topic | Proposed Lectures |
|------|---|-------------------|
| I | Introduction to Big Data: Types of digital data, history of Big Data innovation, introduction to Big Data platform, drivers for Big Data, Big Data architecture and characteristics, 5 Vs of Big Data, Big Data technology components, Big Data importance and applications, Big Data features – security, compliance, auditing and protection, Big Data privacy and ethics, Big Data Analytics, Challenges of conventional systems, intelligent data analysis, nature of data, analytic processes and tools, analysis vs reporting, modern data analytic tools. | 06 |
| II | Hadoop: History of Hadoop, Apache Hadoop, the Hadoop Distributed File System, components of Hadoop, data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, Hadoop Echo System. Map Reduce: Map Reduce framework and basics, how Map Reduce works, developing a Map Reduce application, unit tests with MR unit, test data and local tests, anatomy of a Map Reduce job run, failures, job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats, Map Reduce features, Real-world Map Reduce | 08 |
| III | HDFS (Hadoop Distributed File System): Design of HDFS, HDFS concepts, benefits and challenges, file sizes, block sizes and block abstraction in HDFS, data replication, how does HDFS store, read, and write files, Java interfaces to HDFS, command line interface, Hadoop file system interfaces, data flow, data ingest with Flume and Scoop, Hadoop archives, Hadoop I/O: compression, serialization, Avro and file-based data structures. Hadoop Environment: Setting up a Hadoop cluster, cluster specification, cluster setup and installation, Hadoop configuration, security in Hadoop, administering Hadoop, HDFS monitoring & maintenance, Hadoop benchmarks, Hadoop in the cloud | 08 |
| IV | Hadoop Eco System and YARN: Hadoop ecosystem components, schedulers, fair and capacity, Hadoop 2.0 New Features - NameNode high availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN. NoSQL Databases: Introduction to NoSQL MongoDB: Introduction, data types, creating, updating and deleting documents, querying, introduction to indexing, capped collections Spark: Installing spark, spark applications, jobs, stages and tasks, Resilient Distributed | 09 |

| | | |
|---|--|----|
| | Databases, anatomy of a Spark job run, Spark on YARN SCALA: Introduction, classes and objects, basic types and operators, built-in control structures, functions and closures, inheritance. | |
| V | Hadoop Eco System Frameworks: Applications on Big Data using Pig, Hive and HBase Pig - Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators, Hive - Apache Hive architecture and installation, Hive shell, Hive services, Hive metastore, comparison with traditional databases, HiveQL, tables, querying data and user defined functions, sorting and aggregating, Map Reduce scripts, joins & subqueries. HBase – Hbase concepts, clients, example, Hbase vs RDBMS, advanced usage, schema design, advance indexing, Zookeeper – how it helps in monitoring a cluster, how to build applications with Zookeeper. IBM Big Data strategy, introduction to Infosphere, BigInsights and Big Sheets, introduction to Big SQL. | 09 |

Text books and References:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley
2. Big-Data Black Book, DT Editorial Services, Wiley
3. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill.
4. Thomas Erl, Wajid Khattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers and Techniques", Prentice Hall.
5. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons
6. Arshdeep Bahga, Vijay Madiseti, "Big Data Science & Analytics: A HandsOn Approach ", VPT
7. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP
8. Tom White, "Hadoop: The Definitive Guide", O'Reilly.
9. Eric Sammer, "Hadoop Operations", O'Reilly.
10. Chuck Lam, "Hadoop in Action", MANNING Publishers
11. Deepak Vohra, "Practical Hadoop Ecosystem: A Definitive Guide to Hadoop-Related Frameworks and Tools", Apress
12. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilly
13. Lars George, "HBase: The Definitive Guide", O'Reilly.
14. Alan Gates, "Programming Pig", O'Reilly.
15. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer
16. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons
17. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons
18. Pete Warden, "Big Data Glossary", O'Reilly

| Image Processing (KCS-062) | | |
|---|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able: | | |
| CO 1 | To become familiar with digital image fundamentals. | K ₁ , K ₂ |
| CO 2 | To get exposed to simple image enhancement techniques in Spatial and Frequency domain | K ₂ , K ₃ |
| CO 3 | To learn concepts of degradation function and restoration techniques | K ₂ , K ₃ |
| CO 4 | To study the image segmentation and representation techniques. | K ₂ , K ₃ |
| CO 5 | To become familiar with image compression and recognition method | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |

| Unit | Topic | Proposed Lecture |
|------|--|------------------|
| I | DIGITAL IMAGE FUNDAMENTALS: Steps in Digital Image Processing – Components – Elements of Visual Perception – Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels – Color image fundamentals – RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms – DFT, DCT. | 08 |
| II | IMAGE ENHANCEMENT : Spatial Domain: Gray level transformations – Histogram processing – Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters – Ideal, Butterworth and Gaussian filters, Homomorphic filtering, Color image enhancement. | 08 |
| III | IMAGE RESTORATION : Image Restoration – degradation model, Properties, Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering – Inverse Filtering – Wiener filtering | 08 |
| IV | IMAGE SEGMENTATION: Edge detection, Edge linking via Hough transform – Thresholding – Region based segmentation – Region growing – Region splitting and merging – Morphological processing- erosion and dilation, Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm. | 08 |
| V | IMAGE COMPRESSION AND RECOGNITION: Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, JPEG standard, MPEG. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors – Topological feature, Texture – Patterns and Pattern classes – Recognition based on matching. | 08 |

Text books:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing Pearson, Third Edition, 2010
2. Anil K. Jain, Fundamentals of Digital Image Processing Pearson, 2002.
3. Kenneth R. Castleman, Digital Image Processing Pearson, 2006.
4. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, Digital Image Processing using MATLAB Pearson Education, Inc., 2011.
5. D.E. Dudgeon and R.M. Mersereau, Multidimensional Digital Signal Processing Prentice Hall Professional Technical Reference, 1990.
6. William K. Pratt, Digital Image Processing John Wiley, New York, 2002
7. Milan Sonka et al Image processing, analysis and machine vision Brookes/Cole, Vikas Publishing House, 2nd edition, 1999

| Real Time System (KCS-063) | | |
|---|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able: | | |
| CO 1 | Enumerate the need and the challenges in the design of hard and soft real time systems. | |
| CO 2 | Compare different scheduling algorithms and the schedulability criteria. | |
| CO 3 | Determine schedulability of a set of periodic tasks given a scheduling algorithm. | |
| CO 4 | Develop algorithms to decide the admission criterion of sporadic jobs and the schedule of aperiodic jobs. | |
| CO 5 | Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulability criteria. | |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Introduction | 05 |

| | | |
|--|---|----|
| | Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Deadlines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency. | |
| II | Real Time Scheduling Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-DeadlineFirst (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling Aperiodic and Sporadic jobs in Priority Driven and Clock Driven Systems. | 09 |
| III | Resources Sharing Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority-Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Unit Resources, Controlling Concurrent Accesses to Data Objects. | 09 |
| IV | Real Time Communication Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols | 09 |
| V | Real Time Operating Systems and Databases Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Concurrency Control, Overview of Commercial Real Time databases | 08 |
| Text books: | | |
| <ol style="list-style-type: none"> 1. Real Time Systems by Jane W. S. Liu, Pearson Education Publication. 2. Phillip A Laplanta, Seppo J. Ovaska Real time System Design and Analysis Tools for practitioner, Wiley 3. Mall Rajib, "Real Time Systems", Pearson Education 4. Albert M. K. Cheng, "Real-Time Systems: Scheduling, Analysis, and Verification", Wiley. | | |

| Data Compression (KCS-064) | | |
|--|--|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to understand | | |
| CO 1 | To gain a fundamental understanding of data compression methods for text, images, and video, and related issues in the storage, access, and use of large data sets | K ₁ , K ₂ |
| CO 2 | To select, giving reasons that are sensitive to the specific application and particular circumstance, most appropriate compression techniques for text, audio, image and video information | K ₂ , K ₃ |
| CO 3 | To illustrate the concept of various algorithms for compressing text, audio, image and video information. | K ₂ , K ₃ |
| CO 4 | To understand various Distortion criterias. | K ₂ , K ₃ |
| CO 5 | To illustrate the Advantages of Vector Quantization over Scalar Quantization. | K ₂ , K ₃ |
| DETAILED SYLLABUS | | 3-0-0 |

| Unit | Topic | Proposed Lecture |
|---|---|------------------|
| I | Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes. | 08 |
| II | The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression. | 08 |
| III | Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Moveto-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile Encoding, Dynamic Markov Compression. | 08 |
| IV | Distortion criteria, Models, Scalar Quantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization. | 08 |
| V | Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured VectorQuantizers. | 08 |
| Text books: <ol style="list-style-type: none"> 1. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers 2. Elements of Data Compression, Drozdek, Cengage Learning 3. Introduction to Data Compression, Second Edition, Khalid Sayood, The Morgan Kaufmann Series 4. Data Compression: The Complete Reference 4th Edition by David Salomon, Springer 5. Text Compression 1st Edition by Timothy C. Bell Prentice Hall | | |

Software Engineering Lab (KCS-661)

For any given case/ problem statement do the following;

1. Prepare a SRS document in line with the IEEE recommended standards.
2. Draw the use case diagram and specify the role of each of the actors. Also state the precondition, post condition and function of each use case.
3. Draw the activity diagram.
4. Identify the classes. Classify them as weak and strong classes and draw the class diagram.
5. Draw the sequence diagram for any two scenarios.
6. Draw the collaboration diagram.
7. Draw the state chart diagram.
8. Draw the component diagram.
9. Perform forward engineering in java. (Model to code conversion)
10. Perform reverse engineering in java. (Code to Model conversion)
11. Draw the deployment diagram.

Web Technology Lab (KCS-552)

This lab is based on the Web Technologies. Some examples are as follows:

1. Write HTML/Java scripts to display your CV in navigator, your Institute website, Department Website and Tutorial website for specific subject
2. Write an HTML program to design an entry form of student details and send it to store at database server like SQL, Oracle or MS Access.
3. Write programs using Java script for Web Page to display browsers information.
5. Write a Java applet to display the Application Program screen i.e. calculator and other.
6. Writing program in XML for creation of DTD, which specifies set of rules. Create a style sheet in CSS/ XSL & display the document in internet explorer.
7. Program to illustrate JDBC connectivity. Program for maintaining database by sending queries. Design and implement a simple servlet book query with the help of JDBC & SQL. Create MS Access Database, Create on ODBC link, Compile & execute JAVA JDVC Socket.
8. Install TOMCAT web server and APACHE. Access the above developed static web pages for books web site, using these servers by putting the web pages developed .
9. Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a servlet for doing the following. Create a Cookie and add these four user id's and passwords to this Cookie. 2. Read the user id and passwords entered in the Login form and authenticate with the values available in the cookies.
10. Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.
11. Write a JSP which insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the user name and password from the database
12. Design and implement a simple shopping cart example with session tracking API.

KCS-663: Computer Networks Lab

1. To learn handling and configuration of networking hardware like RJ-45 connector, CAT-6 cable, crimping tool, etc.
2. Configuration of router, hub, switch etc. (using real devices or simulators)
3. Running and using services/commands like ping, trace route, nslookup, arp, telnet, ftp, etc.
4. Network packet analysis using tools like Wireshark, tcpdump, etc.
5. Network simulation using tools like Cisco Packet Tracer, NetSim, OMNeT++, NS2, NS3, etc.
6. Socket programming using UDP and TCP (e.g., simple DNS, data & time client/server, echo client/server, iterative & concurrent servers)
7. Programming using raw sockets
8. Programming using RPC

Note: The Instructor may add/delete/modify/tune experiments, wherever he/she feels in a justified manner

Open Electives to be offered by the CSE/CS/IT/CSI Branches

| Open Elective-1 | |
|------------------------|---------------------------------------|
| KOE-061 | Basics of Data Base Management System |
| KOE-062 | Software Project Management |

| Basics of Data Base Management System (KOE-061) | | |
|--|---|-------------------------------------|
| Course Outcome (CO) | | Bloom's Knowledge Level (KL) |
| At the end of course , the student will be able to: | | |
| CO 1 | Identify and apply the concept of databases, database management systems, ER modeling for designing simple databases | |
| CO 2 | Summarize the concepts related to relational model and solve database queries using relational algebra | |
| CO 3 | Write database queries using Structured Query Language (SQL) | |
| CO 4 | Design and develop databases from the real world by applying the concepts of normalization and design algorithms. | |
| CO 5 | Outline the issues associated with transaction processing and recovery | |
| CO 6 | Identify and understand the recent trends & applications in database management | |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | <p>Introduction: An overview of database management system, database system vs file system, database system concepts and architecture, views of data – levels of abstraction, data models, schema and instances, data independence, database languages and interfaces, data definition languages, DML, overall database structure, transaction management, storage management, database users and administrator.</p> <p>Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, concepts of super key, candidate key, primary key, generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.</p> | 08 |
| II | <p>Relational Database Concepts: Introduction to relational database, relational database structure, relational model terminology – domains, attributes, tuples, relations & relational database schema, integrity constraints, entity integrity, referential integrity, keys constraints, domain constraints, Relational algebra - relational calculus, tuple and domain calculus, basic operations – selection and projection, set-theoretic operations, join operations.</p> <p>Data Base Design & Normalization: Functional dependencies, normal forms, first, second, & third normal forms, BCNF, inclusion dependence, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design</p> | 08 |
| III | <p>Structured Query Language (SQL): Basics of SQL, DDL, DML, DCL, advantage of SQL, SQL data type and literals, types of SQL commands, SQL operators and their</p> | 08 |

| | | |
|---|--|-----------|
| | <p>procedure, tables – creation & alteration, defining constraints, views and indexes, queries and sub queries, aggregate functions, built-in functions, insert, update and delete operations, joins, unions, intersection, minus, transaction control commands.</p> <p>PL/SQL: Introduction, features, syntax and constructs, SQL within PL/SL, DML in PL/SQL Cursors, stored procedures, stored function, database triggers, indices</p> | |
| IV | <p>Transaction Processing Concepts: Transaction concepts, properties of transaction, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, recovery from transaction failures, two-phase commit protocol, log based recovery, checkpoints, deadlock handling.</p> <p>Concurrency Control Techniques: Concurrency control, locking techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity, multi-version schemes, recovery with concurrent transaction.</p> | 08 |
| V | <p>Database Security – Types of security, system failure, backup & recovery techniques, authorization & authentication, system policies, levels of security – physical, OS, network & DBMS, privileges – grant & revoke.</p> <p>Recent Trends in Database Management Systems: Centralized and Client-Server Architectures, Distributed Databases, Object-Oriented Database, Spatial & Temporal Databases, Decision Support Systems, Data Analysis, Data Mining & Warehousing, Data Visualization, Mobile Databases, OODB & XML Databases, Multimedia & Web Databases, Spatial and Geographical Databases, Web and Mobile Databases, Active Databases</p> | 08 |
| <p>Text Books and References:</p> <ol style="list-style-type: none"> 1. Elmasri, Navathe, “Fundamentals of Database System”, Addison Wesley. 2. Korth, Silbertz, Sudarshan, “Database Concepts”, Mc Graw Hill. 3. Bipin C. Desai, “An Introduction to Database System”, Galgotia Publication. 4. Majumdar & Bhattacharya, “ Database Management System”, TMH. 5. Date C.J., “An Introduction to Database System”, Addison Wesley. 6. Ramakrishnan, Gehrke, “Database Management System”, Mc Graw Hill. 7. Atul Kahate, “Introduction to Database Management Systems”, Pearson Education. 8. Paul Beynon Davies, “Database System”, Palgrave Macmillan. 9. Bharti P.K., “ An Introduction to Database Systems”, JPNP. 10. Rajesh Narang, “Database Management System”, PHI. 11. Singh, S.K., “Database System Concepts – design & application”, Pearson Education. 12. Leon & Leon, “Database Management Systems”, Vikas Publishing House. 13. O’Neil, “Databases”, Elsevier Pub. 14. Ivan Bayross, “SQL, PL/SQL – The Programming Language of Oracle”, BPB Publications. 15. P.S. Deshpande, “SQL and PL/SQL for Oracle 10g, Black Book”, Dreamtech Press. 16. George Koch, Kevin Loney, “Oracle: The Complete Reference”, TMH/Oracle Press. 17. Coronel, Morris and Rob, “Database Principles: Fundamentals of Design, Implementation and Management”, Cengage Learning. 18. Gillenson, Paulraj Ponniah, “Introduction to Database Management”, Wiley. 19. G. K. Gupta, “Database Management Systems”, McGraw Hill. 20. Shraman Shah, “Oracle for Professional”, SPD. | | |

| | |
|--|----------------|
| Software Project Management (KOE-062) | |
| Course Outcome (CO) | Bloom’s |

| | | Knowledge Level (KL) |
|--|---|---------------------------------|
| At the end of course , the student will be able : | | |
| CO 1 | To understand the Software Project Planning, Evaluation techniques and software development life cycle (SDLC). | K ₂ |
| CO 2 | To learn about the activity planning and risk management principles. | K ₂ , K ₄ |
| CO 3 | To manage software projects and control software deliverables. | K ₄ , K ₅ |
| CO 4 | To develop skills to manage the various phases involved in project management and people management. | K ₂ , K ₄ |
| CO 5 | To deliver successful software projects that support organization's strategic goals. | K ₂ , K ₄ |
| DETAILED SYLLABUS | | 3-0-0 |
| Unit | Topic | Proposed Lecture |
| I | Project Evaluation and Project Planning : Importance of Software Project Management – Activities – Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning. | 08 |
| II | Project Life Cycle and Effort Estimation : Software process and Process Models – Choice of Process models – Rapid Application development – Agile methods – Dynamic System Development Method – Extreme Programming– Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points – COCOMO II – a Parametric Productivity Model. | 08 |
| III | Activity Planning and Risk Management : Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Formulating Network Model – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Risk Planning – Risk Management – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical paths – Cost schedules. | 08 |
| IV | Project Management and Control: Framework for Management and control – Collection of data – Visualizing progress – Cost monitoring – Earned Value Analysis – Prioritizing Monitoring – Project tracking – Change control – Software Configuration Management – Managing contracts – Contract Management. | 08 |
| V | Staffing in Software Projects : Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership. | 08 |
| Text books: | | |
| 21. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012. 22. Robert K. Wysocki —Effective Software Project Management – Wiley Publication, 2011. 23. Walker Royce: —Software Project Management- Addison-Wesley, 1998. 24. Gopalaswamy Ramesh, —Managing Global Software Projects – McGraw Hill Education (India), Fourteenth Reprint 2013. | | |