RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

CS501 Theory of Computation

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft& Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis &Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1.explain the basic concepts of switching and finite automata theory & languages.

CO2.relate practical problems to languages, automata, computability and complexity.

CO3.construct abstract models of computing and check their power to recognize the languages.

CO4.analyse the grammar, its types, simplification and normal form.

CO5.interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6.develop an overview of how automata theory, languages and computation are applicable in engineering application.

LIST OF EXPERIMENTS

1. Design a Program for creating machine that accepts three consecutive one.
2. Design a Program for creating machine that accepts the string always ending with 101.
3. Design a Program for Mode 3 Machine
4. Design a program for accepting decimal number divisible by 2.

5. Design a program for creating a machine which accepts string having equal no. of 1's and 0's.

6. Design a program for creating a machine which count number of 1's and 0's in a given string.

7. Design a Program to find 2's complement of a given binary number.

8. Design a Program which will increment the given binary number by 1.

9. Design a Program to convert NDFA to DFA.

10. Design a Program to create PDA machine that accept the well-formed parenthesis.

11. Design a PDA to accept WCW^R where w is any string and W^R is reverse of that string and C is a Special symbol.

12. Design a Turing machine that's accepts the following language $a^n b^n c^n$ where n>0.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1: judge various computational models.

CO2: construct abstract models of computing.

CO3: justify the power of abstract models in computing to recognize the languages.

CO4: demonstrate analytical thinking and intuition for problem solving in the related areas.

CO5: discuss the limitations of computation in problemsolving.

CO6: follow set of rules for syntax verification.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

CS502 Database Management Systems

Course Outcomes: After completion of the course students will be able to

1. Understand the different issues involved in the design and implementation of a database system.
2. Study the physical and logical database designs, database modeling, relational, hierarchical, and network models
3. Understand and use data manipulation language to query, update, and manage a database
4. Develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
5. Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
6. Evaluate a business situation and designing & building a database applications

Unit I
DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model: Entitles and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

Unit II
Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity con straits, Complex queries, various joins, indexing, triggers, assertions , Relational algebra and relational calculus, Relational algebra operations like select, Project ,Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

Unit III
Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies. Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Unit IV
Transaction Processing Concepts: -Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. 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. Introduction to Distributed databases, data mining, data warehousing, Object Technology and DBMS, Comparative study of OODBMS Vs DBMS . Temporal, Deductive, Multimedia, Web & Mobile database.

Unit V
Study of Relational Database Management Systems through Oracle/PL SQL
QL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi threaded server. Distributed database, database links, and snapshot. Data dictionary, dynamic performance view. Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Data extraction from single, multiple tables equi- join, non equi-join, self -join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical quires, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Suggested list of experiments:- Lab Assignments:
1. Delete duplicate row from the table.
2. Display the alternate row from table.
3. Delete alternate row from table.
4. Update multiple rows in using single update statement.
5. Find the third highest paid and third lowest paid salary.
6. Display the 3rd, 4th, 9th rows from table.
7. Display the ename, which is start with j, k, l or m.
8. Show all employees who were hired the first half of the month.
9. Display the three record in the first row and two records in the second row and one record in the third row in a single sql statements.
10. Write a sql statements for rollback commit and save points.
11. Write a pl/sql for select, insert, update and delete statements.
12. Write a pl/sql block to delete a record. If delete operation is successful return   1 else return 0.
13. Display name, hire date of all employees using cursors.
14. Display details of first 5 highly paid employees using cursors.
15. Write a database trigger which fires if you try to insert, update, or delete after 7'o' clock.
16. Write a data base trigger, which acts just like primary key and does not allow duplicate values.
17. Create a data base trigger, which performs the action of the on delete cascade.
18. Write a data base trigger, which should not delete from emp table if the day is Sunday.
19. In this subject the students are supposed to prepare a small database application in complete semester like financial accounting system, Railway reservation system,institute timetable management system. Student record system, library management system, hospital management system etc. in RDBMS as follows:
Section A:
Solving the case studies using ER datamodel (design of the database)
Section B:
Implement a miniproject for the problem taken in section A.

Suggested Reading:-

1. Date C J, "An Introduction To DatabaseSystem", Pearson Educations
2. Korth, Silbertz,Sudarshan, "Fundamental of Database System", McGraw Hill
3. Rob, " Data Base System:Design Implementation & Management", Cengage Learninig
4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations
5 . Atul Kahate , " Introduction to Database Management System", Pearson Educations
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.
7. Paneerselvam,"DataBase Management System", PHI Learning
8. dev.mysql.com
9. www.postgressql.org

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

Departmental Elective CS- 503 (A) Data Analytics

UNIT-I:

DESCRIPTIVE STATISTICS :Probability Distributions, Inferential Statistics ,Inferential Statistics through hypothesis tests Regression & ANOVA ,Regression ANOVA(Analysis of Variance)

UNIT-II:
INTRODUCTION TO BIG DATA: Big Data and its Importance, Four V's of Big Data, Drivers for Big Data, Introduction to Big Data Analytics, Big Data Analytics applications.

BIG DATA TECHNOLOGIES: Hadoop's Parallel World, Data discovery, Open source technology for Big Data Analytics, cloud and Big Data, Predictive Analytics, Mobile Business Intelligence and Big Data, Crowd Sourcing Analytics, Inter- and Trans-Firewall Analytics, Information Management.

UNIT-III:
PROCESSING BIG DATA: Integrating disparate data stores, Mapping data to the programming framework, Connecting and extracting data from storage, Transforming data for processing, subdividing data in preparation for Hadoop Map Reduce.

UNIT-IV:
HADOOP MAPREDUCE: Employing Hadoop Map Reduce, Creating the components of Hadoop Map Reduce jobs, Distributing data processing across server farms, Executing Hadoop Map Reduce jobs, monitoring the progress of job flows, The Building Blocks of Hadoop Map Reduce Distinguishing Hadoop daemons, Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

UNIT-V:
BIG DATA TOOLS AND TECHNIQUES: Installing and Running Pig, Comparison with Databases, Pig Latin, User- Define Functions, Data Processing Operators, Installing and Running Hive, Hive QL, Querying Data, User-Defined Functions, Oracle Big Data.

REFERENCES:

1. Michael Minelli, Michehe Chambers, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business", 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
2. Arvind Sathi, "Big Data Analytics: Disruptive Technologies for Changing the Game", 1st Edition, IBM Corporation, 2012.1. Rajaraman, A., Ullman, J. D., Mining of Massive Datasets, Cambridge University Press, United Kingdom, 2012

3. Berman, J.J., Principles of Big Data: Preparing, Sharing and Analyzing Complex Information, Morgan Kaufmann, 2014
4. Barlow, M., Real-Time Big Data Analytics: Emerging Architecture, O Reilly, 2013
5. Schonberger, V.M. , Kenneth Cukier, K., Big Data, John Murray Publishers, 2013
6. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", 1st Edition, Wiley and SAS Business Series, 2012.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

Departmental Elective CS- 503 (B) Pattern Recognition

Unit-I
Introduction – Definitions, data sets for Pattern, Application Areas and Examples of pattern recognition, Design principles of pattern recognition system, Classification and clustering, supervised Learning, unsupervised learning and adaptation, Pattern recognition approaches, Decision Boundaries, Decision region , Metric spaces, distances.

Unit -II
Classification: introduction, application of classification, types of classification, decision tree, naïve bayes, logistic regression , support vector machine, random forest, K Nearest Neighbour Classifier and variants, Efficient algorithms for nearest neighbour classification, Different Approaches to Prototype Selection, Combination of Classifiers, Training set, test set, standardization and normalization.

Unit – III
Different Paradigms of Pattern Recognition, Representations of Patterns and Classes, Unsupervised Learning & Clustering: Criterion functions for clustering, Clustering Techniques: Iterative square -error partitional clustering – K means, hierarchical clustering, Cluster validation.

Unit -IV
introduction of feature extraction and feature selection, types of feature extraction , Problem statement and Uses, Algorithms - Branch and bound algorithm, sequential forward / backward selection algorithms, (l,r) algorithm.

Unit -V
Recent advances in Pattern Recognition, Structural PR, SVMs, FCM, Soft computing and Neuro-fuzzy techniques, and real-life examples, Histograms rules, Density Estimation, Nearest Neighbor Rule, Fuzzy classification.

REFERENCE BOOKS:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, "Pattern Recognition", 4th Edition, academic Press, 2009.
4. Robert Schalkoff, "pattern Recognition: statistical, structural and neural approaches", JohnWiley & sons , Inc, 2007.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

Departmental Elective CS- 503 (C) Cyber Security

UNIT 1
Introduction of Cyber Crime, Challenges of cyber crime, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique,

UNIT 2
Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime, Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers were hacking, session hijacking.

UNIT 3
Cyber Crime and Criminal justice: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E-mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime and Trends.

UNIT 4
The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

UNIT 5
Tools and Methods in Cybercrime: Proxy Servers and Anonymizers, Password Cracking, Key loggers and Spyware, virus and worms, Trojan Horses, Backdoors, DoS and DDoS Attacks , Buffer and Overflow, Attack on Wireless Networks, Phishing : Method of Phishing, Phishing Techniques.

Suggested Books:
1. Principles of Cyber crime, Jonathan Clough Cambridge University Press
2. John R. Vacca, Computer Forensics:Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005
3. Cyber Law Simplified, VivekSood, Pub: TMH.
4. Cyber Security by Nina Godbole, SunitBelapure Pub: Wiley-India
5. Information Warfare: Corporate attack and defense in digital world, William Hutchinson, Mathew Warren, Elsevier.
6. Cyber Laws and IT Protection, Harish Chander, Pub:PHI.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

Open Elective CS- 504 (A) Internet and Web Technology

After completion of the course students will be able to
1.Describe the concepts of WWW including browser and HTTP protocol.
2.List the various HTML tags and use them to develop the user friendly web pages.
3.Define the CSS with its types and use them to provide the styles to the webpages at various levels.
4.Develop the modern web pages using the HTML and CSS features withdifferent layouts as per need of applications.
5.Use the JavaScript to develop the dynamic web pages.
6.Use server side scripting with PHP to generate the web pages dynamically using the database connectivity.
7.Develop the modern Web applications using the client and server sidetechnologies and the web design fundamentals.

UNIT 01
Introduction: Concept of WWW, Internet and WWW, HTTP Protocol : Request and Response, Web browser and Web servers, Features of Web 2.0 Web Design: Concepts of effective web design, Webdesign issues including Browser, Bandwidth and Cache, Display resolution, Look and Feel of the Web
site, Page Layout and linking, User centric design, Sitemap, Planning and publishing website, Designing effective navigation.

UNIT 02
HTML :Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5

UNIT 03
Style sheets : Need for CSS, introduction to CSS, basic syntax andstructure, using CSS, background images, colors and properties,manipulating texts, usingfonts, borders and boxes, margins, padding lists,positioning using CSS, CSS2, Overview and features of CSS3 JavaScript : Client side scriptingwith JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: Javascript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations,DHTML : Combining HTML, CSS andJavascript, Events and buttons

UNIT 04
XML : Introduction to XML, uses of XML, simple XML, XML keycomponents, DTD andSchemas, Using XML with application. Transforming XML using XSL and XSLT PHP: Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

UNIT 05

PHP and MySQL:Basic commandswith PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names,creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP myadmin and databasebugs

Reference Books:

1.Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India

2.Web Technologies, Black Book, dreamtech Press

3.HTML 5, Black Book, dreamtech Press

4.Web Design, Joel Sklar, Cengage Learning

5.Developing Web Applications in PHP and AJAX, Harwani, McGrawHill

6.Internet and World Wide Web How to program, P.J. Deitel & H.M. Deitel , Pearson

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Computer Science and Engineering, V-Semester

Open Elective CS- 504 (B) Object Oriented Programming

Unit-I
Basics of programming: Character set, Constants, Variables, keywords, identifiers literals. Instructions: Type Declaration Instruction, arithmetic Integer Long Short, Signed unsigned, storage classes, Integer and Float Conversions, type conversion in assignment, hierarchy of
operations.

Unit –II
Decision control structure: control instructions, if, if-else, use of logical operator, hierarchy of
logical operators, arithmetic operators, relational operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, special operators, "&,*,.,>, "sizeof" Loops control structure: while loop, for loop, do – while loop, odd loop, nested loop, break, continue, case control structure, go to, exit statement.

Unit-III
Array: what are arrays , array initialization, bound checking 1D array, 2D array initialization of 1D and 2D array, memory map of 1D and 2D array, Multidimensional array. Strings: what are strings, standard library string function strlen(), strcpy(), strcat(), strcmp(), 2D array of characters.

Unit-IV
Structure: Why use structure, declaration of structure, accessing structure elements, how structure elements are stored, array of structure, uses of structure. Preprocessor: features of Preprocessor, macro expansion, micro with arguments, file inclusion, conditional, #if, #elif, miscellaneous directives, #include, #define, directives, #undef, #pragma directives. Union: Union definition & declaration, accessing a union member, union of structures, initialization of union member, uses of union, use of user defined data types.

Unit-V
Introduction: Basic concepts of OOP: object, class, data abstraction, data encapsulation, inheritance, polymorphism, Static and dynamic binding, message passing, benefits of OOP's, disadvantage of OOP's, application of OOP's, a simple program, anatomy of program, creating a source file, compiling and Linking.

References:
1. David Parsons; Object oriented programming with C++; BPB publication
2. Object oriented programming in C++ by Robert Lafore: Galgotia
3. Balagurusamy; Object oriented programming with C++; TMH
4. Java Complete Reference: Herbert Schildt, Mc Graw Hill
5. Hubbard; Programming in C++ (Schaum); TMH
6. Mastering C++ by Venugopal, TMH

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

Open Elective CS- 504 (C) Introduction to Database Management Systems

Unit 1: Database Management System Concepts: Introduction, Significance of Database, Database System Applications; Data Independence; Data Modeling for a Database; Entities and their Attributes, Entities, Attributes, Relationships and Relationships Types, Advantages and Disadvantages of Database Management System, DBMS Vs RDBMS.

Unit 2: Database Models and Implementation: Data Model and Types of Data Model, Relational Data Model, Hierarchical Model, Network Data Model, Object/Relational Model, Object-Oriented Model; Entity-Relationship Model, Modeling using E-R Diagrams, Notation used in E-R Model, Relationships and Relationship Types; Associative Database Model

Unit 3 : SQL : Data Definition Language : Categories of SQL Commands; Data Definition Language ; Create table , Drop table and Alter Table . Primary Key , Foreign Key, Truncate Table, Index, Cursor.

UNIT 4 : SQL DML :Data Manipulation Language, Insert Statement, Multiple Inserts, Delete Statement,   Delete with conditions , Update statement, Update with Conditions , Merge Statement,

UNIT 5 SELECT . SQL queries, Data extraction from single, multiple tables equi-join, non equi-join, self-join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical queries, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL.

Suggested Reading:-

1. Date C J, "An Introduction To Database System", Pearson Educations

2. Korth, Silbertz,Sudarshan, "Fundamental of Database System", McGraw Hill

3. Rob, " Data Base System:Design Implementation & Management", Cengage Learninig

4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations

5 . Atul Kahate , " Introduction to Database Management System", Pearson Educations

6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.

7. Paneerselvam,"DataBase Management System", PHI Learning

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

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Computer Science and Engineering, V-Semester

CS505 Linux (LAB)

Course Outcomes: After completion of the course students will be able to

1. Understand the system calls

2. Compare between ANSI C AND C++ AND POSIX standards

3. Mapping the relationship between UNIX Kernel support for files

4. Understand Kernel support for process creation and termination and memory allocation

Overview of Unix/Linux:-
Concepts, Unix/Linux Installation Process, Hardware Requirements for Unix/Linux, Advantages of Unix/Linux, Reasons for Popularity and Success of Linux/Unix Operating System, Features of Linux/Unix Operating System, Kernel, Kernel Functions,

The Shell Basic Commands, Shell Programming:-
Shell Variables, Branching Control Structures, Loop-Control Structure, Continue and break Statements, Sleep Command, Debugging Script. Use of Linux as web-
server, file server, directory server, application server, DNS server, SMTP server, Firewall, Proxy server.

File System: -
Definition of File System, Defining Geometry, Disk Controller, Solaris File System, Disk Based File Systems, Network-Based File Systems, Virtual File systems, UFS File System, The Boot Block, The Super Block, The Inode, Tuning File System, Repairing File System.

Process Control:-
Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, PS Commands options, PGREP, PRSTAT, CDE Process Manager, Scheduling Process, Scheduling Priorities, Changing the Priority of a time-sharing process, Killing Process.

System Security:-
Physical Security, Controlling System Access, Restricted Shells Controlling File Access, File Access Commands, Access Control List(ACLs), Setting ACL Entries, Modifying ACL entries on a file, Deleting ACL entries on a file, Restricting FTP, Securing Super User Access, Restricting Root Access, Monitoring super user Access, TCP Wrappers.

Dynamic Host Configuration Protocol: -
Introduction, DHCP Leased Time, DHCP Scopes, DHCP IP Address, Allocation Types, Planning DHCP Deployment, DHCP Configuration files, Automatic Startup of DHCP Server, Configuration of DHCP Clients, Manually Configuring the DHCP.

Case Study: -
Installation of Linux, Customization of Linux, Installation of SAMBA, APACHE,
TOMCAT, Send MAIL, Postfix, Implementation of DNS, LDAP services, Firewall, Proxy
server

List of Experiments:-

1. To Study basic & User status Unix/Linux Commands.
2. Study & use of commands for performing arithmetic operations with Unix/Linux.
3. Create a file called wlcc.txt with some lines and display how many lines, words and
characters are present in that file.
4. Append ten more simple lines to the wlcc.txt file created above and split the
appended file into 3 parts. What will be the names of these split files? Display the
contents of each of these files. How many lines will be there on the last file?
5. Given two files each of which contains names of students. Create a program to
display only those names that are found on both the files.
6. Create a program to find out the inode number of any desired file.
7. Study & use of the Command for changing file permissions.
8. Write a pipeline of commands, which displays on the monitor as well as saves the
information about the number of users using the system at present on a file called usere.ux.
9. Execute shell commands through vi editor.
10. Installation, Configuration & Customizations of Unix/Linux.
11. Write a shell script that accepts any number of arguments and prints them in the reverse
order.
12. Write a shell script to find the smallest of three numbers that are read from the keyboard.
13. Write a shell script that reports the logging in of a specified user within one minute after
he/she logs in. The script automatically terminates if the specified user does not login during
a specified period of time.
14. Installation of SAMBA, APACHE, TOMCAT.
15. Implementation of DNS, LDAP services,
16. Study & installation of Firewall & Proxy server

Suggested Reading:
1. Venkatesh Murthy, "Introduction to Unix &Shell", Pearson Edu
2. Forouzan, "Unix &Shell Programming", Cengage Learning
3. Sumitab Das,"Unix Concept & Application",TMH
4. Gopalan, Shivaselvan,"Beginners Guide to Unix " PHI Learning
5. Venkateshwavle,"Linux Programming Tools Unveil`ed", BS Publication.
6. Richard Peterson,"Linux Complete Reference",TMH
7. Richard Peterson,"Unix Complete Reference",TMH

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, V-Semester

CS506- Python

List of Experiments (Please Expand it):

1. To write a Python program to find GCD of two numbers.
2. To write a Python Program to find the square root of a number by Newton's Method.
3. To write a Python program to find the exponentiation of a number.
4. To write a Python Program to find the maximum from a list of numbers.
5. To write a Python Program to perform Linear Search
6. To write a Python Program to perform binary search.
7. To write a Python Program to perform selection sort.
8. To write a Python Program to perform insertion sort.
9. To write a Python Program to perform Merge sort.
10. To write a Python program to find first n prime numbers.
11. To write a Python program to multiply matrices.
12. To write a Python program for command line arguments.
13. To write a Python program to find the most frequent words in a text read from a file.
14. To write a Python program to simulate elliptical orbits in Pygame.
15. To write a Python program to bouncing ball in Pygame.

References:

1. Timothy A. Budd: Exploring python, McGraw-Hill Education.
2. R.Nageshwar Rao ,"Python Programming" ,Wiley India
3. Allen B. Downey; Think Python, O'Reilly Media, Inc.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

CS601 Machine Learning

COURSE OUTCOMES:

After Completing the course student should be able to:
1. Apply knowledge of computing and mathematics to machine learning problems, models and algorithms;

2. Analyze a problem and identify the computing requirements appropriate for its solution;

3. Design, implement, and evaluate an algorithm to meet desired needs; and

4. Apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems in a way that demonstrates comprehension of the trade-offs involved in design choices.

COURSE CONTENTS:

THEOTY:

Unit –I
Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

Unit –II
Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters,

Unit –III
Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

Unit –IV

Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model,   Q-learning, SARSA

Unit –V

Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

TEXT BOOKS RECOMMENDED:

1. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer-Verlag New York Inc., 2nd Edition, 2011.
2. Tom M. Mitchell, "Machine Learning", McGraw Hill Education, First edition, 2017.
3. Ian Goodfellow and Yoshua Bengio and Aaron Courville, "Deep Learning", MIT Press, 2016

REFERENCE BOOKS:

1. Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems", Shroff/O'Reilly; First edition (2017).
2. Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10 January 2018).
3. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Shroff/O'Reilly; First edition (2016).
4. Russell, S. and Norvig, N. "Artificial Intelligence: A Modern Approach", Prentice Hall Series in Artificial Intelligence. 2003.

PRACTICAL:

Different problems to be framed to enable students to understand the concept learnt and get hands-on on various tools and software related to the subject. Such assignments are to be framed for ten to twelve lab sessions.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

CS602 Computer Networks

Course Outcomes: After completion of the course students will be able to
1. Characterize and appreciate computer networks from the view point of components and from the view point of services
2. Display good understanding of the flow of a protocol in general and a network protocol in particular
3. Model a problem or situation in terms of layering concept and map it to the TCI/IP stack
4. Select the most suitable Application Layer protocol (such as HTTP, FTP, SMTP, DNS, Bit torrent) as per the requirements of the network application and work with available tools to demonstrate the working of these protocols.
5. Design a Reliable Data Transfer Protocol and incrementally develop solutions for the requirements of Transport Layer
6. Describe the essential principles of Network Layers and use IP addressing to create subnets for any specific requirements

Unit –I
Computer Network: Definitions, goals, components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality. ISO-OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Principals of physical layer: Media, Bandwidth, Data rate and Modulations

Unit-II
Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary &Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Protocol verification: Finite State Machine Models & Petri net models. ARP/RARP/GARP

Unit-III
MAC Sub layer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted-ALOHA), for Local-Area Networks (CSMA, CSMA/CD, CSMA/CA), Collision Free Protocols: Basic Bit Map, BRAP, Binary Count Down, MLMA Limited Contention Protocols: Adaptive Tree Walk, Performance Measuring Metrics. IEEE Standards 802 series & their variant.

Unit-IV
Network Layer: Need, Services Provided , Design issues, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multicast Routing. IP Addresses, Header format, Packet forwarding, Fragmentation and reassembly, ICMP, Comparative study of IPv4 & IPv6

Unit-V

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, Carrying Unicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management.Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP).

References:
1.Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks" Pearson Education.
2 Douglas E Comer, "Internetworking WithTcp/Ip Principles, Protocols, And Architecture - Volume I" 6th Edition,Pearson Education
3.DimitriBertsekas, Robert Gallager, "Data Networks", PHI Publication, Second Edition.
4.KavehPahlavan, Prashant Krishnamurthy, "Networking Fundamentals", Wiley Publication.
5.Uyless Black, "Computer Networks", PHI Publication, Second Edition.
6.Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, "Computer Networks: An Open Source Approach", McGraw Hill.

List of Experiments:
1. Study of Different Type of LAN& Network Equipments.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc.
3. LAN installations and Configurations.
4. Write a program to implement various types of error correcting techniques.
5. Write a program to Implement various types of framing methods.
6. Study of Tool Command Language (TCL).
7. Study and Installation of Standard Network Simulator: N.S-2, N.S3.OpNet,QualNetetc .
8. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High Mobility Networks .
9. Configure 802.11 WLAN.
10. Implement &Simulate various types of routing algorithm.
11. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using Standard Network Simulators.
12. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Departmental Elective - CS603 (A) Advanced Computer Architecture (ACA)

Course Outcomes: After completion of the course students will be able to
1. Discuss the classes of computers, and new trends and developments in computer architecture
2. Study advanced performance enhancement techniques such as pipelines ,dynamic scheduling branch predictions, caches
3. Compare and contrast the modern computer architectures such as RISC, Scalar, and multi CPU systems
4. Critically evaluate the performance of different CPU architecture
5. Improve the performance of applications running on different CPU architectures.
6. Develop applications for high performance computing systems

Unit-I
Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and multicomputers, Multivector and SIMD Computers. Data and resource dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks

Unit-II
Instruction set architecture, CISC Scalar Processors , RISC Scalar Processors, VLIW architecture, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization-memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System :Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.

Unit-III
Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling -score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscalar pipeline design, Super pipeline processor design.

Unit-IV
Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer architecture, SIMD organization: distributed memory model and shared memory model. Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors

Unit-V
Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model, Functional and Logic Models, Parallel Languages and Compilers, Language Features for Parallelism, Parallel Programming Environment, Software Tools and Environments.

Suggested Books:
1. Kai Hwang, "Advanced computer architecture", TMH.
2. J.P.Hayes, "computer Architecture and organization"; MGH.
3. V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI Learning.
4. Kain,"Advance Computer Architecture: -A System Design Approach", PHI Learning
5. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing.
6. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH.
7. David E. Callav & Jaswinder Pal Singh Marge Kaufmann"Advance Computer Architecture",EIS India.
8. Sajjan G. Shiva, Taylar & Francis, "Advance Computer Architecture

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Departmental Elective - CS603 (B) Computer Graphics & Visualization

Unit-I Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing algorithms: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms.

Unit-II 2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogeneous coordinate system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms

Unit-III 3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm. Curve generation, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

Unit-IV Visualization: Visualization of 2D/3D scalar fields: color mapping, ISO surfaces. Direct volume data rendering: ray-casting, transfer functions, segmentation. Visualization of Vector fields and flow data, Time-varying data, High-dimensional data: dimension reduction, parallel coordinates, Non-spatial data: multi-variate, tree/graph structured, text Perceptual and cognitive foundations, Evaluation of visualization methods, Applications of visualization, Basic Animation Techniques like traditional, key framing

Unit –V Multimedia :Basic of multimedia, application of Multimedia, Text-Types, Unicode Standard ,text Compression, Text file formats, Audio Components, Digital Audio, Digital Audio processing, Sound cards, Audio file formats ,Audio Processing software ,Video-Video color spaces, Digital Video, Digital Video processing, Video file formats. Animation: Uses of Animation, Principles of Animation, Computer based animation, 3D Animation, Animation file formats, Animation software,Special Effects in animation, Storyboarding for Animation, Compression: Lossless/Lossy Compression techniques, Image, Audio & Video Compression, MPEG Standards ,Multimedia Architecture, Multimedia databases.

Recommended Text:

1. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.

2. Foley, Van Dam, Feiner, Hughes, "Computer Graphics: Principles and Practice" Addison-Wesley

3. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill

4. Parekh "Principles of Multimedia" Tata McGraw Hill

5. Maurya, "Computer Graphics with Virtual Reality System ", Wiley India

6. Pakhira,"Computer Graphics ,Multimedia & Animation",PHI learning

7. Andleigh, Thakral , "Multimedia System Design " PHI Learning

8. Khalid Sayood , "Introduction to Data Compression", Morgan Kaufmann

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Departmental Elective - CS603 (C) Compiler Design

Unit-I Introduction to compiling & Lexical Analysis
Introduction of Compiler, Major data Structure in compiler, types of Compiler, Front-end and Back-end of compiler, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering , Specification & Recognition of Tokens,Design of a Lexical Analyzer Generator, LEX.

Unit-II Syntax Analysis &Syntax Directed Translation
Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR,LALR, LR),Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

Unit-III Type Checking & Run Time Environment
Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation , Symbol table, Error Detection & Recovery, Ad-Hoc and Systematic Methods.

Unit –IV Code Generation
Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

Unit –V Code Optimization
Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

References:

1. A. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and
Tools , Pearson Education
2 Raghavan, Compiler Design, TMH Pub.
3. Louden. Compiler Construction: Principles and Practice, Cengage Learning
4. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Mak, writing compiler & Interpreters, Willey Pub.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Open Elective - CS604 (A) Knowledge Management

OBJECTIVES:The student should be made to:

- Learn the Evolution of Knowledge management.
- Be familiar with tools.
- Be exposed to Applications.
- Be familiar with some case studies.

UNIT I : INTRODUCTION

Introduction: An Introduction to Knowledge Management – The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management: From Information Management to Knowledge Management – Key Challenges Facing the Evolution of Knowledge Management – Ethics for Knowledge Management.

UNIT II : CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING

Organization and Knowledge Management – Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

UNIT III : KNOWLEDGE MANAGEMENT-THE TOOLS

Telecommunications and Networks in Knowledge Management – Internet Search Engines and Knowledge Management – Information Technology in Support of Knowledge Management – Knowledge Management and Vocabulary Control – Information Mapping in Information Retrieval – Information Coding in the Internet Environment – Repackaging Information.

UNIT IV : KNOWLEDGE MANAGEMENT-APPLICATION

Components of a Knowledge Strategy – Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

UNIT V : FUTURE TRENDS AND CASE STUDIES

Advanced topics and case studies in knowledge management – Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan – A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

TEXT BOOK:

- Srikantaiah, T.K., Koenig, M., "Knowledge Management for the Information Professional" Information Today, Inc., 2000.

REFERENCE:

- Nonaka, I., Takeuchi, H., "The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation", Oxford University Press, 1995.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Open Elective - CS604 (B) Project Management

Course Learning Objectives:

Understand the different activities in software project development i.e, planning, design and management.

Course content:

1. Conventional Software Management.

Evolution of software economics. Improving software economics: reducing product size, software processes, team effectiveness, automation through software environments. Principles of modern software management.

2. Software Management Process

Framework,: Life cycle phases- inception, elaboration, construction and training phase. Artifacts of the process- the artifact sets, management artifacts, engineering artifacts, pragmatics artifacts. Model based software architectures. Workflows of the process. Checkpoints of the process.

3. Software Management Disciplines

Iterative process planning. Project organisations and responsibilities. Process automation. Project control And process instrumentation- core metrics, management indicators, life cycle expections. Process discriminants.

Books

1. Software Project management, Walker Royce, Addison Wesley, 1998.

2. Project management 2/e ,Maylor.

3. Managing the Software Process, Humphrey.

4. Managing global software Projects, Ramesh, TMH,2001.

Course Outcomes:

1. Understanding the evolution and improvement of software economics according to the basic parameters and transition to the modern software management.

2. Learning the objectives, activities and evaluation criteria of the various phases of the life cycle of software management process.

3. Gaining knowledge about the various artifacts, workflows and checkpoints of the software management process and exploring the design concept using model based architecture from technical and management perspective.

4. Develop an understanding of project planning, organization, responsibilities, automation and control of the processes to achieve the desirable results.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

Open Elective - CS604 (C) Rural Technology & Community Development

Unit – I: Rural Management –
Principles and Practices Introduction to Management and Theory of Management B. Planning, Organisation Structure and Design C. Motivation and Leadership D. Management Control and Managerial Decision Making

Unit – II: Human Resource Management for rural India
Nature, Scope of Human Resource Management. F. Human Resource Planning, Recruitment and Selection, Training and Development, Performance Appraisal G. Welfare programme and Fringe benefits, Wage and Salary Administration H. Morale and Productivity, Industrial Relations and Industrial Disputes

Unit-III Management of Rural Financing:
Rural Credit System, Role of Rural Credit in Rural Development. Evolution and Growth of Rural Credit System in India. B: Agricultural Credit, Agricultural Credit Review Committee, Report of different Committees and Commissions, Problems and Prospects. C: Rural Credit to Non-farm Sector, Credit for small and marginal entrepreneurs. D: Role of Government Institutions towards facilitating Rural Credit. Role of Non- Government/ Semi Government / Quasi- Government Institutions. Growth and Present trend of Rural Financing towards Small scale and Cottage Industries.

Unit – IV: Research Methodology:
Concept of Social Research, Traditional Research, Action Research and Participatory Research B: Qualitative Data Construction and Methods of Data Collection C: Techniques of Interview D: Qualitative methods: Sociometry, Case Studies, observation, coding and content analysis

Unit – V: Research Methodology
Collection, Tabulation and Presentation of data B: Measures of Central Tendency, Dispersion, Moments, Skewness and Kurtosis, Correlation and Regression: Sampling Theory and Test of Significance

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Computer Science and Engineering, VI-Semester

CS605 Data Analytics Lab

Course Outcomes: After completion of the course students should be able to
1. Understand the basic of data analytics using concepts of statistics and probability.
2. Understand the needs of data processing techniques.
3. Implement the data analytics techniques using R, MATLAB and Python.
4. Apply the data analytics techniques in real life applications.

Unit-I
Basics of data analytic framework, data per-processing, Statistics, probability, Probability Distribution, Bayes' Theorem, Central Limit theorem, Data Exploration & preparation, Concepts of Correlation, Regression, Covariance, Outliers, Data visualization.

Unit-II

Introduction to R as a data analytics tool.

Unit -III

Introduction to MATLAB as a data analytics tool.

Unit -IV

Introduction to python as a data analytics tool.

Unit – V

Case studies.

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New Scheme Based On AICTE Flexible Curricula

Computer Science and Engineering, VI-Semester

CS606 Skill Development Lab

The primary objective of skill development lab is to impart the set of skills into students, so that they are industry ready.

Course Outcomes: After completion of the course students should be able to
1. Understand the basics of software as a product.
2. Understand the current requirements of industries.
3. Implement the software as a product using different design patterns.
4. Apply the software development techniques in real life applications.

Unit – I

Software product life cycle.

Unit – II

Software product development standards.

Unit – III

Design patterns – 1

Unit -IV

Design Patterns – II

Unit – V

Case Study