JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF INFORMATION TECHNOLOGY

III Year – I SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	IT3101	Advanced Data Structures	3	1	0	4
2	IT3102	Computer Networks	3	0	0	3
3	IT3103	Compiler Design	3	0	0	3
4	IT3104	Artificial Intelligence	3	0	0	3
5	PE3101	**Professional Elective -I** 1. Software Testing Methodologies 2. NoSQL Databases 3. Scripting Languages 4. Computer Graphics 5. R-Programming	3	0	0	3
6	IT3105	Design and Analysis of Algorithms	3	0	0	3
7	IT3106	Computer Networks & Compiler Design Lab	0	0	3	1.5
8	IT3107	AI Tools & Techniques Lab	0	0	3	1.5
9	MC3101	Employability Skills - II*	2	0	0	0
		Total	20	1	6	22
***Internal Evaluation through Seminar / Test conducted for 50 marks**						

III Year – II SEMESTER

S.No	Course Code	Courses	L	T	P	Credits
1	IT3201	Data Warehousing and Data Mining	3	0	0	3
2	OE3201	**Open Elective- I (Inter Disciplinary)**	3	0	0	3
3	IT3202	Web Technologies	3	0	0	3
4	PE3201	**Professional Elective II** (NPTEL/SWAYAM) **Duration: 12 Weeks Minimum** ***Course/subject title can't be repeated**	3	0	0	3
5	HS3201	Managerial Economics and Financial Accountancy	3	0	0	3
6	IT3203	Web Technologies Lab	0	0	3	1.5
7	IT3204	Data Mining Lab	0	0	3	1.5
8	PR3201	Industrial Training / Skill Development Programmes / Research Project in higher learning institutes	0	0	0	1
		Total	15	0	6	19

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		3	1	0	4

ADVANCED DATA STRUCTURES

Course Objectives:

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs)
- Analyze the space and time complexity of the algorithms studied in the course
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions
- Demonstrate an understanding of Amortization
- Demonstrate an understanding of various search trees

Course Outcomes:

Upon completion of the course, graduates will be able to

- Illustrate several sub-quadratic sorting algorithms.
- Demonstrate recursive methods
- Apply advanced data structures such as balanced search trees, hash tables, priority queues and the disjoint set union/find data structure

UNIT I

Sorting: Medians and order statistics, External Sorting, Introduction, K-way Merging, Buffer Handling for parallel Operation, Run Generation, Optimal Merging of Runs.

Hashing: Introduction, Static Hashing, Hash Table, Hash Functions, Secure Hash Function, Overflow Handling, Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing, Dynamic Hashing Using Directories, Directory less Dynamic Hashing, Alternate hash functions (mid-square, folding, digit analysis), Double Hashing

UNIT II

Priority Queues and Advance Heaps: Double Ended Priority queues, Leftist Trees: Height Biased, Weight Biased. Binomial Heaps: Cost Amortization, Definition of Binomial Heaps, Insertion, Melding two Binomial Heaps, deletion of min element. Fibonacci Heaps: Definition, Deletion from an F-heap, Decrease key, Cascading Cut.

UNIT III

Advanced and Efficient Binary Search Trees: Optimal Binary Search Trees, AVL Trees- rotations, insertion, deletion operations, Red-Black Trees, Definition, Representation of a Red-Black Tree, Searching a Red-Black Tree, Inserting into a Red Black Tree, Deletion from a Red-Black Tree, Joining Red-Black Trees, Splitting a Red-Black tree.

UNIT IV

Multi-way Search Trees: M-Way Search Trees, Definition and Properties, Searching an M-Way Search Tree, B-Trees, Definition and Properties, Number of Elements in a B-tree, Insertion into B-Tree, Deletion from a B-Tree, B+-Tree Definition, Searching a B+-Tree, Insertion into B+-tree, Deletion from a B+-Tree.

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UNIT V

Digital Search Structures: Digital Search Trees: Definition, Search, Insert and Delete. Binary Tries, Compressed Binary Tries. Multi-way Tries: Definition, searching a Trie, sampling strategies, Insertion, Deletion, Height of a Trie. Prefix Search and applications. Suffix Trees.

Text Books:

1) Fundamentals of Data Structures in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press
2) Data Structures, a Pseudo code Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.

Reference Books:

1) Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson
2) "Introduction to Algorithms", T. Cormen, R.Rivest, C. Stein, C. Leiserson, PHI publication, Second Edition, 2004, ISBN 81-203-2141-3.

e-Resources:

1) http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2) http://utubersity.com/?page_id=878
3) http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4) http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms

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III Year – I Semester		L	T	P	C
		3	0	0	3

COMPUTER NETWORKS

Course Objectives:

The main objectives of this course are

- Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model
- Study data link layer concepts, design issues, and protocols

Course Outcomes:

At the end of the course, the students will be able to:

- Illustrate the OSI and TCP/IP reference model
- Analyze MAC layer protocols and LAN technologies

UNIT I

Introduction: Data Communication, components, data representation, data flow; Networks: network criteria, physical structures, network models, categories of network, inter connection of networks; The Internet: brief history, internet today, Standard organization, internet standards, Protocol Layering, TCP/IP Protocol Suite, The OSI model.

UNIT II

Physical layer: Data & Signals, Transmission Impairment, Data Rate Limits, Performance, Multiplexing, Spread Spectrum, Transmission Media: Guided Media, Unguided Media, introduction to switching: Circuit Switched Networks, Packet Switching.

UNIT III

Data Link Layer: Introduction, Link layer Addressing, Error Detection and Correction: Types of Errors, Redundancy, Detection vs Correction, Coding, block coding, cyclic codes: cyclic redundancy check, polynomials, cyclic code analysis, advantages, hard ware implementation, Checksum, Forward Error Correction, DLC Services, Data Link Layer Protocols

UNIT IV

Data Link layer: HDLC: configuration and transfer modes, framing, Point to Point protocol(PPP): services, framing, transition phase, multiplexing

Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA, Controlled Access: Reservation, Polling, Token Passing, Channelization: FDMA, TDMA, CDMA.

UNIT V

Ethernet Protocol, Standard Ethernet, Fast Ethernet,Gigabit Ethernet, 10 Gigabit Ethernet, IEE-802.11: Architecture, MAC sub layer, addressing mechanism, Physical Layer

Bluetooth: Architecture, bluetooth layers, WiMax, Cellur Telephony, Satellite Networks.

Connecting Devices, Virtual LANS

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Text Books:

1) Data Communication and Networking , Behrouz A. Forouzan, McGraw Hill, 5th Edition, 2012
2) Computer Networks , Andrew S. Tanenbaum, David J. Wetherall, Pearson Education India; 5 edition, 2013

Reference Books:

1) Computer networks, Mayank Dave, CENGAGE.
2) Computer Networks: A Systems Approach, LL Peterson, BS Davie, Morgan-Kauffman , 5th Edition, 2011.
3) Computer Networking: A Top-Down Approach JF Kurose, KW Ross, Addison-Wesley , 5th Edition, 2009

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105183/

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		3	0	0	3

COMPILER DESIGN

Course Objectives:

- To study the various phases in the design of a compiler
- To understand the design of top-down and bottom-up parsers
- To understand syntax directed translation schemes
- To introduce LEX and YACC tools
- To learn to develop algorithms to generate code for a target machine

Course Outcomes:

At the end of the course, the students will be able to:

- Design, develop, and implement a compiler for any language
- Use LEX and YACC tools for developing a scanner and a parser
- Design and implement LL and LR parsers
- Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity
- Apply algorithms to generate machine code

UNIT I

Introduction: Language Processors, the structure of a compiler, the science of building a compiler, programming language basics.

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Recursive and Non recursive top down parsers, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

UNIT III

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L-Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch-Statements, Intermediate Code for Procedures.

UNIT IV

Run-Time Environments: Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection. Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

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UNIT V

Machine-Independent Optimizations: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

Text Books:

1) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
2) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.

Reference Books:

1) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
2) The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
3) Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

e-Resources:

1) https://nptel.ac.in/courses/106/104/106104123/

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		3	0	0	3

ARTIFICIAL INTELLIGENCE

Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI

Course Outcomes:

- Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
- Apply the language/framework of different AI methods for a given problem
- Implement basic AI algorithms
- Design and carry out an empirical evaluation of different algorithms on problem formalization and state the conclusions that the evaluation supports

UNIT I

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT III

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNIT V

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

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Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1) Artificial Intelligence- Saroj Kaushik, CENGAGE Learning.
2) Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA.

Reference Books:

1) Artificial Intelligence- Deepak Khemani, TMH, 2013.
2) Introduction to Artificial Intelligence, Patterson, PHI.
3) Artificial intelligence, structures and Strategies for Complex problem solving, George F Lugar, 5th ed, PEA.

e-Resources:

1) https://nptel.ac.in/courses/106/105/106105077/
2) http://aima.cs.berkeley.edu/

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III Year – I Semester		L	T	P	C
		3	0	0	3
SOFTWARE TESTING METHODOLOGIES					

Course Objectives:

- To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing
- To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
- To expose the advanced software testing concepts such as object-oriented software testing methods, web-based and component-based software testing
- To understand software test automation problems and solutions
- To learn how to write software test documents and communicate with engineers in various forms

Course Outcomes:

By the end of the course, the student should have the ability to:

- Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods
- Design and conduct a software test process for a software project
- Analyze the needs of software test automation
- Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects
- Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object oriented software testing problems
- Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications

UNIT I

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation

UNIT II

Dynamic Testing-Black Box testing techniques**:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing

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UNIT III

Static Testing: Inspections, Structured Walkthroughs, Technical Reviews
Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing
Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques

UNIT IV

Efficient Test Suite Management: growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite
Software Quality Management: Software Quality metrics, SQA models
Debugging: process, techniques, correcting bugs.

UNIT V

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit . Test Automation using Selenium tool.
Testing Object Oriented Software: basics, Object oriented testing
Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

Text Books:

1) Software Testing, Principles and Practices, Naresh Chauhan, Oxford.
2) Software Testing- Yogesh Singh, CAMBRIDGE.

Reference books:

1) Foundations of Software testing, Aditya P Mathur, 2ed, Pearson.
2) Software testing techniques – Baris Beizer, Dreamtech, second edition.
3) Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4) Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

e-Resources:

1) https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm

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III Year – I Semester		L	T	P	C
		3	0	0	3
NoSQL DATABASES					

Course Objectives:
The objective of the course is to:

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column oriented and Graph)
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases
- Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases
- Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Course Outcomes:
After the completion of the course, student will be able to do the following

- Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)
- Apply NoSQL data modeling from application specific queries
- Use Atomic Aggregates and denormalization as data modelling techniques to optimize query processing

UNIT I
Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT II
Interacting with NoSQL: If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

UNIT III
NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

UNIT IV
NoSQL Stores: Similarities Between Sql And Mongodb Query Features, Accessing Data From Column-Oriented Databases Like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution In Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

UNIT V
Indexing and Ordering Data Sets : Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

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Text Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional, 2012.
2) Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications, 2013.

Reference Books:

1) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
2) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

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III Year – I Semester		L	T	P	C
		3	0	0	3
SCRIPTING LANGUAGES					

Course Objectives:

From the course the student will

- Understand the concepts of scripting languages for developing web based projects
- Illustrates object oriented concepts like PHP, PYTHON, PERL
- Create database connections using PHP and build the website for the world
- Demonstrate IP address for connecting the web servers
- Analyze the internet ware application, security issues and frame works for application

Course Outcomes:

After the completion of the course, student will be able to do the following

- Ability to understand the differences between scripting languages
- Create PHP authentication Methodology for security issues
- Identify PHP encryption functions and Mcrypt Package
- Explain syntax and variables in TCL
- Able to gain some fluency programming in Ruby, JavaScript, Perl, Python, and related languages
- Master an understanding of python especially the object oriented concepts

UNIT I

Introduction to PERL and Scripting: Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT II

Advanced PERL: Finer points of looping, pack and unpack, file system, eval, data structures,packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

PHP Basics: PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data tothe browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

UNIT III

Advanced PHP Programming: PHP and Web Forms, Files, PHP Authentication and Methodologies-Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

UNIT IV

TCL: TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures,input/output, procedures , strings , patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts



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Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding , Perl-Tk.

UNIT V

Python: Introduction to Python language, python-syntax, statements, functions, Built-in-functionsand Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

Text Books:

1) The World of Scripting Languages, David Barron, Wiley Publications.
2) Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3) Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech).

References Books:

1) Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education. Programming Python,M.Lutz,SPD.
2) PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
3) Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
4) PHP and MySQL by Example, E.Quigley, Prentice Hall (Pearson).
5) Perl Power, J.P.Flynt, Cengage Learning.

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III Year – I Semester		L	T	P	C
		3	0	0	3
COMPUTER GRAPHICS					

Course Objectives:
From the course the student will

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects

Course Outcomes:
After learning the course, the student will be able:

- Illustrate the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations
- Apply projections and visible surface detection techniques for display of 3D scene on 2D screen
- Illustrate able to create the general software architecture of programs that use 3D object sets with computer graphics

UNIT I
Introduction to Graphics: Application areas of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and work stations and input devices

2D Primitives: Output primitives – Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT II

3D Concepts: Parallel and Perspective projections, Three dimensional object representation– Polygons, Curved lines, Splines, Quadric Surfaces, Visualization of data sets, 3D transformations, Viewing, Visible surfaceidentification.

UNIT III
Graphics Programming: Color Models – RGB, YIQ, CMY, HSV, Animations – General Computer Animation, Raster, Keyframe. Graphics programming using OPENGL – Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes

UNIT IV
Rendering: Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadows of objects, Building a camera in a program, Creating shaded objects

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UNIT V

Overview of Ray Tracing: Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.

Text Books:

1) Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education,2004.
2) Schaum's Outline of Computer Graphics Second Edition, Zhigang Xiang, Roy A. Plastock.

Reference Books:

1) James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and practice, Second Edition in C, Pearson Education, 2007.
2) F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

e-Resources:

1) http://math.hws.edu/eck/cs424/downloads/graphicsbook-linked.pdf
2) https://nptel.ac.in/courses/106/106/106106090/

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III Year – I Semester		L	T	P	C
		3	0	0	3

R PROGRAMMING

Course Objectives:
After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling
- Write functions and use R in an efficient way
- Fit some basic types of statistical models
- Use R in their own research
- Be able to expand their knowledge of R on their own

Course Outcomes:
At the end of this course, students will be able to:

- Demonstration and implement of basic R programming framework and data structures
- Explain critical R programming language concepts such as control structures and recursion
- Applying mathematical and statistical operations data structures in R
- Examine data-sets to create testable hypotheses and identify appropriate statistical tests
- Make use of appropriate statistical tests using R and Create and edit visualizations with regression models
- Define model choices and results

UNIT I
Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes**.**

UNIT II
R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

UNIT III
Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability- Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files.

UNIT IV
Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function –Customizing Graphs, Saving Graphs to Files.

UNIT V
Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA. Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson



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Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision-Random Forests.

Text Books:

1) The Art of R Programming, Norman Matloff, Cengage Learning
2) R for Everyone, Lander, Pearson

Reference Books:

1) R Cookbook, Paul Teetor, Oreilly.
2) R in Action, Rob Kabacoff, Manning

e- Resources:

1) https://www.tutorialspoint.com/r/index.htm

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III Year – I Semester		L	T	P	C
		3	0	0	3
DESIGN AND ANALYSIS OF ALGORITHMS					

Course Objectives:

- To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms
- To introduce the different algorithmic approaches for problem solving through numerous example problems
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness

Course Outcomes:

- Describe asymptotic notation used for denoting performance of algorithms
- Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms
- List and describe various algorithmic approaches
- Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches
- Apply graph search algorithms to real world problems
- Demonstrate an understanding of NP- Completeness theory and lower bound theory

UNIT I

Introduction: Algorithm Definition, Algorithm Specification, performance Analysis, Randomized Algorithms.

Sets & Disjoint set union: introduction, union and find operations.

Basic Traversal & Search Techniques: Techniques for Graphs, connected components and Spanning Trees, Bi-connected components and DFS.

UNIT II

Divide and Conquer: General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

The Greedy Method: The general Method, container loading, knapsack problem, Job sequencing with deadlines, minimum-cost spanning Trees.

UNIT III

Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, single-source shortest paths: general weights, optimal Binary search trees, 0/1 knapsack, reliability Design, The traveling salesperson problem.

UNIT IV

Backtracking: The General Method, The 8-Queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, knapsack problem.

Branch and Bound: FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack problem, Traveling salesperson problem.

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UNIT V

NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem.

String Matching: Introduction, String Matching-Meaning and Application, NaÏve String Matching Algorithm, Rabin-Karp Algorithm, Knuth-Morris-Pratt Automata, Tries, Suffix Tree.

Text Books:

1) Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2) Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press.

Reference Books:

1) Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
2) S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

e-Resources:

1) http://nptel.ac.in/courses/106101060/

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III Year – I Semester		L	T	P	C
		0	0	3	1.5
COMPUTER NETWORKS & COMPILER DESIGN LAB					

Course Objectives:

- To learn and use network commands
- To learn socket programming
- To implement and analyze various network protocols
- To implement various parsers

Course Outcomes:

Upon Completion of the course, the students will be able to:

- Implement various protocols using TCP and UDP
- Compare the performance of different transport layer protocols
- Use simulation tools to analyze the performance of various network protocols
- Analyze various routing algorithms
- Implement error correction codes
- Implement parsers

List of experiments

1) Connect the computers in Local Area Network
2) Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
3) Implement Data Link Framing method - Character Count.
4) Implement Data link framing method - Bit stuffing and Destuffing.
5) Implement Error detection method - even and odd parity.
6) Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
7) Implement Data Link protocols - Unrestricted simplex protocol
8) Implement data link protocols - Stop and Wait protoc
9) Simulate error correction code (like CRC).
10) Write a C program to recognize strings under ‘a’, ‘a*b+’, ‘abb’.
11) Write a C program to test whether a given identifier is valid or not.
12) Write a C program to simulate lexical analyser for validating operators
13) Write a C program for constructing recursive descent parsing.
14) Write a C program to implement LALR parsing.
15) Write a C program to implement operator precedence parsing.

SOFTWARE:

1. C / C++ / Java / Python / Equivalent Compiler 30
2. Network simulator like NS2/Glomosim/OPNET/ Packet Tracer / Equivalent

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III Year – I Semester		L	T	P	C
		0	0	3	1.5
AI TOOLS & TECHNIQUES LAB					

Course Objectives:

- Study the concepts of Artificial Intelligence
- Learn the methods of solving problems using Artificial Intelligence
- Introduce the concepts of machine learning

Course Outcomes:

At the end of the course, the students will be able to:

- Identify problems that are amenable to solution by AI methods
- Identify appropriate AI methods to solve a given problem
- Use language/framework of different AI methods for solving problems
- Implement basic AI algorithms
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

List of Experiments:

1. Study of Prolog.
2. Write simple fact for the statements using PROLOG.
3. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing
4. Write a program to solve the Monkey Banana problem.
5. Write a program in turbo prolog for medical diagnosis and show the advantage and disadvantage of green and red cuts
6. Write a program to implement factorial, Fibonacci of a given number
7. Write a program to solve 4-Queen and 8-puzzle problem.
8. Write a program to solve traveling salesman problem.
9. Write a program to solve water jug problem using LISP
10. Implementation of A* Algorithm using LISP /PROLOG
11. Implementation of Hill Climbing Algorithm using LISP /PROLOG
12. Implementation of DFS and BFS for water jug problem using LISP /PROLOG
13. Implementation of Towers of Hanoi Problem using LISP /PROLOG

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III Year – I Semester		L	T	P	C
		2	0	0	0
Employability Skills -II					

Course Objectives:
The main of this course is

- To learn how to make effective presentations and impressive interviews
- To learn skills for discussing and resolving problems on the work site
- To assess and improve personal grooming
- To promote safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the work site

Course Outcomes:
By the end of this course, the student

- Recite the corporate etiquette.
- Make presentations effectively with appropriate body language
- Be composed with positive attitude
- Apply their core competencies to succeed in professional and personal life

A list of vital employability skills from the standpoint of engineering students with discussion how to potentially develop such skills through campus life.

1) Interview Skills: Interviewer and Interviewee – in-depth perspectives. Before, During and After the Interview. Tips for Success.
2) Presentation Skills: Types, Content, Audience Analysis, Essential Tips – Before, During and After, Overcoming Nervousness.
3) Etiquette and Manners – Social and Business.
4) Time Management – Concept, Essentials, Tips.
5) Personality Development – Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.
6) Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
7) Conflict Management: Conflict - Definition, Nature, Types and Causes; Methods of Conflict Resoultion.
8) Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Managemet of Stress
9) Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behaviour; Assertivness Skills.



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10) Emotional Intelligence: Meaning, History, Features, Components, Intrapersonal and Management Excellence; Strategies to enhance Emotional Intelligence.

Reference Books:

1) Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2) S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.
3) R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
4) Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.
5) Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
6) English and Soft Skills – S.P.Dhanavel, Orient Blackswan India, 2010.