Bridge Courses

1. Problem Solving and Programming
2. Fundamentals of Database Management Systems

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**TOTAL** | 22 | **TOTAL** | 12 |

**TOTAL credits = 80**

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Stream Based Electives

Data Science
- Artificial Intelligence
- Big data Analytics and Visualization
- Deep Learning
- Natural Language Processing
- Digital Image Processing
- Pattern Recognition

Cyber Security
- Cryptography
- Network Management and System Administration
- Open Source Systems
- Network Security
- Database Administration
- Block Chain Technologies

Next Generation Networks
- Parallel and Distributed Computing
- Wireless Networks
- Software Defined Networks

Semester 1

20CSA501 OBJECT ORIENTED PROGRAMMING USING JAVA

Course Objectives:
1. To understand Object Oriented Programming concepts and familiarize the relationship between classes and objects in a Java program.
2. To know the principles of packages, inheritance and interfaces
3. To introduce the concepts of exception handling, multithreading and I/O streams
4. To introduce the design of Graphical User Interface using applets and swing controls.
5. To understand how database connectivity is achieved using JDBC.

Course Outcomes:
- CO1: Able to understand object-oriented programming principles.
- CO2: Develop Java programs with the concepts of inheritance and interfaces.
- CO3: Build Java applications using exceptions, threads and I/O streams.
- CO4: Able to create applets and develop interactive Java programs using swings.
- CO5: Develop java applications that interact with database.
Syllabus:

UNIT I

UNIT II
Packages- Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces

UNIT III

UNIT IV

Unit V
Introduction to JDBC, JDBC Drivers & Architecture, CRUD operation Using JDBC.

TEXTBOOK:
OBJECTIVE
This course provides mathematical background and sufficient experience on various topics like matrix algebra, logic and proofs, combinatorics and algebraic structures. This knowledge improves student’s Logical and Mathematical thinking and ability to deal with abstract concepts in computer science and to solve practical problems.

Course Outcomes
1. To construct mathematical arguments using logical connectives and quantifiers.
2. Understand the basic concepts of Mathematical reasoning, set and functions.
3. Acquires knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems
4. Apply the concepts of generating functions to solve the recurrence relations.
5. To familiarise concepts like Groups and Rings.

UNIT I
Unit II

Unit III
Groups – Axiom of a group – Examples and basic algebra in groups – Order of an element of a group – Isomorphism of groups – Cyclic groups – Subgroups – Cosets and Lagrange’s theorem – Rings - Field

Unit IV
Matrices - Rank of a matrix - Solving system of equations – Echelon form of a matrix and Row reduced echelon form of matrix - Eigen values and Eigenvectors - Cayley - Hamilton theorem.

Unit V

TEXT BOOKS/ REFERENCES:

**20CSA502 ADVANCED OPERATING SYSTEMS 3 0 0 3**

Course Outcomes
CO1: Understand the architecture and functionalities of modern OS and virtual machines
CO2: Understand and apply the algorithms for resource management and scheduling
CO3: Apply semaphores and monitors for classical and real world synchronization scenarios.
CO4: Understand how a distributed OS system works.
CO5: Ability to engage in independent learning as a team to study characteristic features of modern operating systems

syllabus

UNIT 1
Introduction to Operating System and its functions: Types of Operating Systems; Computer hardware review – Instruction execution cycle, Interrupts; System calls – How to implement a new system call in Linux; Difference between system calls and library routines.
Process concept - Process Creation and termination, PCB, Process States, Inter-process Communication, Classic synchronization problems and their solutions; Deadlocks, Concept of Threads

UNIT 2
Memory Management & I/O: Address space abstraction, Address binding. Dynamic linking and shared libraries. Basic memory management, swapping, Paging, Segmentation, Virtual memory, Page replacement algorithms, DMA & Cache memory Creation of shared memory. Overview of I/O Hardware; Application I/O Interface; Kernel I/O Subsystem; Transforming I/O Requests to Hardware Operations; Performance.

UNIT 3

UNIT 4

UNIT 5
Distributed Operating Systems – Fundamentals of Distributed systems, Message Passing, RPC, Distributed Shared Memory, Synchronization; Distributed File System, Distributed Coordination – Mutual Exclusion; Time Stamping.
TEXT BOOKS
2. Distributed Operating Systems Concepts and Design – Pradeep K Sinha - Prentice-Hall India
3. The Design of the Unix Operating System - Maurice J Bach – Prentice-Hall India

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20CSA503 ADVANCED COMPUTER NETWORKS 3 0 1 4

COURSE OUTCOMES

CO1: To master the terminology and concepts of the core network and layered approach.
CO2: To determine proper usage of the IP address, subnet mask and default gateway in a routed network and designing of Network Models using Simulation tools
CO3: Understand and analyze (Using Wireshark tool) the concepts of TCP/IP layers and their working in local area networks and wide area networks.

CO4: Mastering basic concepts of Routing protocols and services and their design/performance issues in local area networks and wide area networks.

CO5: To design or simulate a real time network and study its QoS parameters.

SYLLABUS

Common network services and tools - ifconfig, nw.js - netcat - netstat - DNS - dhcp and monitoring tool Wireshark

Network simulator – NS2/NS3 basic routing protocols, congestion control, flow monitoring and case studies

TEXT BOOKS/REFERENCES:

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COURSE OUTCOMES

CO1: Must be able to learn basics—including data types, control structures, algorithm development, and program design with functions—via the Python programming language.
CO2: To apply the fundamental principles of Object-Oriented Programming, as well as in-depth data and information processing techniques.
CO3: Students will be equipped with knowledge to solve problems, explore real-world software development challenges, and create practical and contemporary applications.
CO4: To understand the role of python programming with respect to current industry requirements and become job ready.
CO5: To learn how to develop algorithms for resolving huge data processing problems.

SYLLABUS

Why Python- Python Installation- Python 2.7 vs 3.x- Introduction to Essential Python Libraries- Introduction to iPython and Jupyter - Python Language Basics- Indentation, Comments, Function Calls, Variables and Argument Passing- Python Language Basics - Types, Duck-Typing, Import, Binary operator, Comparisons, Mutable objects - Standard Data Types in Python, Command Line Arguments, Control Flow, Input/Output in Python- Input, Output, Eval, Print, Repr() and Str(), - Zfill- File IO.

Lists, tuples, and dictionaries; basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values; traversing dictionaries.

Design with functions: hiding redundancy, complexity; arguments and return values; formal vs actual arguments, named arguments, Program structure and design, Recursive functions. Classes and OOP: classes, objects, attributes and methods; defining classes; design with classes, data modeling; persistent storage of objects, inheritance, polymorphism, operator overloading (_eq_, _str_, etc); abstract classes; exception handling, try block.

Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.
TEXT BOOKS/ REFERENCES:


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Lab

SYLLABUS

1. Write a Python program to print all the Disarium numbers between 1 and 100.
2. Write a Python program to encrypt the text using Caesar Cipher technique. Display the encrypted text. Prompt the user for input and the shift pattern.
3. Write a Python program to construct a linked list. Prompt the user for input. Remove any duplicate numbers from the linked list.
4. Traverse a path and display all the files and subdirectories in each level till the deepest level for a given path. Also, display the total number of files and subdirectories.
5. Read a file content and copy only the contents at odd lines into a new file.
6. Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.
7. Write a function nearly_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
8. Write a function cumulative product to compute cumulative product of a list of numbers.
9. Write a function reverse to reverse a list. Without using the reverse function.
10. Using Regular Expressions, develop a Python program to
   a) Identify a word with a sequence of one upper case letter followed by lower case letters.
   b) Find all the patterns of “1(0+1)” in a given string.
   c) Match a word containing ‘z’ followed by one or more o’s.
   d) Prompt the user for input.

11. Write a Python program to plot the Line chart in MS Excel Sheet using Xlsx Writer module to display the annual net income of the companies mentioned below.

12. Python Program to Make a Simple Calculator
13. Python program using packages and libraries.
14. Python Program to Shuffle Deck of Cards
15. Python Program to Display Calendar.
16. Python | Sort Python Dictionaries by Key or Value
17. Handling missing keys in Python dictionaries
18. Python dictionary with keys having multiple inputs
19. Python program to find the sum of all items in a dictionary
20. Python | Ways to remove a key from dictionary
21. Ways to sort list of dictionaries by values in Python – Using itemgetter
22. Ways to sort list of dictionaries by values in Python – Using lambda function
23. Python | Merging two Dictionaries
24. Program to create grade calculator in Python
25. Python | Check order of character in string using OrderedDict()
26. Python | Find common elements in three sorted arrays by dictionary intersection
27. Dictionary and counter in Python to find winner of election
28. Find all duplicate characters in string
29. Print anagrams together in Python using List and Dictionary
30. K’th Non-repeating Character in Python using List Comprehension and OrderedDict
31. Check if binary representations of two numbers are anagram
32. Python Counter to find the size of largest subset of anagram words
33. Python | Remove all duplicates words from a given sentence
34. Python Dictionary to find mirror characters in a string
35. Counting the frequencies in a list using dictionary in Python
36. Python | Convert a list of Tuples into Dictionary
37. Python counter and dictionary intersection example (Make a string using deletion and rearrangement)
COURSE OUTCOMES

1. Familiarize the students to OPPS Database concepts and its features
2. Exemplify the complex data types, all level inheritance, and DBS architecture
3. Be Familiar with Client server and parallel Databases, Explain Interquery and Intraquery Parallelism
4. Exemplify XML data model and how-to retrieval information in Databases.
5. Understand the concepts of Intelligent database and Temporal database

Introduction to object-oriented database & syllabus discussion Abstraction, encapsulation, and information hiding. Inheritance Overloading Polymorphism Dynamic binding, Object-Oriented Data Model. Complex Data Types, Structured Types and Inheritance in SQL Table Inheritance, Array and Multiset. Types in SQL Object, Identity and Reference Types in SQL.

Introduction to Parallel database and I/O Parallelism, Interquery Parallelism, Intraquery Parallelism. Intraoperation Parallelism, Interoperation Parallelism, Transaction model and properties, Transaction structure, Transaction serialization and recovery


INTELLIGENT DATABASES
Active Databases: Syntax and Semantics (Starburst, Oracle, DB2)- Taxonomy- Applications- Design Principles for Active Rules- Temporal Databases: Overview of Temporal Databases TSQL2- Deductive Databases-Recursive

REFERENCE BOOKS:

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**Semester 2**

**20CSA511 DATA STRUCTURES AND ALGORITHMS 3 014**

**COURSE OUTCOMES**

CO1: To understand how data are stored and organised.
CO2: Ability to describe stack, queue and linked list operation. Understand basic data structures such as arrays, linked lists, stacks, and queues.
CO3: Ability to analyze algorithms and algorithm correctness. To summarize the searching and sorting techniques. Apply Algorithm for solving problems like sorting, searching, insertion, and deletion of data.
CO4: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CO5: Solve problem involving graphs, trees and heaps. To solve real world problems efficiently. Represent and manipulate data using nonlinear data structures like trees and graphs to design algorithms for various applications.

SYLLABUS

Abstract Data Types, Linear Data Structures: Arrays (single and multi-dimensional), Stack ADT, Multi Stack ADT, Queue ADT, Circular Queue, Singly Linked List, Doubly Linked List, Circular Linked List.
Graphs: Matrix and List Representation of Graphs, Breadth First Search, Depth First Search, Shortest Path Algorithms (with Analysis) – Dijkstra - Bellman Ford- Floyd Warshall’s all Pair shortest path Algorithm-Minimum spanning Tree (with Analysis) – Kruskal– Prims - Applications of BFS and DFS.

TEXT BOOKS/ REFERENCES:


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Objectives: This course helps the students to proficient in Javascript and use HTML, CSS and Javascript to handle front-end operations and back-end server scripting. MEAN is a full-stack development toolkit used to develop a fast and robust web application.

COURSE OUTCOMES

CO1: Let the students acquainted with the latest web application development trends in the IT industry.
CO2: Equip students with principles, knowledge and skills for the design and construction of web-enabled internet applications.
CO3: Design, Implement and deploy an inhouse project using MongoDB, Express.js, AngularJS and Node.js.
CO4: Evaluate different web application development alternatives and choose the appropriate one for a specific scenario.

SYLLABUS

Basics of HTML, CSS, and Javascript HTML, CSS, Bootstrap, Javascript basics – Variables, functions, and scopes, Logic flow and loops, Events and Document object model, Handling JSON data, Understanding Json callbacks.
Introduction to Node JS Installation, Callbacks, Installing dependencies with npm, Concurrency and event loop fundamentals, Node JS callbacks, Building HTTP server, Importing and exporting modules,
Building REST services using Node JS REST services, Installing Express JS, Express Node project structure, Building REST services with Express framework, Routes, filters, template engines - Jade, ejs.


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20MAT514 MATHEMATICAL FOUNDATIONS OF COMPUTER APPLICATIONS-II
Objective
This course will discuss the application of probability in the computer science field and how it is used in the design and analysis of algorithms. This helps to familiar with the graph theory basics in solving computer science problems.

**Course Outcomes**

1. Gain in depth knowledge about statistical distributions, properties and real time applications.
2. Acquires knowledge of finite automata theory and to design discrete problems to solve using computers.
3. Apply algorithms and use definitions to solve problems to prove statements in elementary number theory.
4. It enables students to model and solve real world problems using graphs and trees.

**Unit 1**

**Probability and Random Variables** - Random experiment, sample space and events. Definitions of probability, addition and multiplication rules of probability, conditional probability and some numerical examples (optional); Random variables: Definition, types of random variables, Probability Mass Function and Probability Distribution Function of random variables; Mathematical expectation: mean, variance, covariance, Moment generating function and Cumulative generating function of random variables; Probability distributions: Binomial, Poisson and Normal distributions with their important characteristics.

**Unit II**

**Finite state automata** - Deterministic finite state automata (DFA) - Non deterministic finite state automata (NFA) - Equivalence of DFA and NFA - Equivalence of NFA and Regular Languages

**Unit III**


**Unit IV**


**UNIT - V**
Euler’s Formula, Euler Circuits, chinese postman problem, applications of kuratowski's theorem, Hamiltonian Graphs, Coloring of graphs, Chromatic Numbers, chromatic polynomials, map colouring, The Four-Color Problem, Max-Flow Min-Cut theorem, maximum bipartite matching.

TEXT BOOKS/ REFERENCES:


20CSA513 DATA MINING AND APPLICATIONS

COURSE OUTCOMES

CO1 Recall important Knowledge discovery concepts, methods, and applications, in particular, the basic concepts data preprocessing to prepare the data for mining.

CO2 Recall importance of warehouse and identify efficient pattern mining association methods and rules, such as Apriori, and FP-growth.

CO3 Learn pattern-based classifications and prediction, including all classifiers.

CO4 Recall basic concepts, methods, and applications of cluster analysis, including the concept of clustering, the requirements and challenges of cluster analysis, a multi-dimensional categorization of cluster analysis, and an overview of typical clustering methodologies.

CO5 Overview about advanced data types and visualization and applications in various fields.
Introduction: Evolution and Importance of Data Mining-Types of Data and Patterns Mined-Technologies-Applications-Major Issues in Data Mining. Knowing about Data-Data Preprocessing: attribute type, Basic statistical descriptions of data, measuring data similarity and dissimilarity, Cleaning-Integration-Reduction-PCA, Data Transformation and Discretization.

Data warehousing-basic concepts: data warehouse, Difference, Comparison, architecture-data warehouse modeling: datacube, star, snowflakes and fact constellations schemas, typical OLAP operations. Mining Frequent Patterns: Basic Concept – Frequent Item Set Mining Methods – Mining Association Rules – Association to Correlation Analysis.

Classification and Prediction: Issues - Decision Tree Induction - Bayesian Classification – Rule Based Classification – k-Nearest-Neighbor Classification - Linear SVM - Regression – Linear, Logistic - Accuracy and Error measures –Introduction to Ensemble methods

Clustering: Overview of Clustering – Types of Data in Cluster Analysis – Major Clustering Methods-Partitioning Methods- k-Means, k-Medoids. Hierarchical Methods-Agglomerative and Divisive hierarchical clustering-single linkage, complete linkage, average linkage. Density-Based Methods-DBSCAN, Graph-based clustering (CHAMELEON), Grid-based Clustering: CLIQUE, probabilistic Model-Based Clustering-EM algorithm

Datamining trends and research frontiers- Mining complex Data types- Mining other kinds of data-data mining applications.

Lab :Implementation of Data mining algorithms using Latest Open Source Data mining Tools.Tensorflow, python, R

TEXT BOOKS/ REFERENCES:

1. Jiawei Han, Micheline Kamber and Jian Pei, “Data mining concepts and Techniques”, Third Edition, Elsevier Publisher, 2006.
COURSE OUTCOME

CO1: To develop understanding of the basic framework of research process
CO2: identify various sources of information for literature review and data collection.
CO3: Gain a practical understanding of the various methodological tools used for conducting research
CO4: Able to conduct a research study from its inception to its report and study on Ethical issues in research
CO5: To formulate a problem based on a case study and design a proper research design with supporting literature survey


Case study – choosing a computational problem, problem definition, scope, objective, literature survey, data collection, sampling, research design and report

TEXT BOOKS/ REFERENCES:

Semester 3

20CSA601  MACHINE LEARNING  3 0 1 4

COURSE OUTCOMES:
CO1: Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
CO2: Ability to understand and apply scaling up machine learning techniques and associated computing techniques and technologies.
CO3: Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
CO4: To develop skills of using recent machine learning software for solving practical problems.
CO5: To gain experience of doing independent study and research.

SYLLABUS:
Introduction to ML; Problems, data and tools. Learning systems, goals, challenges and applications of machine learning system. Aspects of developing system, training data, testing data, concept representation, classification errors, validation. Linear regression, SSE, gradient decent, bias and variance estimation, overfitting and underfitting, regularization.
Logistic regression, hypothesis representation, decision boundary, cost function, multi-class classification. Nearest neighbor methods. Decision Tree learning, representing concepts as decision trees, picking the best splitting attribute: entropy and information gain. Probability and
classification, Naïve Bayes classification, Non-linear predictions, EM algorithm, kernels, Kernel regression, kernels, Support vector machine (SVM) and kernels, kernel optimization.


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TEXTBOOKS / REFERENCES:

20CSA602 SOFTWARE ENGINEERING AND DESIGN PATTERNS 3 0 0 3

COURSE OUTCOMES

CO1: Deliver quality software products by possessing the leadership skills as an individual or contributing to the team development and demonstrating effective and modern working strategies by applying both communication and negotiation management skill.

CO2: Understands the concept of pattern based analysis and design and the pattern based design principle. Learn that design patterns are solutions, and they can solve many problems that can be encountered in the future.
CO3: Understands how to apply the pattern based analysis and design to the software to be developed. Understands the structure of design patterns and the logic of design patterns. Understands the importance of design patterns in software development.

CO4: Understands the details of object oriented programming by comparing the object-oriented programming model with the standard structured programming.

CO5: Uses the basic design principles in solving real life problems

SYLLABUS


Introduction: What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

A Case Study: Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface.


TEXT BOOKS/ REFERENCES:

5. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,WileyDreamTech.
6. Head First Design Patterns By Eric Freeman-Oreilly-spd
20CSA681  IOT AND CLOUD LAB  0 0 1 1

COURSE OUTCOMES
CO1: Understand different types of cloud services – Delivery models, Deployment models using prominent cloud platforms
CO2: Implement different solution approaches in Cloud – VM, containers, setting up and monitoring applications in cloud
CO3: Understand general concepts of IoT and recognize different devices – IoT Architecture, Microcontroller basics (Arduino/NodeMCU), Different Sensors, Communication Protocols, Networking
CO4: Create IoT solutions using sensors, actuators and devices and evaluate the design/security issues in it – Home automation, Industry applications, Surveillance applications and other IoT applications

SYLLABUS
Cloud Computing:- Familiarize various cloud platforms AWS, Google cloud etc, Create and configure VMs, Working with Containers and docker, Application development and deployment in cloud, Containerizing and orchestrating apps with Kubernetes Engine, Different storage options, Monitoring and load-balancing
Internet of Things:- Introduction to IoT, Reference Architecture, Microcontroller basics (Arduino/NodeMCU), Sensing, Actuation, Networking basics, Communication Protocols, Sensor Networks, IoT with Cloud Platforms, Domain specific applications of IoT (Home automation, Industry applications, Surveillance applications, Other IoT applications), Privacy and Security issues in IoT.

TEXT BOOKS/ REFERENCES:
2. https://sites.google.com/google.com/gcp-teachingresources/home?pli=1&authuser=1

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### 20CSA698  
**Dissertation – Phase I**  
**4 Credits**

The goal of Dissertation-Phase I is to help the student apply the theories and important tools they studied in this MCA program to solve real world problems and mobilize the students for the next semester course Dissertation-Phase II.

**Course Objectives:**

- **CO-01**: Provide opportunities to identify real world problems.
- **CO-02**: Conduct thorough literature review on the problem domain.
- **CO-03**: Specialize in problem specific methods, applications and tools.
- **CO-04**: Demonstrate independence and originality in thought and application.
- **CO-05**: Provide opportunity to work as a team and evaluate the developed product/algorithm both from individuals’ and teams’ perspective.

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Semester 4

20CSA699 Dissertation – Phase II
12 credits

The goal of Dissertation Phase II is to help the student experienced in industrial/research projects by applying the skills they acquired by the different courses in MCA program, to solve real world problems.

Course Objectives:

CO-01: Apply the skills a student acquired through the different courses in this program to design software solutions for real world problems.
CO-02: To expose the student to the industry-standard project practices, under time and deliverable constraints.
CO-03: Provide opportunity to work as a team and evaluate the developed product/algorithm both from individual’s and team’s perspective.
CO-04: Train the student to write and publish research papers.
CO-05: Demonstrate independence and originality in thought and application and communicate among software professionals to demonstrate the knowledge and principles.

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ELECTIVES

20CSA531 Artificial Intelligence  3 0 0 3

OBJECTIVE- The course aims to offer a view of the conventional approach to Artificial Intelligence and serves as a basis for more in depth treatment of specific theories and principles for understanding complete A.I. systems integrating different approaches and methods. The course also helps to familiarize the students with how to represent knowledge, including incomplete and uncertain knowledge of the real world; how to reason logically with that knowledge using probabilities; and so on. The course also incorporates some state-of-the-art topics, such as the logical representation of different types of knowledge and reasoning under uncertainty.

COURSE OUTCOMES

CO1 To be aware of the basics of AI and its need along with the issues in designing search problems
CO2 Understand various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms)
CO3 To get a thorough idea about the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving
CO4 Express and comprehend the working knowledge of reasoning in the presence of incomplete and/or uncertain information
CO5 To gain the aptitude to apply knowledge representation and reasoning to real-world problems, to develop expert systems.

SYLLABUS


**TEXTBOOKS:**

**REFERENCES:**
2. *Introduction to Artificial Intelligence* – Eugene Charnaik, Drew McDermott (Pearson Education Asia)

**CO – PO AFFINITY MAP**

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Course Outcome

1. This Course provides a comprehensive overview of how to integrate mobile technology. This course focuses on developing multiplatform mobile applications using the Web skills.
2. Learn to setup Android application development environment
3. Create, test and debug Android application by setting up Android development environment
4. Illustrate user interfaces for interacting with apps and triggering actions
5. Analyze performance of android applications and understand the role of permissions and security

Module: 1

Module: 2

Module: 3
User Interaction Application Development, Testing UI, Background Tasks, Triggering, scheduling and optimizing tasks.

Module: 4
Data Storage and accessing the mobile data with different databases, Preferences and Settings, Storing data using SQLite, Sharing data with content providers, Loading data using Loaders. Google APIs for Android - Maps, Cloud Messaging, Authentication, Storage, Hosting and Google Play services.

Module: 5
Different level of security in mobile application, Solution of attacks, malware, permission, Firebase and Recent Trends.
COURSE OBJECTIVES

CO1: To understand the mathematical fundamentals of Cryptography.
CO2: To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
CO3: To acquaint with Discrete logarithm and the Public Key Cryptographic methods.
CO4: To understand message authentication and hash functions.
CO5: To be familiar with the significance of digital signatures and digital signature algorithms.

TEXTBOOKS

CO – PO Affinity Map

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Course Objectives: The course provides the inner workings of cryptographic systems and how to correctly use them in real-world applications. It describes various cryptographic algorithms.

COURSE OUTCOMES

CO1: To understand the mathematical fundamentals of Cryptography.
CO2: To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
CO3: To acquaintance with Discrete logarithm and the Public Key Cryptographic methods.
CO4: To understand message authentication and hash functions.
CO5: To be familiar with the significance of digital signatures and digital signature algorithms.
SYLLABUS

Mathematical Background for Cryptography - integer arithmetic, modular arithmetic, matrices, linear congruence, algebraic structures, GF(2n) fields.
Symmetric key ciphers – Kerckhoff’s principle, substitution ciphers, transposition ciphers, stream and block ciphers, modern block ciphers, modern stream ciphers, DES structure and analysis, multiple DES, security, AES- transformations, key expansion, ciphers, analysis.
Discrete Logarithm and its Applications - Introduction, Diffie-Hellman Key Exchange, Other Applications. Asymmetric key cryptography – RSA cryptosystem, RABIN cryptosystem, ELGAMAL cryptosystem, elliptic curve cryptosystem.
Message integrity – hash functions, Random oracle model, message authentication, MAC (Message Authentication Codes) and other applications, digital signature.

TEXT BOOKS/ REFERENCES:

3. Wenbo Mao, "Modern Cryptography, Theory & Practice”, Pearson Education.

CO – PO Affinity Map

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20CSA534 COMPILER DESIGN 3 1 0 4
**Course Objectives:** The main objective of this course is to introduce the major concept areas of language translation and compiler design and to develop an awareness of the function and complexity of modern compilers. This course is a study of the theory and practice required for the design and implementation of interpreters and compilers for programming languages.

**COURSE OUTCOMES**

CO1: To understand the theory and practice of compiler implementation.
CO2: To learn finite state machines and lexical scanning.
CO3: To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, symbol tables, intermediate machine representations and actual code generation
CO4: Identify the similarities and differences among various parsing techniques and grammar transformation techniques.
CO5: To provide practical, hands on experience in compiler design

**SYLLABUS**

Automata and Language: Chomsky hierarchy of languages, Introduction to Finite Automata – Non-Deterministic Finite Automata- equivalence of NFAs and DFAs- minimization of DFA- Regular Expressions. Context-free Grammar - Parse tree derivations (Top-down, Bottom-up), Context-free languages – Chomsky normal form, GNF.


**TEXT BOOKS/ REFERENCES:**


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20CSA535BIG DATA ANALYTICS AND VISUALIZATION 3 0 0 3

COURSE OUTCOMES

CO1: Gain the ability to choose the right solution for a commercial task involving big data, including databases, architectures and cloud services.
CO2: Gain an understanding of the analysis of big data including methods to visualise and automatically learn from vast quantities of data.
CO3: Develop the programming skills to build solutions using big data technologies such as Map Reduce, scripting for No-SQL, Apache Mahout, Hive and the ability to write parallel algorithms for multi-processor execution.
CO4: Understanding of the issues of scalability of databases, data analysis, search and optimization.
CO5: Get insights into different data visualization techniques. Understanding of real life issues faced by different organizations and its effective solutions.

Introduction of big data – Big data characteristics - Volume, Veracity, Velocity, and Variety – Data Appliance Challenges and Issues, Case for Big data, Big data sources, Features of data. - Evolution of Big data – Best Practices for Big data Analytics - and Integration tools Introduction to Data Modeling, Data Models Used in Practice: Conceptual data models, Logical data models, Physical data models, Common Data Modeling Notations, How to Model Data: Identify entity types, Identify attributes, Apply naming conventions, Identify relationships,

**TEXT BOOKS/ REFERENCES:**
Objectives: Using a syntax that is deliberately from Java, C++ and C, C#.NET achieves a natural trade-off of terseness and clarity, enabling programmers to express concepts in a clear and maintainable form. The recent enhancements to the language allowing students to work with C#.NET in both an Object-Oriented and partially functional style.

Course Outcomes

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<th>CO1</th>
<th>Learn to use .NET framework and basic programming concepts in C#</th>
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<td>Students will be able to develop programs to solve real world problems using C# in .Net framework.</td>
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<td>CO3</td>
<td>Understand the Window Programming and event driven programming. Must be able to develop interactive programs for real time applications.</td>
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<td>CO4</td>
<td>Understanding the Role of Managed Provider and ADO.NET Objects.</td>
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<td>CO5</td>
<td>Must be able to understand the concepts of serialization/deserialization used with binary data.</td>
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SYLLABUS

Unit 1

Unit 2
String class: methods and properties of string class, enumerations, boxing and unboxing, OOPS concepts: Encapsulation, data hiding, inheritance, interfaces, polymorphism, operator overloading, overriding Methods, Static Class members, Delegates and events. Exception Handling, garbage collector, DLLs, Assemblies, Reflection and Class Libraries.

Unit 3
Basics of Windows Programming- Event Driven Programming, Windows Forms, Using common controls-Labels, textboxes, buttons, check boxes, radio button, progress bar, combo box, list box. Components-timer, Imagelist, Menus, Modal and Modeless Dialog Boxes, MDI, Mouse
and keyboard event handling. Components: Timer, FileSystemWatcher, Process, BackgroundWorker. Drag and Drop, Advanced Controls: TreeView and ListView

Unit 4

Unit 5:
Files: System.IO, directory and file types, Stream readers and stream writers, dealing with Binary files: Serialization / Deserialization.

Textbook/Reference:
1. C# 4.0 the Complete Reference by Herbert Schildt
2. Latest version of Andrew Trolsens C# text from Apress (Pro C# 5.0 and the .NET Framework 4.5)
3. Robert Powel, Richard Weeks, C# and the .NET Framework, Techmedia

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20CSA537 Parallel and Distributed Computing 3 0 0 3
COURSE OUTCOMES

CO1. Understand the requirements for programming parallel systems and how they can be used to facilitate the programming of concurrent systems.
CO2. To learn and apply knowledge of parallel and distributed computing techniques and methodologies.
CO3. To learn the architecture and parallel programming in graphics processing units (GPUs).
CO4. Understand the memory hierarchy and cost-performance tradeoffs.
CO5. To gain experience in the design, development, and performance analysis of parallel and distributed applications.

SYLLABUS
Introduction-Asynchronous/synchronous computation/communication, concurrency control, fault tolerance, GPU architecture and programming, heterogeneity, interconnection topologies, load balancing, memory consistency model, memory hierarchies, Message passing interface (MPI), MIMD/SIMD examples.

Multithreaded programming, parallel algorithms & architectures, parallel I/O, performance analysis and tuning, power, programming models (data parallel, task parallel, process-centric, shared/distributed memory), scalability and performance studies, scheduling, storage systems, synchronization, and tools.

TEXTBOOKS/REFERENCES

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Elective

20CSA538 Advanced Algorithms 3-0-0-3

Course objectives
This course introduces students to advanced techniques for the design and analysis of algorithms and explores a variety of applications. It gives a sound theoretical understanding of algorithms and improves the scientific problem solving skills.

Course outcomes
CO 1. Understand advanced algorithmic methods to solve problems
CO 2. Learn various graph algorithms and solve computational problems using graph models
CO 3. Learn Network flow algorithms with applications
CO 4. Understand NP completeness and methods to tackle Hard problems.

Syllabus
Unit 1. Basics of algorithms– Asymptotic analysis, amortised analysis, Recurrences, Greedy, Dynamic programming and backtracking methods
Unit 2. Graph algorithms, BFS and DFS, applications, topological sort, strongly connected component, bi-connected component, articulation points, graph colouring, bipartite graph, Network flow, residual network, applications
Unit 3. P, NP and NP complete problems, polynomial time reduction, Approximation algorithms, approximation ratio, vertex cover, tsp, Parameterized Algorithms
References

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20CSA539 DEEP LEARNING 3 0 03

COURSE OUTCOMES

CO1: To know the main techniques in deep learning and the main research in this field.

CO2: Be able to design and implement deep neural network systems.

CO3: Be able to identify new application requirements in the field of computer vision.

CO4: Applying knowledge and understanding

CO5: To learn how to develop algorithms for resolving huge data processing problems.
SYLLABUS


TEXT BOOKS/ REFERENCES:

2. Li Fei-Fei (Stanford), Rob Fergus (NYU), Antonio Torralba (MIT), “Recognizing and Learning Object Categories” (Awarded the Best Short Course Prize at ICCV 2005).

CO – PO Affinity Map

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COURSE OUTCOMES

CO1) Introduction to different software testing techniques, process and errors handled in software projects.

CO2) Distinguish black box and white box testing techniques for functional and structural testing and testcase designing.

CO3) To understand the different testing activities and levels of testing which aims to uncover the defects in all the stages of project.

CO4) Discuss about the non-functional testing and debugging methods.

CO5) Demonstrate various issues for object-oriented testing and tools for testing.

SYLLABUS

Specification-based testing techniques, code-based testing techniques, Model-based testing, Blackbox box testing - Functional Testing: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique. 
Whitebox testing- Structural Testing: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing, Mutation testing, Static Analysis, Dynamic Analysis 
Reducing the number of test cases: Prioritization guidelines, Priority category, Scheme, Risk Analysis, Regression Testing, Slice-based testing 
Program slicing and its application, Reliability analysis, Formal methods; verification methods; oracles. 

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Objectives: To explore fundamental concepts of NLP and its role in current and emerging technologies. Gain a thorough understanding of modern neural network algorithms for the processing of linguistic information.

Course Outcomes
CO1: Provides an overview of Natural Language Processing
CO2: Understand global vectors for word representations
CO3: Will be able to recognize named entity using neural networks.
CO4: Able to model languages and perform sentimental analysis.
CO5: Understand dynamic memory networks for NLP

Syllabus
Introduction to NLP, Simple Word Vector representations: word2vec-GloVe: Global Vectors for Word Representation
Advanced word vector representations: language models, softmax, single layer networks-Neural Networks and back propagation for named entity recognition
Introduction to Tensorflow- Recurrent neural networks -- for language modelling and other tasks- RUs and LSTMs -- for machine translation-
Recursive neural networks -- for parsing-Parsing with Compositional Vector Grammars- Recursive neural networks -- for different tasks (e.g. sentiment analysis)
Convolutional neural networks -- for sentence classification-The future of Deep Learning for NLP: Dynamic Memory Networks

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20CSA542 WIRELESS NETWORKS 300 3

COURSE OUTCOMES

CO1: Explain the concepts and features of wireless communication and transmission technologies.
CO2: Describe the design and working of different wireless communication methods, its signalling and channel access mechanism.
CO3: Describe the architecture and working of wireless communication networks and protocols.
CO4: To explore the characteristics of different types of Wireless LAN networks.
CO5: Explain the working of wireless routing protocols.

Syllabus

UNIT 1
UNIT 2


UNIT 3


UNIT 4


UNIT 5


TEXTBOOK / REFERENCES:


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Course Outcomes:

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<td>Perform Protein structural analysis and do protein structure prediction.</td>
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<td>CO3</td>
<td>Do computer aided drug design, docking, screening, QSAR.</td>
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Unit I
Introduction to genes and proteins, organization of DNA, RNA and protein, Motifs, Restriction maps and Restriction enzymes, DNA sequence analysis, DNA Databases, Searching scientific information using search engines, Protein structure and function, protein sequence databases, sequence alignment, PAM matrix, Global and local alignment, BLAST: features and scores, Multiple sequence alignment, Conservation score, phylogenetic trees.

Unit II
Protein sequence analysis, hydrophobicity profiles, non-redundant datasets, Protein secondary structures, Ramachandran plot, propensity, secondary structure prediction, Protein tertiary structure, Protein Data Bank, visualization tools, structural classification, contact maps, Protein structural analysis, protein structure prediction.

Unit III
Protein stability, energetic contributions, database, stabilizing residues, stability upon mutations, Protein folding rates, proteins interactions, binding site residues, Computer aided drug design, docking, screening, QSAR.

References

20CSA544       Network Management and System Administration       3 0 0 3

COURSE OUTCOMES
CO1: Acquire the knowledge about network fundamentals and network management standards (OSI and TCP/IP).
CO2: Acquire the knowledge about network infrastructure and network security.
CO3: Acquire the knowledge about windows server fundamentals and popular windows Network services and Applications.
CO4: Understanding the concepts of Linux fundamentals and Linux installation and package management.
CO5: Understanding the concepts of User management and file management in Linux.
SYLLABUS

TEXT BOOKS/ REFERENCES:

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COURSE OUTCOMES

CO1: To enable students to learn the fundamental concepts of a digital image processing and its working protocols.
CO2: To understand image enhancement techniques in spatial and frequency domain so as to devise algorithms or mathematical models for real time image enhancement problems.
CO3: To enable students implement algorithms for handling intensive image restoration problems.
CO4: Development of segmentation algorithms used to detect and extract the region of interest from images.
CO5: Interpretation and use of feature extraction and image representation techniques to carry out image labeling and automatic image understanding.

UNIT-1

UNIT-2

UNIT-3

UNIT-4

UNIT-5

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20CSA546 INFORMATION RETRIEVAL 3 0 0 3

COURSE OUTCOMES

CO1: Be familiar with the basic methods for information extraction and retrieval of textual data
CO2: Understand the concept of applying text processing techniques to prepare documents for statistical modelling.
CO3: Must be able to evaluate the performance of machine learning models for textual data.
CO4: Master the concept of machine learning models for analyzing textual data and correctly interpreting the results.

SYLLABUS

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20CSA547 SEMANTIC WEB TECHNOLOGIES 3003


Course Outcome

CO1: Understand the rationale behind Semantic Web.
CO2: Model ontologies using Resource Description Framework (RDF).
CO3: Design RDF Schemas for ontologies.
CO4: Model and design ontologies using Web Ontology Language (OWL).
CO5: Query ontologies using SPARQL.
CO6: Understand and reflect on the principles of Ontology Engineering.
CO7: Apply Semantic web technologies to real world applications.

PO1: Engineering Knowledge
PO2: Problem Analysis
PO3: Design/Development of Solutions
PO4: Conduct Investigations of complex problems
PO5: Modern tools usage
PO6: Engineer and Society
PO7: Environment and Sustainability
PO8: Ethics
PO9: Individual & Team work
PO10: Communication
PO11: Project management & Finance
PO12: Lifelong learning

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TEXT BOOKS / REFERENCES:

20CSA548 Software Defined Network

Course Outcomes:
1. Differentiate between traditional networks and software defined networks and learn the fundamentals of software defined networks.
2. Understand advanced and emerging networking technologies, separation of the data plane and control plane.
3. Improves the advanced networking research skills.
4. Study of the SDN Programming and analyse the performance of varying and complex networking tasks.
5. Expand the knowledge learned about SDN concepts and apply it to solve real time world problems.
Module: 1
Basic Packet Switching Terminology, Historical Background, The Modern Data Center, Traditional Switch Architecture, Autonomous and Dynamic Forwarding Tables, Open Source and Technological Shifts. Why SDN?, Genesis of SDN-

Module: 2

Module: 3
Introduction to Open SDN and its limitations, SDN via APIs, SDN via Hypervisor Based Overlays, SDN via Opening up the Device, Introduction of SDN Controllers and its general concepts, Layer 3 Centric, Plexxi, Cisco OnePK.
Introduction of Network Programmability, Management Interface, Application-Network Divide, Modern Programmatic Interfaces, I2RS, Modern Orchestration

Module: 4
SDN in the Data Center- Introduction of Data Center and its demands, Tunneling Technologies for the Data Center, Path Technologies in the Data Center, Ethernet Fabrics in the Data Center, SDN Use Cases in the Data Center, Comparison of Open SDN, Overlays and APIs, Real-World Data Center Implementations

Module: 5
Introduction SDN application and its usages, SDN in the Data Center - SDN in Other Environments - SDN Applications - SDN Use Cases - The Open Network Operating System.

Text Books
20CSA549      OPEN SOURCE SYSTEMS       30 0 3

COURSE OUTCOMES

CO1: Understand the difference between open source software and commercial software.
CO2: Exposed to the context and operation of Open Source Communities and associated software projects.
CO3: Get familiar with participating in an open source project using Git and GitHub.
CO4: Get insights into different development models and frameworks used in open source community.
CO5: Learn open source programming using Python.

SYLLABUS


TEXT BOOKS/ REFERENCES:
E-Book “Producing Open Source Software” which is available at: https://producingoss.com/

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20CSA550 NETWORK SECURITY 3 0 0 3

COURSE OUTCOMES
CO1: Understand network security models and analyze authentication mechanisms for challenge response scenarios.
CO2: Understand e-mail architecture and standards for securing mail communication.
CO4: Apply and analyze Web security protocols for E-Commerce applications.
SYLLABUS

TEXT BOOKS

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20CSA551 DATABASE ADMINISTRATION 3003

COURSE OUTCOME

CO1: Establish and in-depth understanding of Database Administration using the Oracle DBMS interfaces.
CO2: Analyze and model requirements and constraints for the purposes of installing, configuring, and tuning a DBMS

CO3: To develop methods for implementing security, back-up and recovery measures.
CO4: To develop methods for creating and Managing Database Storage Structures and understand network responsibilities for DBA.
CO5: Acquire and apply the knowledge and skills required to Monitoring the Performance of the Database
SYLLABUS


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OBJECTIVE
The objective of this course is to equip students with mathematical and statistical techniques used in pattern recognition and enable students to develop machine learning algorithms for real life problems.

COURSE OUTCOMES
CO1: Understand the concept of a pattern and the basic approach to the development of pattern recognition and machine intelligence algorithms and applications of PR system

CO2: Understand the basic methods of feature extraction, feature evaluation, analyse and relate research in the pattern recognition area.

CO3: Understand and apply both supervised and unsupervised classification methods to develop PR system in real-world data

CO4: Apply pattern recognition techniques to real-world problems such as object detection and recognition

CO5: Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers

CO6: Summarize, analyze, and relate research in the pattern recognition area verbally and in writing


Text Books
COURSE OBJECTIVES

By the end of the course, students will be able to understand

1. Basic Cryptographic primitives used in Blockchain – Secure, Collison-resistant hash functions, digital signature, public key cryptosystems, zero-knowledge proof systems
2. Basic Distributed System concepts – distributed consensus and atomic broadcast, Byzantine fault-tolerant consensus methods
3. Basic Blockchain (Blockchain 1.0) – concepts germane to Bitcoin and contemporary proof-of-work based consensus mechanisms, operations of Bitcoinblockchain, crypto-currency as application of blockchain technology
4. Blockchain 2.0 – Blockchains with smart contracts and Turing complete blockchain scripting – issues of correctness and verifiability, Ethereum platform and its smart contract mechanism
5. Blockchain 3.0 – Plug-and-play mechanisms for consensus and smart contract evaluation engines, Hyperledger fabric platform
6. Beyond Cryptocurrency – applications of blockchain in cyber security, integrity of information, E-Governance and other contract enforcement mechanisms
7. Limitations of blockchain as a technology, and myths vs. reality of blockchain technology
8. Research directions in Blockchain technology

**COURSE OUTCOMES**

- Explain design principles of Bitcoin and Ethereum.
- Explain Nakamoto consensus.
- Explain the Simplified Payment Verification protocol.
- List and describe differences between proof-of-work and proof-of-stake consensus.
- Interact with a blockchain system by sending and reading transactions.
- Design, build, and deploy a distributed application.
- Evaluate security, privacy, and efficiency of a given blockchain system

**SYLLABUS**

**Introduction:** Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Why Nakamoto Came up with Blockchain based crypto currency? Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash etc.

**Basic Distributed Computing:** Atomic Broadcast, Consensus, Byzantine Models of fault tolerance

**Basic Crypto primitives:** Hash functions, Puzzle friendly Hash, Collision resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems

**Blockchain 1.0:** Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use

**Blockchain 2.0:** Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts

**Blockchain 3.0:** Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain
Privacy, Security issues in Blockchain: Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - -advent of algorand, and Sharding based consensus algorithms to prevent these.

Text Books:


Reference Book:


20CSA554 OPERATIONS RESEARCH AND OPTIMIZATION TECHNIQUES 3 0 0 3

Course Objective: This Course deals with the optimization techniques and tools used for operations research. Students would be able to acquire skill and knowledge for various optimization techniques.

Course Outcome: Getting Familiarise the concept of operations research. Gives an overview of the various manual techniques used for solving the different types of problems in operations research. Formulation Of LPP-Graphical Solution Of LPP – Canonical And Standard Form Of LPP-Simplex Method-Big M Method- Two Phase Method- Principle Of duality-Dual Simplex Method. Transportation Problem-Initial Basic Feasible Solution-North West Corner Rule- Vogel’s Approximation Method –Tests For Optimality-Unbalanced Transportation Problem-Assignment Problem-Travelling Salesman Problem. Decision Theory-Decision making under risk-EMV-EOL-EVPI criteria-decision tree analysis, Game Theory, Queuing Theory.

TEXT BOOKS/ REFERENCES:
3. R Panneerselvam – Operations research, 2nd edition, PHI
Management Elective IV

PRINCIPLES OF ECONOMICS AND MANAGEMENT

CO 1: Define and explain how basic concepts of microeconomics (such as elasticity, scarcity or choice) can be used to explain the behaviour of individuals, household or firms.

CO 2: Represent supply and demand, in graphical form, including the downward/upward slope of the curves and what shifts/moves along the curves.

CO 3: To understand the importance of market structures, on the question of the stability and failure of markets.

CO 4: Describe and explain how basic macroeconomic policies (such as fiscal or monetary) can be used to analyse the economy as a whole.

CO 5: Explain basic management, business and marketing principles to be able to continue studies on a higher level.

CO 6: To understand the role of PESTLE factors on the SWOT of corporations, in the domestic and the international business environment.

SYLLABUS:


TEXT BOOKS/REFERENCES

20HU532 SOFTWARE PROJECT MANAGEMENT 3 0 0 3

COURSE OUTCOMES

CO1: To understand the basics of software project management activities for the success of project
CO2: Project Evaluation and programme management techniques
CO3: Understand the basic steps that need to be carried out by a manager in project planning and the right selection of process development models.
CO4: Focus on effort and duration estimation techniques.
CO5: Understand project activity planning based on estimations
CO6: To study various risk management approaches and its simulations
CO7: Resource allocations and issues
CO8: Project monitoring and control issues and techniques for configuration management.
CO9: To understand software quality management and team management

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20HU533 MANAGEMENT INFORMATION SYSTEMS 3 0 0 3

COURSE OUTCOMES

CO1: To educate the role, advantages and components of an Information System
CO2: Provide knowledge about new methodologies and strategies to improve efficiency and efficacy of business models.
CO3: To learn different types of systems that supports in managing different levels of organization.
CO4: Acquire knowledge in integrating methodologies with functional areas and decision-making process in an organization
CO5: To learn role of Information System techniques in achieving competitive advantage of an organization.


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20HU534 Management & Organizational Behaviour 3 0 0 3

CO1: Understand the concepts related to Business and demonstrate the roles, skills and functions of management.

CO2: Demonstrate the applicability of the concept of organizational behaviour to understand the behaviour of people in the organization.

CO3: Analyse the complexities associated with management of the group behaviour in the organization.

CO4: Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.

Unit – 1 Introduction to Management

Management: Introduction, Definition of management, Nature, Purpose and Functions, Levels and types of managers, managerial roles, skills for managers, evolution of management thought, Fayol’s fourteen principles of management, Recent trends in management.

Unit-2 Managerial Functions


Unit-3 Introduction to OB

Unit - 4 Group Behaviour
Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms - Leadership styles – Group decision making techniques – Team building - Organizational behaviour modification - Interpersonal relations – Communication – Control.

Unit - 5 Dynamics of organizational behaviour

TEXT BOOKS

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20HU535 BUSINESS INTELLIGENCE 3 0 03

CO1: Understand the Business Intelligence Framework and its applications
CO2: Learn Data Modeling, Representation and Transformation of data for BI
CO3: Understand Multidimensional Modeling, ETL and Transformations in SSIS with a knowledge of SSIS architecture and its parts
CO4: Understand the OLAP operations of a data warehouse, its schemas and implementation
CO5: Learn business metrics, frameworks, enterprise reporting and dashboards using SSAS and SSRS


3-tier data warehouse architecture, Data Marts Data integration: Basics of Data Integration (Extraction Transformation Loading)- Concepts of data integration need and advantages of using data integration. Introduction to common data integration approaches, Introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications. Introduction to Multi-Dimensional Data Modeling-Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi-dimensional modeling, OLAP operations, concepts of dimensions, facts,
cubes, attribute, hierarchies, star and snowflake schema, OLAP Servers – MOLAP, ROLAP, OLAP query model and query processing, indexing OLAP Data, Data Warehouse Implementation

Introduction to business metrics and KPIs, creating cubes using SSAS. Basics of Enterprise Reporting- Introduction to enterprise reporting, concepts of dashboards, balanced scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.

TEXT BOOKS/ REFERENCES:
2. Jiawei Han, MichelineKamber and Jian Pei, “Data mining concepts and Techniques”, Third Edition, Elsevier Publisher, 2006.

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OPEN LAB

20CSA682 R Programming Lab 0 0 11

Course Outcomes

CO1: Learn the basic syntax of R programming language in RStudio environment
CO2: Pre-process raw data in R for further analysis.
CO3: Conduct exploratory data analysis and create insightful visualizations to identify patterns.
CO4: Introduce machine learning algorithms for supervised and unsupervised learning.
CO5: Evaluate the performance of models and degree of certainty of predictions

**Syllabus**

**Unit 1**
Introduction to Data Science Process – Loading Data in R – Exploring Data – Managing Data

**Unit 2**

**Unit 3**
Delivering Results – Documentation and Deployment – Producing Effective Reports and Visualizations

**TEXTBOOKS**
1. “R for Data Science”, Hadley Wickham and Garett Grolemund, O’Reilly, 2017
3. “Practical Data Science with R”, Nina Zumel and John Mount, Dreamtech/Manning, 2014

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20CSA683  MATLAB PROGRAMMING 0 0 1 1

Introduction to MATLAB, Installation, basic features, MATLAB Desktop, command window, workspace, current directory, data types, matrices, control flow and operators, strings, graphics, basic plotting, mathematical functions, programmers toolbox, array operations and linear equations, M-file scripts, debugging, solving linear systems, polynomials, Eigen values, Eigen vector, interpolation, least square regression, root finding methods.

20CSA684  HIGH PERFORMANCE COMPUTING LAB 0 0 1 1

Introduction to parallel computing, introduction to OPENMP, OPENMP paradigms, parallel regions, multi-threading, data sharing attribute clauses, worksharing, OPENMP reduction, runtime functions, OPENMP exercises to illustrate for loop, sections, critical section, synchronization. Divide and conquer strategies using OPENMP. Introduction to MPI, basics of MPI, MPI function call, example programs on MPI and OPENMP+MPI.

20CSA685  Natural Language Processing Lab 0 0 1 1

Objectives: To acquire practical knowledge about the fundamental concepts of NLP and its role in current and emerging technologies. Gain practical understanding of modern neural network algorithms for the processing of linguistic information.

Course Outcomes

CO1: Basic practical understanding of Natural Language Processing
CO2: Understand global vectors for word representations
CO3: Will be able to recognize named entity using neural networks.
CO4: Able to model languages and perform sentimental analysis.
CO5: Able to use CNN for sentence classification
Syllabus

1. Understand and implement word2vec
2. Understand the skip-gram method in word2vec
3. Understand and implement GloVe using gradient descent and alternating least squares
4. Use recurrent neural networks for named entity recognition
5. Understand and implement recursive neural tensor networks for sentiment analysis
6. CNN for sentence classification

CO – PO Affinity Map

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20CSA686  CYBER SECURITY LAB 0 0 1 1

COURSE OUTCOMES
CO1: Understand the causes of basic security vulnerabilities and how they are exploited
CO2: Understand the basic security issues in web and its countermeasures
CO3: Develop skills in using security-oriented development
CO4: Develop the skill to test the security vulnerabilities in a system

SYLLABUS

**TEXT BOOKS**
5. Threat Modeling, Frank Swiderski and Window Snyder, Microsoft Professional, 1st Edition, 2004

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**20CSA687 DEEP LEARNING LAB 0011**

**COURSE OUTCOMES**

CO1: To know the main techniques in deep learning and the main research in this field.

CO2: Be able to design and implement deep neural network systems.
CO3: Engineering and training neural networks for various application domains.

CO4: Use deep Learning technologies throughout most of machine learning pipeline.

CO5: To learn how to develop algorithms for resolving huge data processing problems.

**SYLLABUS**

1. CNNs for Hand-written digit recognition using Tensor flow.
2. CNNs for Hand-written digit recognition using Keras.
3. Simple image classification with Inception Model.
4. Demonstrate use of GoogleNet and Hyper-parameter Optimization.
5. Demonstrate use of AlexNet and Hyper-parameter Optimization.
6. Create CONV layer of a CNN.
7. Display details of CONV layer of a CNN.
8. Demonstrate use of Stride and Pad for CONV layers of a CNN.
10. RELU in CNNs.
11. Pooling and fully connected layers in CNNs
12. Classify movie reviews — binary classification using Keras.
13. Python Code: RNNs for Hand-written digit recognition using Tensorflow
14. Python Code: Bi-directional RNNs for Hand-written digit recognition using Tensorflow
15. Python Code: Next word prediction using RNNs

**TEXT BOOKS/ REFERENCES:**

2. Li Fei-Fei (Stanford), Rob Fergus (NYU), Antonio Torralba (MIT), “Recognizing and Learning Object Categories” (Awarded the Best Short Course Prize at ICCV 2005).

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