

STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering with
specialization in Artificial Intelligence
YEAR II, SEMESTER III

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Engineering Science Course	BCSAI 301	Computer Networks	3	0	0	25	50	75	3
2	Science	BCSAI 302	Probability and Random Variables	3	0	0	25	50	75	3
3	Engineering Science Course	BCSAI 303	Data Structures & Algorithms	3	0	0	25	50	75	3
4	Engineering Science Course	BCSAI 304	Object Oriented Programming with Java	3	0	0	25	50	75	3
5	Engineering Science Course	BCSAI 305	Cloud Computing	3	0	0	25	50	75	3
6	Engineering Science Course	BCSAI 306	Computational Systems Biology	2	0	0	15	35	50	2
7	Engineering Science Course	IIOT3	Smart Industry Connectivity	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
7	Engineering Science Course	BCSAI 307	Computer Networks Lab	0	0	4	15	35	50	2
8	Engineering Science Course	BCSAI 308	Data Structures & Algorithms Lab	0	0	4	15	35	50	2
9	Engineering Science Course	BCSAI 309	Object Oriented Programming with Java Lab	0	0	4	15	35	50	2
			TOTAL	21	0	12	215	460	675	27
L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination										

STUDY AND EVALUATION SCHEME
(With effective from academic session 2023-2024)
B. Tech. in Computer Science & Engineering
specialization in Artificial Intelligence
YEAR II, SEMESTER IV

Sl. No.	Category	Course Code	Course Title/ Subjects	Hours per week			Evaluation Scheme		Total	Credits
				L	T	P	CA	EE		
THEORY										
1	Engineering Science Course	BCSAI 401	Design and Analysis of Algorithms	3	0	0	25	50	75	3
2	Engineering Science Course	BCSAI 402	Robotic Operating Systems & Robot Simulation	3	0	0	25	50	75	3
3	Engineering Science Course	BCSAI 403	Database Management System	3	0	0	25	50	75	3
4	Engineering Science Course	BCSAI 404	Software Engineering	3	0	0	25	50	75	3
5	Engineering Science Course	BCSAI 405	AI and Intelligent Agents	3	0	0	25	50	75	3
6	Engineering Science Course	IIOT4	Data Analytics for IIOT	4	0	0	30	70	100	4
PRACTICALS AND PROJECTS										
6	Engineering Science Course	BCSAI 406	Database Management System with SQL Lab	0	0	4	15	35	50	2
7	Engineering Science Course	BCSAI 407	Robotic Operating Systems & Robot Simulation (Lab)	0	0	4	15	35	50	2
8	Engineering Science Course	BCSAI 408	Online Social Network Analysis Lab	0	0	4	15	35	50	2
9	Engineering Science Course	BCSAI 409	Shell Scripting Lab			4	15	35	50	2
			TOTAL	19	0	16	215	460	675	27

L-Lecture, T- Tutorial , P- Practical ,CA- Continuous Assessment, EE- End Semester Examination

BCS AI 301: COMPUTER NETWORKS**3L + 0T + 0P + 3C****MM 100****Unit 1: Networking Fundamentals**

Basics of Network & Networking, Advantages of Networking, Types of Networks, Types of Network Architecture, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling, media connectors, Introduction of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, Comparison between OSI model & TCP/IP model.

Unit 2: Basics of Network Devices

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, Modem, Ethernet standards, Ethernet Components, Point-to-Point Protocol, Address Resolution Protocol, Message format, transactions, Benefits of Wireless Technology, Types of Wireless Networks, Wireless network Components, wireless LAN standards, wireless security Protocols.

Unit 3: Basics of Network, Transport and Application Layers

Network Layer: Internet Protocol (IP), IP standards, versions, functions, The IPv4 and IPv6 Datagram Format, IPv4 addressing, IPv4 Subnetting, CIDR and VLSM, IPv6 Addressing, , Internet Control Message Protocol , Internet Group Management Protocol ,Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer Protocols

Unit 4: WAN Technology

Introduction to WAN, WAN Switching techniques, connecting to the Internet, Satellite-Based Services, Cellular Technologies, Technologies used for Connecting LANs, Remote Access Connections and technologies, Authentication and Authorization, Tunnelling and Encryption Protocols, Security Appliances and Security Threats.

Unit 5: Troubleshooting Network

Trouble Shooting Networks: Command-Line Interface Tools, Network and Internet Troubleshooting, Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools.

Text/ Reference Books:

1. Data Communication And Networking (Sie), Forouzan, TMH
2. Computer Network, Tanenbaum, Pearson
3. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011
4. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013
5. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008
6. CCNA Exploration Course Booklet: Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010.

BCSAI 302: PROBABILITY AND RANDOM VARIABLES

3L + 0T + 0P + 3C

MM 100

Unit 1: Probability And Random Variables

Probability – Axioms of probability – Conditional probability – Baye’s theorem – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

Unit 2: Two – Dimensional Random Variables

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

Unit 3: Random Processes

Classification – Stationary process – Markov process – Markov chain – Poisson process – Random telegraph process.

Unit 4: Correlation And Spectral Densities

Auto correlation functions – Cross correlation functions – Properties – Power spectral density – Cross spectral density – Properties.

Unit 5: Linear Systems With Random Inputs

Linear time invariant system – System transfer function – Linear systems with random inputs – Auto correlation and cross correlation functions of input and output

Text /Reference Books:

1. Ibe, O.C.,” Fundamentals of Applied Probability and Random Processes “, 1st Indian Reprint, Elsevier, 2007.
2. Peebles, P.Z., “Probability, Random Variables and Random Signal Principles “, Tata McGraw Hill, 4th Edition, New Delhi, 2002.
3. Cooper. G.R., McGillem. C.D., “Probabilistic Methods of Signal and System Analysis”, Oxford University Press, New Delhi, 3rd Indian Edition, 2012.
4. Hwei Hsu, “Schaums Outline of Theory and Problems of Probability, Random Variables and Random Processes “, Tata McGraw Hill Edition, New Delhi, 2004.

BCSAI 303: DATA STRUCTURES & ALGORITHMS**3L + 0T + 0P + 3C****MM 100****Unit 1: Introduction to Data structures**

Definition, Classification of data structures: primitive and non-primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: Malloc(), Calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

Unit 2: Searching and Sorting

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort.

Unit 3: Stack and Queue

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque), Priority queue, Operations on all types of Queues.

Unit 4: Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

Unit 5: Tree Graphs and their Applications:

Definition: Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

Text /Reference Books:

1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. E. Balaguruswamy Programming in ANSI C.
5. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
6. Tenenbaum, Data Structures Using C. Pearson Education, 200
7. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
8. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006

BCSAI 304: OBJECT ORIENTED PROGRAMMING USING JAVA

3L + 0T + 0P + 3C

MM 100

Unit: 1

Introduction to Java

Introduction, installing java, JRE and JDK, Byte Code, JVM; Simple Java program. Creating Objects, Data types, Operators: Arithmetic Operators, Bitwise operators, Relational operators, Logical Operators, The Assignment Operator, ternary operator; Operator Precedence, Access specifiers. Type casting; Strings. Control Statements: conditional statements, looping statements, jumping statements, methods, static methods, and static block, Arrays

Unit: 2

Classes, Inheritance, package and Interface

Classes: Classes in Java; declaring a class; constructors, method overloading, Object Class.

Inheritance: Simple Inheritance, Super class and sub class, super keyword multiple, and multilevel inheritance; Overriding.

Packages and Interfaces: Packages, Defining Packages, access protection, Importing Packages. Abstract Methods, Abstract Classes, Defining Abstract Classes, Extending Abstract Classes, Defining Interfaces, Implementing Interfaces

Lambda Expressions

Introducing Lambda Expressions, Lambda Expression Fundamentals, Functional Interfaces, Some Lambda Expression Examples, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments

Unit: 3

Thread Programming, Exceptions and I/O

Thread Programming: What are threads? Thread life cycle, Extending Thread class, implementing runnable interface, Synchronization, Deadlock, Manipulation Thread states.

Exception Handling: Fundamentals, Exception Types, try and catch, multiple catch clauses, nested try statements, throw, and throws, finally, built in exceptions, user defined exceptions and chained exceptions. I/O: Introduction, stream classes, Byte Streams, Character Streams, Reading Data from

Keyboard, Folders and Folder Operations, Files and File Operations, Serialization and Deserialization

Unit: 4

Networking and JDBC

Networking: Introduction, Socket, Client/Server architecture, Reserved Sockets, Proxy Servers, Internet Addressing, Factory Methods, Instance Methods, TCP/IP Client Sockets : URL,URL Connection, TCP/IP Server Sockets, Datagrams, Datagram Sockets, Inet4Address and Inet6Address, RMI: Stub, Skelton

Database connectivity – JDBC architecture and Drivers. JDBC API - loading a driver, connecting to a database, creating and executing JDBC statements, handling SQL exceptions. Accessing result sets: types and methods. An example - JDBC application to query a database

Unit: 5

GUI Programming with AWT and JavaFX

AWT: GUI Programming, AWT Basics, AWT package: Layouts, Label, Text Field, Button, Events, Text Area, Checkbox, Checkbox Group, List, Canvas, Menus, Pop Menus, Panel, And Dialog. Listeners: Action Listener, Mouse Listener, Item Listener, Key Listener, Window Listener

JavaFX: Basic Concepts, JavaFX Packages, Stage and Scene Classes ,Nodes and Scene Graphs, Layouts, Application Class and the Lifecycle Methods, Compiling and Running a JavaFX Program, JavaFX Control: Label, Buttons and Events, Event Handling, Button, ToggleButton, RadioButton, Image, ImageView, ListView, ComboBox, Menus, Toolbar, Case Study .

Text/Reference Books:

1. Herbert Schildt: Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007
2. Jim Keogh: J2EE The Complete Reference, Tata McGraw Hill, 2007
3. Y. Daniel Liang: Introduction to JAVA Programming, 6th Edition, Pearson Education, 2007
4. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education, 2006

BCSAI 305: CLOUD COMPUTING

3L + 0T + 0P + 3C

MM 100

Unit 1: Understanding cloud computing

Introduction to Cloud Computing -Benefits and Drawbacks - Types of Cloud Service Development - Deployment models

Unit 2: Cloud Architecture Technology and Architectural Requirements

The Business Case for Clouds -Hardware and Infrastructure – Accessing the cloud – Cloud Storage – Standards- Software as a Service – Discovering Cloud Services Development tools. Three Layered Architectural Requirement - Provider Requirements - Service Centric Issues - Interoperability – QoS.

Unit 3: Fault Tolerance

Fault Tolerance - Data Management Storage and Processing – Virtualization Management - Scalability - Load Balancing - Cloud Deployment for Enterprises - User Requirement - Comparative Analysis of Requirement.

Unit 4: Security Management in Cloud

Security Management Standards - Security Management in the Cloud Availability Management – SaaS Availability Management - PaaS Availability Management – IaaS Availability Management - Access Control - Security Vulnerability, Patch, and Configuration Management – Privacy in Cloud- The Key Privacy Concerns in the Cloud - Security in Cloud Computing

Unit 5: Virtualization

Objectives - Benefits - Virtualization Technologies – Data Storage Virtualization – Storage Virtualization – Improving Availability using Virtualization - Improving Performance using Virtualization Improving Capacity using Virtualization.

Text /Reference Books:

1. David S Linthicum, “Cloud Computing and SOA Convergence in your Enterprise A Step by Step Guide”, Addison Wesley Information Technology Series.
2. Anthony T Velte, Toby J.Velte, Robert Elsenpeter, “Cloud computing A Practical Approach “, Tata McGraw Hill Publication
3. Tim Mather, Subra Kumaraswamy, Shahed Latif, “Cloud Security and Privacy
4. An Enterprise Perspective on Risks and Compliance” , O’Reilly Publications, First Edition
5. Michael Miller, “Cloud Computing – Web-Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education, New Delhi, 2009.
6. Cloud Computing Specialist Certification Kit – Virtualization Study Guide

BCSAI 306: COMPUTATIONAL SYSTEMS BIOLOGY

2L + 0T + 0P + 2C

MM 100

Unit 1: Introduction to Mathematical Modelling

Collection, Classification and Tabulation of data, Bar diagrams and Pie diagrams, Histogram, Frequency curve and frequency polygon, Ogives. Mean, median, mode, Standard deviation.

Unit 2: Introduction to Static Networks

Graph Theory, Overview of types of Graphs-cyclic/acyclic, complete bipartite, Graph Terminology, Representation of Networks, Sparse Matrices, Basic Network parameters

Unit 3: Network Biology and Applications

Biological Problems map to graph problems, Networks Jargons-Node, Density, Degree, Clustering Co-efficient, Closeness, Connected Component, Motifs

Unit 4: Reconstruction of Biological Networks

Random Networks, Small-world networks, power law networks, Centrality-lethality Analysis, Assortativity, Community Detection, Protein Network, Gene Regulatory networks

Unit 5: Dynamic Modelling of Biological systems

Introduction, Biochemical Network Model-Michaelis-Menten Kinetics, Non-biological network model-planetary motion, stock-market behavior

Text/Reference Books

1. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley and Sons, 2001.
2. Computational Cell Biology, Christopher Fall, Springer, 2000.
3. Mathematical models in biophysics, Riznichenko Galina Yur'evna, Book Online, Biophysical society.
4. Voit E (2012) A First Course in Systems Biology. Garland Science, 1/e. ISBN 0815344678
5. Klipp E (2009) Systems biology: a textbook. Wiley-VCH, 1/e. ISBN 9783527318742
6. Newman MEJ (2011) Networks: an introduction. Oxford Univ. Press. ISBN 9780199206650

BCSAI 307: COMPUTER NETWORKS LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

1. Switch Configuration - Basic Commands and Switch Port Security.
2. Router – Configuration and Setting up of Passwords.
3. PPP Encapsulation, PPP PAP Authentication, PPP CHAP Authentication.
4. A configuration of default, Static and Dynamic Routing.
5. VLAN Configuration.
6. Configuration of Access-lists - Standard and Extended ACLs.
7. DHCP, DHCP Relay and DHCP Exclusions.
8. Configuring Logging to a Remote Syslog Server.
9. Design and analyse network with a router, Switch and Hub to find the number of broadcast domains and collision domain using packet tracer.
10. Configure a wireless network for ad-hoc and infrastructure mode.
11. Configure point to site and site to site VPN.
12. Perform network troubleshooting using ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat.

BCSAI 308: DATA STRUCTURES AND ALGORITHMS LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

Part A

1. Use a recursive function to find GCD of two numbers.
2. Use a recursive function to find the Fibonacci series.
3. Use pointers to find the length of a string and to concatenate two strings.
4. Use pointers to copy a string and to extract a substring from a given a string.
5. Use a recursive function for the towers of Hanoi with three discs.
6. Insert an integer into a given position in an array.
7. Deleting an integer from an array.
8. Write a program to create a linked list and to display it.
9. Write a program to sort N numbers using insertion sort.
10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.
2. Deleting a node from a singly linked list.
3. Pointer implementation of stacks.
4. Pointer implementation of queues.
5. Creating a binary search tree and traversing it using in order, preorder and post order.
6. Sort N numbers using merge sort.

List of Experiments:

Part A

1. Write a program to check whether two strings are equal or not.
2. Write a program to display reverse string.
3. Write a program to find the sum of digits of a given number.
4. Write a program to display a multiplication table.
5. Write a program to display all prime numbers between 1 to 1000.
6. Write a program to insert element in existing array.
7. Write a program to sort existing array.
8. Write a program to create object for Tree Set and Stack and use all methods.
9. Write a program to check all math class functions.
10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)
11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

1. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.
2. Write a program to get file name at runtime and display number of lines and words in that file.
3. Write a program to list files in the current working directory depending upon a given pattern.
4. Create a text field that allows only numeric value and in specified length.

BCSI 401: DESIGN AND ANALYSIS OF ALGORITHMS

3L + 0T + 0P + 3C

MM 100

Unit 1:

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit 2:

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch- and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving, Bin Packing, Knapsack TSP. Heuristics – characteristics and their application domains.

Unit 3:

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.

Unit 4:

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit 5:

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE

Text/Reference books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz et al.
Algorithm Design, 1ST Edition, Jon Kleinberg and Éva Tardos, Pearson.
1. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
2. Algorithms—A Creative Approach, 3RD Edition, Udi Manber, Addison-Wesley, Reading, MA.

Semester IV

B. Tech CSE (AI)

BCSAI 402: ROBOTIC OPERATING SYSTEMS & ROBOT SIMULATION

3L + 0T + 0P + 3C

MM 100

Unit-1: Introduction

Understanding ROS, ROS Environment, Installation and Configuration of ROS Environment, ROS Filesystem, ROS package:create and build.

Unit-2: ROS Design: Graph concepts, Nodes, topic, messages, command line tools: roscore, rosnodetool, roslaunch, rostopic, rqt_plot

Unit-3: ROS services: connections and parameters; system dependencies and roslaunch, debugging, visualizing

Unit-4: ROS Standards: coding style, package layout, naming conventions, common procedures

Unit-5: Coordinate frames and transforms: actions/tasks, message ontology, client libraries: main and experimental

Text/Reference Books:

1. Morgan Quigley, Brian Gerkey, William D. Smart, "Programming Robots with ROS", O'Reilly Media,2015
2. Low K. H., "Industrial Robotics: Programming, Simulation and Applications", I-Tech,2007.
3. John J. Craig, "Introduction to Robotics Mechanics and Control", 3rd edition, Pearson,2008.
4. B. Siciliano and K.P. Valavanis, "Control problems in Robotics and Automation", Springer, 1998.

Semester IV

B. Tech (AI)

BCSAI 403: DATABASE MANAGEMENT SYSTEM

3L + 0T + 0P + 3C

MM 100

Unit 1: Introduction

Purpose of Database System — Views of data – Data Models – Database Languages — Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases.

Unit 2: Relational Model-I

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals. Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables. Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator, Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL

Unit 3: Relational Model-II

Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases.

Unit 4: Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

Unit 5: Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

Text/Reference Books:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Fourth Edition, Pearson/Addision Wesley, 2007.
3. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.

BCSAI 404: SOFTWARE ENGINEERING**3L + 0T + 0P + 3C****MM 100**

Unit 1: Introduction: Introduction to software Engineering, Software characteristics, Software components, Software applications, Software Engineering Principles, Software metrics and measurement, monitoring and control. Software development life-cycle, Water fall model, prototyping model, Incremental model, Iterative enhancement Model, Spiral model.

Unit 2: Software Requirement Specification: Requirements Elicitation Techniques, Requirements analysis, Models for Requirements analysis, requirements specification, requirements validation.

Unit 3: System Design: Design Principles: Problem partitioning, abstraction. Top down and bottom up – design, structured approach. Functional versus object oriented approach of design, design specification, Cohesiveness and Coupling. Overview of SA/SD Methodology, structured analysis, data flow diagrams, extending DFD to structure chart.

Unit 4: Testing: Verification and validation, code inspection, test plan, test case specification. Level of testing: Unit, Integration Testing, Top down and bottom up integration testing, Alpha and Beta testing, System testing and debugging. functional testing, structural testing, Software testing strategies. Software Maintenance: Structured Vs unstructured maintenance, Maintenance Models, Configuration Management, Reverse Engineering, Software Re-engineering

Unit 5: Software Project Management: Project planning and Project scheduling. Software Metrics: Size Metrics like LOC, Token Count, Function Count. Cost estimation using models like COCOMO. Risk management activities. Software Reliability and Quality Assurance: Reliability issues, Reliability metrics, reliability models, Software quality, ISO 9000 certification for software industry, SEI capability maturity model.

Text / Reference Books:

1. R.S. Pressman, Software Engineering: A Practitioner's Approach, McGraw-Hill, Ed 7, 2010.
2. P. Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, Edition 3, 2011.
3. R. Mall, Fundamentals of Software Engineering, Prentice-Hall of India, 3rd Edition, 2009.
4. I. Sommerville, Software engineering (9th edition), Addison Wesley, 2010

BCSAI 405: AI AND INTELLIGENT AGENTS

3L + 0T + 0P + 3C

MM 100

Unit 1: Introduction - What is intelligence? Foundations of artificial intelligence (AI). History of AI; Problem Solving- Formulating problems, problem types, states and operators, state space, search strategies.

Unit 2: Informed Search Strategies - Best first search, A* algorithm, heuristic functions, Iterative deepening A*(IDA), small memory A*(SMA); Game playing - Perfect decision game, imperfect decision game, evaluation function, alpha-beta pruning

Unit 3: Uncertainty - Basic probability, Bayes rule, Belief networks, Default reasoning, Fuzzy sets and fuzzy logic; Decision making- Utility theory, utility functions, Decision- theoretic expert systems.

Unit 4 : Learning Forms of Learning, Inductive Learning: - Learning Decision Trees, Statistical learning methods: - Naïve Bayes models, Bayesian network, EM algorithm, HMM, Instance based learning:-nearest neighbour models.

Unit 5 : Intelligent Systems

Expert System- Stages in the Development of an Expert System, Difficulties in Developing Expert System, Application of Expert System, Introduction to Evolutionary Programming, Swarm Intelligent Systems.

Text / Reference Books:

1. Stuart Russell and Peter Norvig. Artificial Intelligence – A Modern Approach, Pearson Education Press, 2001.
2. Kevin Knight, Elaine Rich, B. Nair, Artificial Intelligence, McGraw Hill, 2008.
3. George F. Luger, Artificial Intelligence, Pearson Education, 2001.
4. Mils J. Nilsson, Artificial Intelligence: A New Synthesis, Morgan Kauffman, 2002.

BCSAI 406: DATABASE MANAGEMENT SYSTEMS WITH SQL LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

1. Perform following actions using SQL statements
 - a. Create a new user with name “shiva” and password “kumar@1”
 - b. Assign the following privileges
 - i. Create and drop tables
 - ii. Create and drop users
 - iii. Allow to assign above privileges to new users
 - iv. List all tables in the database
 - v. List all users in the database
 - vi. Logout from current user and log in as “shiva”
2. Create following tables and insert minimum 10 rows in to each table
 - a. Department table with following columns with appropriate data types
 - i. DeptId
 - ii. DeptName
 - iii. DeptLoc
 - b. Employee table with following columns with appropriate data types
 - i. EmpId
 - ii. EmpName
 - iii. DOB
 - iv. DOJ
 - v. Job
 - vi. Salary
 - c. Product table with following columns with appropriate data types
 - i. ProdId
 - ii. ProdName
 - iii. Price
 - d. Sales table with following columns with appropriate data types
 - i. SalesId
 - ii. Date
 - iii. Quantity
3. Update above tables with following features using SQL statements
 - a. Make DeptId in Department table as Primary Key
 - b. Make EmpId in Employee table as Primary Key
 - c. Add DeptId column to the Employee table and make it foreign key from Department table and update the values
 - d. Add EmpId and ProdId to the Sales table and make them foreign key from Employee and Product table and update the values
 - e. Update all columns in all tables with appropriate constraint such as not null, check and so on

4. Perform the following SQL statements
 - a. Create a view “EmpDeptView” from Employee and Department table which contains following columns
 - i. EmpName
 - ii. DOB
 - iii. Salary
 - iv. DeptId
 - v. DeptName
 - vi. Loc
 - b. Retrieve all employees whose salary between 25,000 to 30,000
 - c. Retrieve all employees who is working in Accounts department (If it is not there add this row to Department table)
 - d. Retrieve all employees who is working other than Accounts department
 - e. Retrieve all employee who is working in Sales department and Bangalore location
 - f. Retrieve all employees who completed minimum 5 years
 - g. Retrieve all employees who completed minimum 5 years and salary less than 30,000
5. Perform the following SQL statements
 - a. Retrieve all employees whose salary more than 30,000
 - b. Retrieve employee details who is getting maximum salary
 - c. Retrieve employee details who is getting minimum salary
 - d. Retrieve employee details who is getting 3rd maximum salary
 - e. Retrieve employee details who is getting 5th minimum salary
 - f. Retrieve total number of employees in each department in Bangalore location
 - g. Retrieve total number of employees in each location
 - h. Retrieve total number of employees in each location in Accounts department
 - i. Retrieve total number of employees who complete more than 10 years in each department
6. Write a PL/SQL Procedure to find prime number from 1 to n, n is a user input or parameter
7. Write a PL/SQL Functions to return number of days an employee working using EmpId
8. Write a PL/SQL Procedure to find sum of salaries of all employee working in a particular location
9. Write a PL/SQL Function to return sum of sales byProdId
10. Write a PL/SQL Function to return sum of sales byEmpId
11. Write a PL/SQL Procedure to generate Employee Report department wise as follows

DeptName

EmpName Job Location Salary Cumulative_Salary

12. Write a PL/SQL Trigger to insert row into OldEmployee table when a employee deleted from Employee table (Create OldEmployee table)
13. Write a PL/SQL Trigger not to delete more than 2 employees at a time
14. Write a PL/SQL Trigger not to update employee salary if it cross 67000
15. Write a PL/SQL Package with following procedures and functions
 - a. Procedures
 - i. Print Total Quantity Sales Summary Report(SalesId, Date, Quantity and Total Quantity)
 - ii. Print Total Quantity Sales Summary Report by Date wise
 - b. Functions
 - i. Return employee name who made maximum sales till date
 - ii. Return product name soled maximum quantity till date

Semester IV

B. Tech (AI)

BCSAI 407: ROBOTIC OPERATING SYSTEMS & ROBOT SIMULATION (LAB)

0L + 0T + 4P + 2C

MM 100

List of Experiments:

1. Understand Basic System Requirements
2. Installation of ROS
3. System and Utility files configuration
4. Tools commands roscore, rosnod, rosrn, rostopic, rqt_plot
5. Commandline tools interfaces packages

Semester IV

B. Tech (AI)

BCSAI 408: ONLINE SOCIAL NETWORK ANALYSIS LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

1. Social Media need and applications
2. Understanding various social media platforms
3. Distinction and varied uses.
4. Network Graphs.
5. Implementation with tree structures.

Semester IV

B. Tech (AI)

BCSAI 409: SHELL SCRIPTING LAB

0L + 0T + 4P + 2C

MM 100

List of Experiments:

To gain the knowledge of Linux for penetration testing and vulnerability assessment in database, network, operating systems.

1. Introduction to backtrack and kali Linux operating system.
2. Introduction to virtualization, Installation of Backtrack and Kali operating system through VMware and Virtual box tools.
3. Basic commands of Linux to familiar with Backtrack for eg.
4. Information gathering through Kali Linux or Backtrack.
5. Vulnerability analysis through kali Linux or Backtrack.
6. Exploitation tools of Kali Linux and Backtrack.
7. Forensic tools of Kali Linux and Backtrack.
8. Sniffing & Spoofing tools of Kali Linux and Backtrack.
9. Reverse Engineering tools of Kali Linux and Backtrack.
10. Reporting tools of Kali Linux and Backtrack.